

FIRST EDITION

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# Critical View

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GENERAL SURGERY BOARD REVIEW

*Syllabus · Rules · Trials · A Hundred Questions Answered*

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# CRITICAL VIEW



*General Surgery Board Review*

### **Critical View: General Surgery Board Review**

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### **This book is educational material and nothing else.**

It exists to help a surgeon pass a general surgery board or licensing examination. That is a narrower purpose than it may look, and the difference matters. Examination questions compress a decision into a single best answer; a patient in front of you does not. **Nothing here is clinical guidance, and nothing here may be used to decide the care of a real person.** Those decisions belong to the treating clinician, with the local protocol, the guideline in full, and the multidisciplinary team.

**Reviewed by the author.** Every chapter, every rule and every answer in this book was written and reviewed by the author, a practising consultant in General and Digestive Surgery. Single authorship is the point and also the limitation: it gives the material one consistent clinical voice, and it means it has not been through independent peer review. Where a question turns on a live controversy, the answer says so rather than pretending the field has settled.

**Guidelines move; this book is a snapshot.** Every guideline version and every named trial cited here was resolved against PubMed and ClinicalTrials.gov before publication, and anything that could not be resolved is not cited. But guidance is revised and trials report. Check the date on the cover against the date you are reading it.

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## How to use this book

This book is arranged around how memory actually works under examination conditions, not around how a textbook is usually laid out. Four things drive the structure, and all four are worth knowing because they change what you should **do** with the pages.

**Answer before you read.** Every chapter opens with three questions and no answers. Attempt them cold. Getting them wrong is not wasted effort — trying to retrieve something you do not yet know primes you to absorb it when you meet it minutes later. The answers sit at the end of the chapter, deliberately out of eyeshot.

**Retrieve, do not reread.** The single most reliable finding in the study of learning is that testing yourself beats reviewing. Cover the tables and say the rule out loud before you look. Rereading and highlighting feel productive and are among the weakest techniques measured; they produce fluency with the page rather than command of the content.

**Space it out.** Each chapter closes with the same instruction: come back in two days, then a week, then three weeks. Three short spaced passes beat one long session of the same total length, by a wide margin, and the advantage grows the longer the gap to the examination.

**Mix the topics.** The hundred-question paper is deliberately not grouped by chapter. Interleaving feels harder than working through one subject at a time and produces better retention and better transfer. It is also what the examination does to you, and revising chapter by chapter flatters you into thinking you are readier than you are.

**The shape of a chapter.** Objectives, so you know what you are looking for. Three questions, unanswered. A figure placing the chapter inside the paper. A table of what the syllabus covers. A table of the rules that carry marks, as **when you see this / what it means**. The trials you should be able to name and the guidance the chapter rests on. Then the answers to your three questions, with the reasoning.

**The hundred-question paper.** Sit it in one go, timed, two hours, before you look at a single answer. Then read the reasoning for the options you did not choose as well as the one you did. Knowing why the other four are wrong is what separates a candidate who passes from one who only recognises the right answer when it is in front of them.

## Contents

|                                                                |     |
|----------------------------------------------------------------|-----|
| SECTION I — The syllabus, chapter by chapter .....             | 7   |
| Section 1 · Applied Surgical Basic Science .....               | 9   |
| Section 2 · Surgical Critical Care .....                       | 17  |
| Section 3 · Trauma and Damage Control .....                    | 25  |
| Section 4 · Emergency General Surgery .....                    | 33  |
| Section 5 · Abdominal Wall and Hernia .....                    | 41  |
| Section 6 · Benign Hepatopancreatobiliary Disease .....        | 49  |
| Section 7 · Benign Colorectal Disease .....                    | 57  |
| Section 8 · Perioperative Care, ERAS and Patient Safety .....  | 65  |
| Section 9 · Benign Oesophagogastric Disease .....              | 71  |
| Section 10 · Proctology and Pelvic Floor .....                 | 79  |
| Section 11 · Endocrine Surgery .....                           | 87  |
| Section 12 · Breast Disease .....                              | 93  |
| Section 13 · Vascular Surgery for the General Surgeon .....    | 101 |
| Section 14 · Paediatric Surgery for the General Surgeon .....  | 109 |
| Section 15 · Bariatric and Metabolic Surgery .....             | 115 |
| Section 16 · Skin, Soft Tissue and Necrotising Infection ..... | 123 |
| Section 17 · Thoracic Surgery for the General Surgeon .....    | 129 |
| Section 18 · Evidence, Statistics and Critical Appraisal ..... | 135 |
| Section 19 · Transplantation and Organ Donation .....          | 141 |
| Section 20 · Surgical Oncology .....                           | 149 |
| SECTION II — The hundred-question paper .....                  | 156 |
| SECTION III — Answers, with the reasoning .....                | 207 |





SECTION I

# THE SYLLABUS, CHAPTER BY CHAPTER

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## SECTION 1

# APPLIED SURGICAL BASIC SCIENCE

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### THIS CHAPTER COVERS

- Wound healing: phases, factors impairing healing, abnormal scars
- Metabolic and endocrine response to injury and surgery
- Haemostasis, coagulation cascade, anticoagulant and antiplatelet management
- Transfusion: products, thresholds, massive transfusion protocol, complications
- Fluid, electrolyte and acid-base disorders in the surgical patient
- Surgical microbiology, antisepsis, sterilisation, theatre discipline
- Applied anatomy: inguinal canal, mesorectal and retroperitoneal planes, hepatic segments, vascular territories
- Surgical physiology: gastrointestinal, hepatic, renal, respiratory

10% of the paper · 500 questions in the bank behind this chapter

Figure 1: Where Applied Surgical Basic Science sits in a general surgery examination.

### Before you read this chapter

Answer these three now, from what you already know. Write the letter down. Getting them wrong before you read is not a waste — attempting first is what makes the reading stick. The answers are at the end of the chapter, not here.

**Q1.1** A 40-year-old woman with no significant medical history is being consented for an elective laparoscopic cholecystectomy. She reports that both her mother and her maternal uncle bled heavily after dental extractions, and that she herself has lifelong easy bruising and menorrhagia. Preoperative bloods show haemoglobin 108 g/L, platelet count  $240 \times 10^9/L$ , prothrombin time 12 seconds (normal) and an activated partial thromboplastin time that is mildly prolonged at 41 seconds. Liver function and renal function are normal. She is not taking aspirin, non-steroidal anti-inflammatory drugs or any anticoagulant. The haematology team is asked for advice before the operation is scheduled.

- A Haemophilia B, and she should receive recombinant factor IX before induction
- B Immune thrombocytopenia, and she should receive a platelet transfusion at induction
- C Von Willebrand disease, and she should be assessed for desmopressin responsiveness before surgery
- D Vitamin K deficiency, and she should receive intravenous vitamin K for three days preoperatively
- E Lupus anticoagulant, and she should be started on therapeutic low molecular weight heparin

**Q1.2** A 45-year-old woman is undergoing an elective open repair of a recurrent groin defect through a previously scarred field. The anatomy is distorted by mesh from a previous operation. The consultant asks the registrar to identify the boundaries of the deep inguinal ring before dividing anything. The registrar correctly identifies the inferior epigastric vessels running on the medial side of the ring. The consultant then asks which structure forms the floor of the inguinal canal medially and which the anterior wall along its lateral third, since safe dissection here depends on knowing what may be divided and what must be preserved.

- A Floor: external oblique aponeurosis; anterior wall laterally: transversalis fascia alone
- B Floor: transversalis fascia reinforced medially by the conjoint tendon; anterior wall laterally: external oblique aponeurosis reinforced by internal oblique fibres
- C Floor: internal oblique muscle; anterior wall laterally: the lacunar ligament
- D Floor: the inguinal ligament alone throughout; anterior wall laterally: the cremasteric fascia
- E Floor: peritoneum and preperitoneal fat; anterior wall laterally: the pectineal ligament

**Q1.3** A 44-year-old man with no previous medical history is admitted with a stab wound to the left thigh and arrives with a compressible bleeding wound. He is alert, blood pressure 104/64 mmHg, pulse 106 per minute. A family history is taken: a maternal uncle bled heavily after a dental extraction and a brother needed transfusion after a tonsillectomy. Preoperative bloods show haemoglobin 128 g/L, platelets  $246 \times 10^9$  per litre, prothrombin time normal, activated partial thromboplastin time prolonged at 58 seconds. A 50:50 mix with normal plasma corrects the activated partial thromboplastin time to normal.

- A A lupus anticoagulant
- B A factor VIII or factor IX deficiency
- C A factor VII deficiency
- D Vitamin K deficiency from poor nutrition
- E An acquired factor VIII inhibitor

## What this chapter covers

### AREA OF THE SYLLABUS

Wound healing: phases, factors impairing healing, abnormal scars

Metabolic and endocrine response to injury and surgery

Haemostasis, coagulation cascade, anticoagulant and antiplatelet management

Transfusion: products, thresholds, massive transfusion protocol, complications

Fluid, electrolyte and acid-base disorders in the surgical patient

Surgical microbiology, antisepsis, sterilisation, theatre discipline

Applied anatomy: inguinal canal, mesorectal and retroperitoneal planes, hepatic segments, vascular territories

Surgical physiology: gastrointestinal, hepatic, renal, respiratory

Oncogenesis and tumour biology at the level a general surgeon is examined on

Thermoregulation, energy devices and tissue effects

## The rules that carry marks

| WHEN YOU SEE                                                                                                 | WHAT IT MEANS, OR WHAT TO DO                                                                        |
|--------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| Transfusion-related acute lung injury and circulatory overload both cause pulmonary oedema after transfusion | the discriminator is filling pressure, which is normal or low in lung injury and raised in overload |
| Ionised calcium must be measured and replaced during massive transfusion                                     | citrate chelation causes both myocardial depression and coagulopathy, and calcium is factor IV      |
| Never combine a metal laparoscopic cannula with a plastic anchoring sleeve                                   | the hybrid arrangement traps capacitively coupled current and causes remote bowel burns             |

|                                                                                                             |                                                                                                                                                   |
|-------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| The posterior wall of the inguinal canal is transversalis fascia reinforced medially by the conjoint tendon | a sac lateral to the inferior epigastric vessels is indirect, medial is direct                                                                    |
| an isolated prolonged activated partial thromboplastin time                                                 | the mixing study separates factor deficiency, which corrects, from an inhibitor, which does not                                                   |
| heparin-induced thrombocytopenia                                                                            | stopping heparin is not enough — a non-heparin anticoagulant must be started immediately, and warfarin withheld until the platelet count recovers |

## What you are expected to know

- The aberrant obturator artery crossing the lacunar ligament is the corona mortis, and the lacunar ligament should never be divided blindly when releasing a femoral hernia.
- In major haemorrhage the international normalised ratio distracts: fibrinogen below 1.5 g/L is the deficiency that stops clot forming, and it requires cryoprecipitate or fibrinogen concentrate rather than plasma.
- Mucocutaneous bleeding with a normal platelet count, normal prothrombin time and mildly prolonged activated partial thromboplastin time in both sexes of a family is von Willebrand disease until proven otherwise.
- The ilioinguinal nerve enters the inguinal canal through its anterior wall by piercing internal oblique, whereas the genital branch of the genitofemoral nerve is the only nerve that enters through the deep ring within the cord.
- The inguinal canal is reinforced posteriorly at its medial end by the conjoint tendon and anteriorly at its lateral end by internal oblique — the reciprocal pattern that explains where direct and indirect hernias emerge.
- The ilioinguinal nerve lies on the anterior surface of the cord inside the inguinal canal and is the nerve most commonly implicated in chronic pain after anterior mesh repair.
- Postoperative euvolaemic hyponatraemia with concentrated urine reflects stress-induced antidiuretic hormone release, and hypotonic dextrose infusions make it worse.
- The first-hour drop in core temperature under anaesthesia is redistribution, not surgical heat loss, which is why prewarming before induction is the effective intervention.

### ■ BOARD PEARL

A normal anion gap acidosis with a high chloride and a normal lactate after days of 0.9 per cent saline is iatrogenic hyperchloraemic acidosis; change the fluid, do not chase a leak.

### ■ BOARD PEARL

Refeeding syndrome is driven by the calorie load, not the route; reduce feeding, replace phosphate, magnesium and potassium, and give thiamine before or with the first carbohydrate.

## Trials you should be able to name

| TRIAL                                          | WHAT IT IS ABOUT |
|------------------------------------------------|------------------|
| TRICC (1999, New England Journal of Medicine)  | —                |
| BRIDGE (2015, New England Journal of Medicine) | —                |
| CRASH-2 (2010, Lancet)                         | —                |

## Guidance this chapter is written against

*Principles of perioperative fluid and acid-base management*

*Principles of transfusion medicine — classification of acute transfusion reactions*

*Principles of the metabolic response to starvation and refeeding*

*Principles of massive transfusion and damage control resuscitation*

*Applied anatomy of the femoral canal and femoral ring*

*Massive haemorrhage protocols — fibrinogen replacement thresholds*

*Principles of electrosurgical safety, monopolar diathermy in laparoscopy*

*Principles of preoperative assessment of the bleeding patient (coagulation screen interpretation)*

*Standard descriptive anatomy of the inguinal canal*

*Applied anatomy of the inguinal canal and Hesselbach's triangle*

## Retrieval check

The three you answered before reading. Mark yourself honestly; a wrong answer you now understand is worth more than a right one you guessed.

### Q1.1 CORRECT ANSWER C

The picture is von Willebrand disease, and the correct preoperative step is formal diagnosis with assessment of desmopressin responsiveness.

Why: Mucocutaneous bleeding, menorrhagia and an autosomal family history affecting both sexes point to von Willebrand disease. Von Willebrand factor carries factor VIII, so a low level shortens factor VIII survival and mildly prolongs the activated partial thromboplastin time. The platelet count and prothrombin time are normal, which fits. Many type 1 patients respond to desmopressin, but responsiveness must be tested rather than assumed.

Option A: Haemophilia B is X-linked and would not affect the mother and daughter in this pattern, and it causes deep joint and muscle bleeding. Option C: Correct — it explains the mucocutaneous phenotype, the family history in both sexes and the isolated mild activated partial thromboplastin time prolongation. Option B: Her platelet count is normal, so immune thrombocytopenia is excluded and prophylactic platelets are useless. Option D: Vitamin K deficiency prolongs the prothrombin time first, and hers is normal with normal liver function. Option E: A lupus anticoagulant prolongs the activated partial thromboplastin time but predisposes to thrombosis, not to lifelong mucocutaneous bleeding.

*Mucocutaneous bleeding with a normal platelet count, normal prothrombin time and mildly prolonged activated partial thromboplastin time in both sexes of a family is von Willebrand disease until proven otherwise.*

*Principles of preoperative assessment of the bleeding patient (coagulation screen interpretation)*

**Q1.2 CORRECT ANSWER B**

The floor is transversalis fascia, reinforced medially by the conjoint tendon, and the anterior wall is external oblique aponeurosis with internal oblique fibres reinforcing its lateral third.

Why: The canal is built so that its weak points are covered from behind at the medial end and from in front at the lateral end. That is why a direct hernia pushes through the transversalis fascia medial to the epigastric vessels. It is also why the deep ring, lying laterally, is protected anteriorly by internal oblique. Naming these layers is what allows a safe redo dissection when the planes are scarred.

Option B: Correct — it reflects the reciprocal reinforcement of floor medially and anterior wall laterally. Option A: External oblique aponeurosis is the anterior wall, never the floor. Option C: Internal oblique contributes to the roof and anterior wall, not the floor; the lacunar ligament is a medial floor structure. Option D: The inguinal ligament is the rolled inferior edge of external oblique and does not form the whole floor. Option E: Peritoneum lies deep to transversalis fascia and is not a wall of the canal.

*The inguinal canal is reinforced posteriorly at its medial end by the conjoint tendon and anteriorly at its lateral end by internal oblique — the reciprocal pattern that explains where direct and indirect hernias emerge.*

*Applied anatomy of the inguinal canal*

**Q1.3 CORRECT ANSWER B**

An isolated prolonged activated partial thromboplastin time that corrects on mixing indicates a factor deficiency in the intrinsic pathway, and the X-linked family pattern points to factor VIII or IX.

Why: The mixing study is the discriminating test. Correction means the patient's plasma lacks something that normal plasma supplies, so this is a deficiency. Failure to correct would mean an inhibitor is present, neutralising factor in both samples. The pattern of affected males related through females is classic X-linked inheritance, which fits haemophilia A or B.

Option B: Correct — an intrinsic pathway factor deficiency with an X-linked family history. Option A: A lupus anticoagulant prolongs the activated partial thromboplastin time but does not correct on mixing, and it causes thrombosis rather than bleeding. Option C: Factor VII deficiency prolongs the prothrombin time, which is normal here. Option D: Vitamin K deficiency affects factors II, VII, IX and X, so the prothrombin time would be prolonged first. Option E: An acquired inhibitor by definition fails to correct on a 50:50 mix and typically presents in older patients without a family history.

*In an isolated prolonged activated partial thromboplastin time, the mixing study separates factor deficiency, which corrects, from an inhibitor, which does not.*

*Principles of coagulation testing and the coagulation cascade*

**■ KEY POINT**

Come back to this chapter in two days, then in a week, then in three weeks. Do not reread it — cover the tables and say the rules out loud first, then check. Spacing and retrieval are the two things that work; rereading is not.





## SECTION 2

# SURGICAL CRITICAL CARE

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### THIS CHAPTER COVERS

- Shock: classification, recognition, haemodynamic monitoring
- Sepsis and septic shock: bundles, source control, vasopressors
- Respiratory failure, ARDS, ventilation strategies, weaning
- Acute kidney injury and renal replacement in the surgical patient
- Nutrition in critical illness — see also Surgical Nutrition
- Abdominal compartment syndrome and open abdomen management
- Sedation, analgesia and delirium
- Organ donation after brain and circulatory death

9% of the paper · 450 questions in the bank behind this chapter

Figure 2: Where Surgical Critical Care sits in a general surgery examination.

### Before you read this chapter

Answer these three now, from what you already know. Write the letter down. Getting them wrong before you read is not a waste — attempting first is what makes the reading stick. The answers are at the end of the chapter, not here.

**Q2.1** A 46-year-old man has been ventilated for seven days after a laparotomy for a strangulated internal hernia complicated by pneumonia. He is now on pressure support 8 cmH<sub>2</sub>O with PEEP 5 and FiO<sub>2</sub> 0.30, saturating 97%. He is awake, follows commands, has an intact cough and minimal secretions. He is off vasopressors, afebrile, and his sedation was stopped this morning. The nurse reports he is comfortable on these settings. The registrar asks how best to decide whether he can come off the ventilator today rather than waiting another 24 hours.

- A Wean the pressure support by 2 cmH<sub>2</sub>O each day until he tolerates 0 cmH<sub>2</sub>O
- B Perform a spontaneous breathing trial and calculate the rapid shallow breathing index
- C Proceed directly to percutaneous tracheostomy as he has been ventilated for seven days
- D Extubate immediately without further testing since his gas exchange is adequate
- E Measure a negative inspiratory force alone and extubate if it exceeds -20 cmH<sub>2</sub>O

**Q2.2** A 32-year-old man is being managed in a rural hospital 170 kilometres from the regional centre after a crush injury to both thighs. There is no CT scanner available overnight, no interventional radiology and no intensive care bed; the single ventilator is in use. On day two he becomes progressively more agitated and breathless. Peripheral oxygen saturation is 86 per cent on a reservoir mask. The chest is clear on auscultation with no wheeze. Portable chest radiograph shows bilateral diffuse infiltrates. Blood pressure is 118/70 mmHg and there is no jugular venous distension. Which is the most appropriate immediate management?

- A Intravenous furosemide 80 mg for presumed fluid overload
- B Empirical thrombolysis for suspected massive pulmonary embolism
- C High-dose intravenous methylprednisolone as definitive treatment for fat embolism
- D Start non-invasive ventilation with a tight-fitting mask, arrange urgent retrieval and prepare for intubation if he deteriorates
- E Insert bilateral chest drains for presumed occult pneumothoraces

**Q2.3** A 28-year-old man is brought to a rural hospital two hours after a stab wound to the left flank. There is no interventional radiology service and the nearest CT scanner is ninety minutes away by road. He is agitated and confused. Pulse is 138 beats per minute, blood pressure 82/56 mmHg, respiratory rate 34 per minute and capillary refill five seconds. He has passed 8 mL of urine since arrival. He has received two litres of warmed crystalloid with only transient improvement. The abdomen is distended and tender. Haemoglobin is 78 g/L.

- A** Class I haemorrhagic shock — observe and repeat haemoglobin in four hours
- B** Class II haemorrhagic shock — continue crystalloid and arrange transfer for CT
- C** Neurogenic shock from spinal cord injury — start noradrenaline and immobilise the spine
- D** Class III to IV haemorrhagic shock — activate major haemorrhage protocol and take him to theatre
- E** Distributive shock from early sepsis — give broad-spectrum antibiotics and a further fluid bolus

## What this chapter covers

### AREA OF THE SYLLABUS

Shock: classification, recognition, haemodynamic monitoring  
 Sepsis and septic shock: bundles, source control, vasopressors  
 Respiratory failure, ARDS, ventilation strategies, weaning  
 Acute kidney injury and renal replacement in the surgical patient  
 Nutrition in critical illness — see also Surgical Nutrition  
 Abdominal compartment syndrome and open abdomen management  
 Sedation, analgesia and delirium  
 Organ donation after brain and circulatory death  
 Scoring systems: APACHE, SOFA, P-POSSUM, Clavien-Dindo, CCI

## The rules that carry marks

| WHEN YOU SEE                                                                            | WHAT IT MEANS, OR WHAT TO DO                                                                                                            |
|-----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| The rapid shallow breathing index is respiratory rate divided by tidal volume in litres | a value below 105 predicts successful extubation when the wider readiness criteria are also satisfied                                   |
| Clavien-Dindo grades a single complication by the treatment it needed                   | the Comprehensive Complication Index sums all complications into one 0 to 100 score and is the better measure of total morbidity burden |
| a young patient                                                                         | systolic blood pressure does not fall until roughly a third of the blood volume is lost — a narrowing                                   |

|                                                                              |                                                                                                                                           |
|------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                              | pulse pressure and tachycardia are the earliest reliable signs of haemorrhagic shock                                                      |
| severe acute respiratory distress syndrome                                   | prone positioning for at least 16 hours a day combined with lung-protective ventilation is the intervention with proven mortality benefit |
| a septic patient is no longer fluid responsive                               | start noradrenaline to a mean arterial pressure of 65 mmHg rather than giving more fluid                                                  |
| a hospital without ventilatory capacity                                      | recognising early acute respiratory distress syndrome means calling for retrieval before the patient tires, not after                     |
| A transient responder to fluid after penetrating trauma is bleeding actively | give blood products and operate rather than pursue imaging                                                                                |

### What you are expected to know

- Sustained intra-abdominal pressure above 20 mmHg with new organ dysfunction, after medical measures have been exhausted, mandates decompressive laparotomy with temporary abdominal closure.
- Abdominal compartment syndrome is intra-abdominal pressure above 20 mmHg with new organ dysfunction, and once organ failure is established the treatment is decompressive laparotomy.
- The Comprehensive Complication Index aggregates every Clavien-Dindo graded complication into a single weighted 0 to 100 score, capturing cumulative morbidity that reporting only the highest grade conceals.
- Readiness to extubate is established by a daily spontaneous breathing trial, not by incremental reduction of pressure support.
- Fever in an asplenic patient is a medical emergency: give parenteral broad-spectrum antibiotics immediately, before investigation and before transfer, and widen cover for Capnocytophaga after a dog bite.
- The Comprehensive Complication Index expresses cumulative postoperative morbidity as a single weighted figure, whereas Clavien-Dindo captures only the single worst event.
- A narrowing pulse pressure precedes systolic hypotension in haemorrhagic shock and is the earliest reliable haemodynamic warning.

#### ■ BOARD PEARL

In sepsis from an obstructed urinary tract, antibiotics and fluids do not substitute for decompression, and decompression does not justify delaying antibiotics — both happen at once.

#### ■ BOARD PEARL

Prolonged starvation with weight loss and low phosphate or magnesium mandates electrolyte correction, thiamine and hypocaloric trophic feeding before any approach to the caloric target.

## Trials you should be able to name

| TRIAL                                                                       | WHAT IT IS ABOUT |
|-----------------------------------------------------------------------------|------------------|
| PROSEVA (2013, New England Journal of Medicine)                             | —                |
| SEPSISPAM (2014, NEJM)                                                      | —                |
| STARRT-AKI (2020, New England Journal of Medicine)                          | —                |
| ARMA / ARDS Network low tidal volume trial (2000, N Engl J Med)             | —                |
| ARMA/ARDSNet low tidal volume trial (2000, New England Journal of Medicine) | —                |
| POISE (2008, Lancet)                                                        | —                |
| ARDSNet ARMA (2000, New England Journal of Medicine)                        | —                |
| Lee TH et al. Circulation 1999                                              | —                |

## Guidance this chapter is written against

*ATS/CHEST clinical practice guideline on liberation from mechanical ventilation*

*World Society of the Abdominal Compartment Syndrome, definitions and management of intra-abdominal hypertension*

*Surviving Sepsis Campaign — International guidelines for sepsis and septic shock, 2026 (Intensive Care Med 2026;52:863-936)*

*Clavien-Dindo classification of surgical complications and the Comprehensive Complication Index*

*ESPEN — Clinical nutrition in surgery*

*World Society of the Abdominal Compartment Syndrome consensus definitions and management*

*Principles of weaning from mechanical ventilation — rapid shallow breathing index*

*BSH — Prevention and treatment of infection in asplenic patients, 2024 (Br J Haematol 2024;204:1672-86)*

*ATLS classification of haemorrhagic shock*

*Berlin definition of acute respiratory distress syndrome*

## Retrieval check

The three you answered before reading. Mark yourself honestly; a wrong answer you now understand is worth more than a right one you guessed.

### Q2.1 CORRECT ANSWER **B**

A spontaneous breathing trial with assessment of the rapid shallow breathing index is the correct way to test readiness.

Why: He has passed the screening criteria: cause resolving, adequate oxygenation on low FiO<sub>2</sub>, haemodynamic stability and an intact neurological state. The next step is a trial of 30 to 120 minutes on minimal support or a T-piece. A respiratory rate to tidal volume ratio below about 105 predicts success. Daily trials paired with sedation interruption shorten ventilation more than gradual weaning.

Option A: Slow, incremental weaning prolongs ventilator days compared with daily spontaneous breathing trials. Option B: Correct — an objective trial with an index measurement identifies who can be extubated today. Option C: Tracheostomy is for anticipated prolonged ventilation, and he is on the verge of extubation. Option D: Adequate oxygenation alone does not predict extubation success; ventilatory reserve and airway protection must be tested. Option E: Inspiratory force is a weak single predictor with poor specificity when used alone.

*Readiness to extubate is established by a daily spontaneous breathing trial, not by incremental reduction of pressure support.*

*ATS/CHEST clinical practice guideline on liberation from mechanical ventilation*

### **Q2.2 CORRECT ANSWER D**

This is early acute respiratory distress syndrome after a crush injury, and the priority is oxygenation support plus retrieval to a unit that can ventilate him.

Why: Bilateral infiltrates with hypoxaemia and no evidence of raised filling pressures within a week of an insult defines acute respiratory distress syndrome. A clear chest on auscultation with a normal venous pressure argues strongly against cardiogenic oedema. Non-invasive ventilation buys time in a hospital without a ventilator, but it is a bridge, not a destination. The retrieval call is made now, not after he tires.

Option A: Diuresis in a euvolaemic patient with no cardiogenic features risks hypoperfusion without improving the shunt. Option D: Correct — it supports oxygenation while triggering transfer and anticipating airway deterioration. Option B: Thrombolysis without imaging or haemodynamic collapse exposes a crush-injured patient to catastrophic bleeding. Option C: Steroids are not a definitive treatment for fat embolism syndrome and would not address the immediate hypoxaemia. Option E: Bilateral infiltrates on radiograph are not pneumothoraces; blind drainage would cause harm.

*In a hospital without ventilatory capacity, recognising early acute respiratory distress syndrome means calling for retrieval before the patient tires, not after.*

*Berlin definition of acute respiratory distress syndrome*

### **Q2.3 CORRECT ANSWER D**

This is class III to IV haemorrhagic shock with a transient response to fluid, and it needs blood and an operation, not another scan.

Why: Tachycardia above 120, hypotension, confusion, a respiratory rate over 30 and oliguria together define the severe end of the ATLS classification. Confusion and hypotension are the features that separate class III and IV from the milder grades. A transient responder is bleeding faster than you can replace. With no CT and no radiology service on site, the theatre is the diagnostic test.

Option A: Class I shock has a normal blood pressure and a normal mental state, neither of which he has. Option B: Class II shock is tachycardic but normotensive, and transfer for imaging would use ninety minutes he does not have. Option D: Correct — the physiology fits severe haemorrhage and a transient fluid response mandates blood products and immediate laparotomy. Option C: Neurogenic shock is characterised by hypotension with bradycardia and warm peripheries, the opposite of his findings. Option E: Sepsis two hours after a stab wound is implausible, and further crystalloid would worsen dilution and coagulopathy.

*A transient responder to fluid after penetrating trauma is bleeding actively; give blood products and operate rather than pursue imaging.*

*ATLS classification of haemorrhagic shock*

■ **KEY POINT**

Come back to this chapter in two days, then in a week, then in three weeks. Do not reread it — cover the tables and say the rules out loud first, then check. Spacing and retrieval are the two things that work; rereading is not.





## SECTION 3

# TRAUMA AND DAMAGE CONTROL

---

# 3

### THIS CHAPTER COVERS

- ATLS primary and secondary survey, adjuncts, FAST
- Haemorrhagic shock, permissive hypotension, damage control resuscitation
- Blunt and penetrating abdominal trauma: selective non-operative management
- Solid organ injury grading and management — spleen, liver, kidney
- Hollow viscus, duodenal, pancreatic and diaphragmatic injury
- Pelvic fracture haemorrhage, preperitoneal packing, REBOA
- Thoracic trauma: tension pneumothorax, haemothorax, resuscitative thoracotomy
- Damage control surgery, temporary abdominal closure, planned relaparotomy

8% of the paper · 400 questions in the bank behind this chapter

Figure 3: Where Trauma and Damage Control sits in a general surgery examination.

### Before you read this chapter

Answer these three now, from what you already know. Write the letter down. Getting them wrong before you read is not a waste — attempting first is what makes the reading stick. The answers are at the end of the chapter, not here.

**Q3.1** A 39-year-old woman is stabbed in the left upper quadrant, 3 cm below the costal margin in the anterior axillary line, with a screwdriver. She is alert and haemodynamically normal with a pulse of 88 and blood pressure of 124 over 76. The wound is 2 cm long, is not bleeding and there is no evisceration. Abdomen is soft with tenderness confined to the wound. Chest radiograph is normal with no free air beneath the diaphragm and no pneumothorax. FAST is negative. Local wound exploration under local anaesthesia shows the tract passing through the anterior fascia. Computed tomography reports no diaphragmatic defect and no intraperitoneal injury.

- A Discharge from the emergency department with wound care advice, since the computed tomogram is normal
- B Diagnostic laparoscopy to inspect the left hemidiaphragm directly
- C Repeat computed tomography of the abdomen at 24 hours
- D Immediate laparotomy through a midline incision
- E Left thoracotomy to visualise the diaphragm from above

**Q3.2** A 58-year-old man is brought in after his car was struck from the side at a junction. On arrival he is confused with a Glasgow Coma Scale of 8. CT of the head shows a large acute subdural haematoma with 8 mm of midline shift, and the neurosurgical team is preparing theatre. CT of the abdomen shows a grade III splenic laceration with no contrast blush and a moderate haemoperitoneum. His pulse is 108 beats per minute and blood pressure 96/58 mmHg. He has received one unit of red cells and one unit of plasma. A junior colleague asks whether permissive hypotension should be used while the spleen is managed non-operatively. What is the most appropriate haemodynamic target?

- A Accept a systolic pressure of 80 to 90 mmHg until definitive haemostasis is achieved
- B Target a systolic pressure of 70 mmHg to minimise clot disruption in the spleen
- C Withhold all further fluid and blood until the subdural haematoma has been evacuated
- D Restore and maintain a mean arterial pressure of at least 80 mmHg with blood products and vasopressors as needed
- E Resuscitate with large volume warmed crystalloid to a systolic pressure of 140 mmHg

**Q3.3** A 28-year-old man is stabbed in the left mid-axillary line at the level of the seventh intercostal space during an altercation. He arrives haemodynamically normal, with heart rate 84 and blood pressure 130/78. The chest radiograph shows a small left apical pneumothorax and no diaphragmatic abnormality. A chest drain is inserted with minimal blood loss. The abdomen is soft and non-tender. Contrast-enhanced CT of the chest and abdomen shows no visceral herniation, no free fluid and no solid organ injury. He remains completely well after six hours of observation. What is the most appropriate management?

- A Discharge once the chest drain is removed, as CT has excluded significant injury
- B Local wound exploration of the chest wall and discharge if the pleura is not breached
- C Repeat chest radiograph at 24 hours and discharge if unchanged
- D Left thoracotomy to repair the presumed diaphragmatic injury
- E Diagnostic laparoscopy to inspect the left hemidiaphragm

## What this chapter covers

### AREA OF THE SYLLABUS

ATLS primary and secondary survey, adjuncts, FAST

Haemorrhagic shock, permissive hypotension, damage control resuscitation

Blunt and penetrating abdominal trauma: selective non-operative management

Solid organ injury grading and management — spleen, liver, kidney

Hollow viscus, duodenal, pancreatic and diaphragmatic injury

Pelvic fracture haemorrhage, preperitoneal packing, REBOA

Thoracic trauma: tension pneumothorax, haemothorax, resuscitative thoracotomy

Damage control surgery, temporary abdominal closure, planned relaparotomy

Burns: resuscitation, escharotomy, referral criteria

Vascular trauma and extremity injury for the general surgeon

## The rules that carry marks

| WHEN YOU SEE                                                                                                       | WHAT IT MEANS, OR WHAT TO DO                                                                    |
|--------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| pelvic fracture haemorrhage with persistent hypotension and no angiography available                               | preperitoneal packing with external fixation is the definitive option — and the binder stays on |
| blunt splenic injury it is haemodynamic status                                                                     | not the AAST grade, that decides between operative and non-operative management                 |
| Main pancreatic duct disruption to the left of the superior mesenteric vessels is managed by distal pancreatectomy | drainage alone is reserved for injuries without duct involvement                                |

|                                                                                                                             |                                                                                                            |
|-----------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
| Permissive hypotension is abandoned when there is significant traumatic brain injury                                        | protect cerebral perfusion pressure with blood products and vasopressors instead                           |
| A blunt diaphragmatic injury missed acutely presents later with herniation and obstruction                                  | at early delayed presentation it is reduced and repaired primarily through the abdomen                     |
| Any penetrating wound between the nipple line and the costal margin on the left requires direct inspection of the diaphragm | a normal CT does not exclude the injury                                                                    |
| a stable patient with an anterior abdominal stab wound                                                                      | peritoneal violation alone does not mandate laparotomy — evisceration, peritonism or instability do        |
| Referred left shoulder tip pain after splenic injury reflects diaphragmatic irritation                                      | the decision to abandon non-operative management rests on haemodynamics and haemoglobin trend, not on pain |

### What you are expected to know

- Hypothermia, acidosis and coagulopathy together mandate abbreviating the operation, not completing it.
- Post-splenectomy care is vaccination plus antibiotic prophylaxis plus a standby emergency antibiotic supply plus a patient alert card plus annual influenza vaccination — vaccination alone is incomplete.
- Unexplained free fluid on CT with no solid organ injury after blunt trauma is a bowel or mesenteric injury until surgically excluded; absent free gas does not reassure.
- A left thoracoabdominal penetrating wound needs direct visualisation of the diaphragm, usually laparoscopically, because a normal computed tomogram does not exclude an occult diaphragmatic injury.
- Paediatric blunt splenic injury is managed non-operatively according to haemodynamic status and haemoglobin trend, not according to the CT grade.
- Acute traumatic diaphragmatic rupture is repaired operatively, usually transabdominally with non-absorbable suture, because the defect will not close and herniated viscera can strangulate.

#### ■ BOARD PEARL

In combined vascular and skeletal limb injury, insert a temporary vascular shunt first, then fix the skeleton, then perform definitive vascular repair — perfusion should never wait for orthopaedic fixation.

#### ■ BOARD PEARL

In burn resuscitation the clock starts at the time of injury, half the calculated first 24-hour volume is given in the first 8 hours, and the formula is only a starting point titrated against urine output.

## Trials you should be able to name

| TRIAL           | WHAT IT IS ABOUT                                   |
|-----------------|----------------------------------------------------|
| CRASH-2         | tranexamic acid trauma haemorrhage                 |
| UK-REBOA        | resuscitative endovascular balloon occlusion aorta |
| CRASH-3         | tranexamic acid traumatic brain injury             |
| PROPPR          | plasma platelets red blood cells ratio transfusion |
| CRASH-2; PROPPR | —                                                  |

## Guidance this chapter is written against

ACS Committee on Trauma — *Advanced Trauma Life Support*, 11th edition (2025)

BSH — *Prevention and treatment of infection in asplenic patients*, 2024 (*Br J Haematol* 2024;204:1672-86)

APSA — *Blunt liver and spleen injury in children*, 2023

WSES-AAST — *Duodeno-pancreatic and extrahepatic biliary tree trauma*, 2019 (Coccolini, *World J Emerg Surg* 2019;14:56)

AAST — *Organ Injury Scaling*, 2018 update — *SPLEEN, LIVER AND KIDNEY ONLY* (Kozar, *J Trauma Acute Care Surg* 2018;85:1119-22, PMID 30462622)

WSES — *Liver trauma*, 2020 (Coccolini, *World J Emerg Surg* 2020;15:24)

AAST — *Organ Injury Scaling*, 2018 update — *spleen, liver and kidney*

AAST — *Organ Injury Scaling*, 2018 update — *spleen*

AAST — *Organ Injury Scaling*, 2018 update (Kozar, *J Trauma Acute Care Surg* 2018;85:1119-22, PMID 30462622)

AAST — *Organ Injury Scaling*, 2018 update — *spleen, liver and kidney* (Kozar, *J Trauma Acute Care Surg* 2018;85:1119-22)

## Retrieval check

The three you answered before reading. Mark yourself honestly; a wrong answer you now understand is worth more than a right one you guessed.

### Q3.1 CORRECT ANSWER **B**

A penetrating wound in the left thoracoabdominal zone requires direct inspection of the diaphragm, because computed tomography cannot reliably exclude a small defect.

Why: A small diaphragmatic laceration may be invisible on cross-sectional imaging. Missed left-sided defects do not heal, because of the pressure gradient between abdomen and chest. They present later with herniation, incarceration or gastric volvulus, and the operation is then far more dangerous. Laparoscopy is the accurate way to look and allows repair at the same sitting.

Option A: Discharge accepts a real risk of a missed defect that will present years later as a strangulated hernia. Option B: Correct — laparoscopy visualises the hemidiaphragm directly and permits primary repair with non-absorbable suture. Option C: Repeat imaging repeats the same limitation and adds a day of delay without adding information. Option D: Laparotomy answers the question but at greater morbidity than a diagnostic laparoscopy in a stable patient. Option E: Thoracotomy is a larger and more painful approach and does not allow assessment of the abdominal viscera.

*A left thoracoabdominal penetrating wound needs direct visualisation of the diaphragm, usually laparoscopically, because a normal computed tomogram does not exclude an occult diaphragmatic injury.*

ACS Committee on Trauma — Advanced Trauma Life Support, 11th edition (2025)

### Q3.2 CORRECT ANSWER D

Significant traumatic brain injury is the principal exception to permissive hypotension: cerebral perfusion pressure must be protected.

Why: Permissive hypotension limits clot disruption in bleeding trauma patients. But the injured brain has lost autoregulation and a single episode of hypotension worsens outcome substantially. When both a bleeding solid organ and a severe head injury coexist, the brain sets the target. Use blood products first and add vasopressor support if pressure remains inadequate.

Option A: This is the correct target in isolated torso haemorrhage but risks secondary brain injury in this patient. Option D: Correct — the traumatic brain injury overrides permissive hypotension and demands a higher perfusion target. Option B: A systolic pressure of 70 mmHg would compound cerebral ischaemia in a patient with midline shift. Option C: Withholding resuscitation until craniotomy leaves him hypotensive during the very period the brain is most vulnerable. Option E: Aggressive crystalloid to a supranormal pressure causes dilutional coagulopathy, hypothermia and rebleeding.

*Permissive hypotension is abandoned when there is significant traumatic brain injury — protect cerebral perfusion pressure with blood products and vasopressors instead.*

ACS Committee on Trauma — Advanced Trauma Life Support, 11th edition (2025)

### Q3.3 CORRECT ANSWER E

A penetrating wound in the left thoraco-abdominal zone warrants laparoscopy to exclude an occult diaphragmatic injury, even when CT is normal.

Why: CT is insensitive to small diaphragmatic lacerations when no viscus has herniated. Left-sided defects do not seal, because the pressure gradient between abdomen and chest progressively draws stomach and colon upward. The complication presents months or years later as strangulated herniation with high mortality. Laparoscopy is highly sensitive for acute diaphragmatic injury and allows repair at the same sitting.

Option A: Discharge on a normal CT accepts a real risk of a missed defect that will present late and catastrophically. Option B: Local wound exploration cannot reach or assess the diaphragm. Option E: Correct — laparoscopy visualises the diaphragm directly and permits repair. Option C: Serial radiography detects herniation only once it has already occurred. Option D: Thoracotomy is excessive for a stable patient with no evidence of intrathoracic bleeding.

*Any penetrating wound between the nipple line and the costal margin on the left requires direct inspection of the diaphragm; a normal CT does not exclude the injury.*

ACS Committee on Trauma — Advanced Trauma Life Support, 11th edition (2025)

**■ KEY POINT**

Come back to this chapter in two days, then in a week, then in three weeks. Do not reread it — cover the tables and say the rules out loud first, then check. Spacing and retrieval are the two things that work; rereading is not.





SECTION 4

# EMERGENCY GENERAL SURGERY

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# 4

THIS CHAPTER COVERS

- Acute appendicitis: diagnosis, scoring, antibiotics versus appendicectomy
  - Perforated peptic ulcer: repair, lavage, Helicobacter eradication
  - Small bowel obstruction: adhesional, water-soluble contrast challenge, timing of surgery
  - Large bowel obstruction, sigmoid and caecal volvulus, stenting as a bridge
  - Acute mesenteric ischaemia: arterial, venous, non-occlusive
  - Lower gastrointestinal bleeding: localisation and intervention
  - Upper gastrointestinal bleeding: endoscopic, radiological and surgical control
  - Incarcerated and strangulated hernia
-

8% of the paper · 400 questions in the bank behind this chapter

Figure 4: Where Emergency General Surgery sits in a general surgery examination.

### Before you read this chapter

Answer these three now, from what you already know. Write the letter down. Getting them wrong before you read is not a waste — attempting first is what makes the reading stick. The answers are at the end of the chapter, not here.

**Q4.1** A 76-year-old woman with atrial fibrillation on apixaban and chronic obstructive pulmonary disease presents to a rural hospital at eleven at night with eight hours of severe generalised abdominal pain that is disproportionate to the findings on palpation. The abdomen is soft with no guarding. Pulse is irregular at 128, blood pressure 96/58, lactate 4.8 mmol/L, pH 7.28, white cell count  $21 \times 10^9/\text{L}$ . There is no computed tomography available until the radiographer travels in, and the nearest scanner with angiographic capability is 90 minutes away by ambulance. There is no interventional radiology service and no intensive care bed.

- A Await the on-call radiographer and obtain a plain computed tomogram locally before deciding
- B Reverse the apixaban, resuscitate and perform emergency laparotomy here without further imaging
- C Start therapeutic heparin and observe with serial lactate measurement overnight
- D Diagnostic peritoneal lavage to determine whether laparotomy is required
- E Resuscitate, discuss immediately with the vascular and radiology team at the tertiary centre and transfer for computed tomographic angiography with a view to revascularisation

**Q4.2** A 54-year-old woman with type 2 diabetes attends with 30 hours of right iliac fossa pain, fever and anorexia. Pulse is 92 per minute, blood pressure 130/80 mmHg, temperature 38.1 degrees Celsius. There is tenderness and a vague fullness in the right iliac fossa but no generalised peritonism. White cell count is  $17.4 \times 10^9/\text{L}$  and C-reactive protein is 210 mg/L. Contrast-enhanced computed tomography shows an inflamed appendix with a walled-off periappendiceal collection measuring 5.5 cm, no free intraperitoneal gas and no generalised free fluid. She is haemodynamically stable. What is the most appropriate management?

- A Intravenous antibiotics with percutaneous image-guided drainage of the collection
- B Immediate laparoscopic appendicectomy with drainage of the collection
- C Immediate open right hemicolectomy
- D Intravenous antibiotics alone with no drainage and no further imaging after discharge
- E Laparoscopic washout with a drain and a planned appendicectomy at 48 hours

**Q4.3** A 52-year-old woman with a body mass index of 35 attends with 10 hours of a painful, tender lump in the left groin, vomiting and cessation of flatus. She has had a reducible femoral hernia for two years. The lump is below and lateral to the pubic tubercle, irreducible, exquisitely tender, with erythema of the overlying skin. Pulse is 110 per minute, blood pressure 128/78 mmHg, temperature 37.8 degrees Celsius. Lactate is 2.4 mmol/L and white cell count  $16 \times 10^9/L$ . Abdominal radiography shows dilated small bowel loops with air-fluid levels.

- A** Attempt taxis under sedation and, if successful, list for elective repair in six weeks
- B** Computed tomography of the abdomen and pelvis before any operative decision
- C** Nasogastric decompression and intravenous fluids for 24 hours with reassessment
- D** Laparoscopic transabdominal preperitoneal repair with mesh placed over the reduced sac without inspecting the bowel
- E** Emergency exploration of the groin with assessment of the contents and repair of the defect

## What this chapter covers

### AREA OF THE SYLLABUS

Acute appendicitis: diagnosis, scoring, antibiotics versus appendicectomy  
 Perforated peptic ulcer: repair, lavage, Helicobacter eradication  
 Small bowel obstruction: adhesional, water-soluble contrast challenge, timing of surgery  
 Large bowel obstruction, sigmoid and caecal volvulus, stenting as a bridge  
 Acute mesenteric ischaemia: arterial, venous, non-occlusive  
 Lower gastrointestinal bleeding: localisation and intervention  
 Upper gastrointestinal bleeding: endoscopic, radiological and surgical control  
 Incarcerated and strangulated hernia  
 Ogilvie syndrome and colonic pseudo-obstruction  
 The emergency laparotomy pathway and its audited standards

## The rules that carry marks

| WHEN YOU SEE                                                            | WHAT IT MEANS, OR WHAT TO DO                                                                                                                       |
|-------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| acute mesenteric ischaemia                                              | revascularise before resecting; the pattern of occlusion distinguishes embolic, thrombotic and non-occlusive disease and dictates the intervention |
| obstructing left-sided colonic lesions without perforation or ischaemia | endoscopic stenting as a bridge converts an emergency operation into an elective, often stoma-free, resection                                      |

|                                                                                                                           |                                                                                        |
|---------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| Pain out of proportion with atrial fibrillation and lactic acidosis is mesenteric ischaemia until disproved               | in a hospital without angiography the correct next step is transfer, not local imaging |
| A high Alvarado score with a negative pregnancy test in a young woman justifies proceeding to laparoscopy without imaging | computed tomography belongs to the equivocal score                                     |
| A tender irreducible femoral hernia with obstruction must never be reduced by taxis                                       | explore the groin and inspect the contents before repairing the defect                 |
| Mesenteric venous thrombosis with a viable, enhancing bowel wall is treated with prompt therapeutic anticoagulation       | surgery is reserved for peritonitis or clinical deterioration                          |
| An irreducible, tender hernia with obstructive symptoms goes to theatre                                                   | a normal lactate never justifies waiting                                               |
| Non-operative treatment of uncomplicated appendicitis depends on the patient being able to return quickly if it fails     | geography and access are part of the shared decision                                   |

## What you are expected to know

- Perforated peptic ulcer is treated by omental patch and lavage, followed by NSAID withdrawal, proton pump inhibitor and Helicobacter eradication — definitive acid-reducing surgery is obsolete.
- A walled-off appendiceal abscess in a stable patient is drained and treated with antibiotics, with interval investigation of the colon to exclude a neoplasm.
- Large bowel obstruction on a plain film must be characterised by computed tomography before treatment, because mechanical obstruction and pseudo-obstruction look alike and are managed in opposite ways.
- In acute colonic pseudo-obstruction, correct electrolytes and withdraw opioids first; neostigmine and colonoscopic decompression are for failure of conservative measures or progressive caecal dilatation.
- An irreducible groin hernia with obstruction and local inflammatory change is an indication for immediate operation, never for forced reduction.
- In a stable, non-perforated left-sided colonic obstruction in a high-risk patient, a self-expanding metallic stent as a bridge avoids an emergency laparotomy and its audited mortality.

### ■ BOARD PEARL

In CT-confirmed uncomplicated appendicitis, antibiotic-first management and appendicectomy are both acceptable, and the choice belongs to a documented shared decision with the patient.

### ■ BOARD PEARL

In adhesive small bowel obstruction without signs of strangulation, decompress, resuscitate and give a water-soluble contrast challenge before considering operation.

## Trials you should be able to name

| TRIAL                                                   | WHAT IT IS ABOUT                                          |
|---------------------------------------------------------|-----------------------------------------------------------|
| CODA; APPAC                                             | —                                                         |
| APPAC; CODA                                             | —                                                         |
| CODA (antibiotics versus appendectomy for appendicitis) | antibiotics    appendectomy    appendicitis    randomised |

## Guidance this chapter is written against

WSES — Diagnosis and treatment of acute appendicitis — Jerusalem guidelines, 2025 edition (JAMA Surg 2026;161:283-295, PMID 41604201)

WSES — Bologna guidelines for adhesive small bowel obstruction (ASBO), 2017 update (World J Emerg Surg 2018;13:24, PMID 29946347)

WSES guidelines on the diagnosis and management of acute mesenteric ischaemia

WSES guidelines for the management of perforated peptic ulcer

WSES guidelines on the management of obstructing colon cancer, and ESGE guideline on colonic stenting

WSES guidelines on acute mesenteric ischaemia

WSES Diagnosis and treatment of acute appendicitis — Jerusalem guidelines, 2025 edition

WSES guidelines on emergency repair of complicated abdominal wall hernias

European Hernia Society guidelines on groin hernia management

WSES guidelines, management of large bowel obstruction

## Retrieval check

The three you answered before reading. Mark yourself honestly; a wrong answer you now understand is worth more than a right one you guessed.

### Q4.1 CORRECT ANSWER E

This is embolic acute mesenteric ischaemia in a hospital that cannot diagnose or revascularise it, so the decision is immediate transfer, not local temporising.

Why: Pain out of proportion, atrial fibrillation, acidosis and a rising lactate make the diagnosis on clinical grounds. Survival depends on restoring flow, and a small hospital with no angiography and no intensive care cannot do that. She has no peritonitis yet, so there is a window in which revascularisation may still salvage bowel. Transfer decided in minutes is worth more than any test done locally.

Option A: A non-angiographic scan will not show the occlusion adequately and buys hours the bowel does not have. Option B: Laparotomy without revascularisation in a hospital with no intensive care bed removes dead bowel and leaves the occlusion untreated. Option E: Correct — it moves her towards the only intervention that changes the outcome, without wasting time on local imaging. Option C: Heparin alone treats neither an embolus lodged in the superior mesenteric artery nor the ischaemic bowel beyond it. Option D: Peritoneal lavage answers a question about contamination, not about arterial occlusion, and delays transfer.

*Pain out of proportion with atrial fibrillation and lactic acidosis is mesenteric ischaemia until disproved; in a hospital without angiography the correct next step is transfer, not local imaging.*

*WSES guidelines on acute mesenteric ischaemia*

#### **Q4.2 CORRECT ANSWER A**

A walled-off periappendiceal abscess in a stable patient is best treated by antibiotics and percutaneous drainage.

Why: A collection of this size responds well to drainage, and immediate surgery through a phlegmon carries a higher rate of bowel injury and stoma formation. She has no peritonitis and no instability, so there is no indication to operate tonight. Interval imaging or colonoscopy after recovery is required to exclude an underlying neoplasm, particularly at her age. Interval appendicectomy is then a discussion, not an automatic step.

Option B: Operating into an inflamed phlegmon risks injuring the caecum and ileum and converting a drainable abscess into a resection. Option A: Correct — source control by drainage plus antibiotics avoids a hazardous operation in an unfavourable field. Option C: Right hemicolectomy is a major resection for what is an inflammatory process, and would be unjustified without a proven tumour. Option D: Antibiotics without drainage under-treat a 5.5 cm collection, and omitting interval investigation risks missing a caecal or appendiceal neoplasm. Option E: A laparoscopic washout with a planned early appendicectomy commits her to two operations in an inflamed field for no gain.

*A walled-off appendiceal abscess in a stable patient is drained and treated with antibiotics, with interval investigation of the colon to exclude a neoplasm.*

*WSES Diagnosis and treatment of acute appendicitis — Jerusalem guidelines, 2025 edition*

#### **Q4.3 CORRECT ANSWER E**

A tender, irreducible femoral hernia with obstruction and overlying erythema is strangulated and requires emergency exploration with inspection of the contents.

Why: The femoral canal is a rigid ring and strangulation happens early. Erythema, tenderness and a rising white cell count with obstruction are the clinical signature of compromised bowel. The operation must expose the sac, assess the viability of whatever is inside, resect if necessary and then close the defect. What is inside the sac decides whether mesh is used at all.

Option A: Taxis on a strangulated hernia risks reducing dead bowel into the peritoneal cavity, an error that can be fatal. Option B: CT delays an operation that is already indicated on clinical grounds and adds nothing to a decision that has been made. Option E: Correct — exploration allows the contents to be assessed and resected if needed before the defect is repaired. Option C: Conservative management does nothing for a mechanical strangulation and simply allows infarction to complete. Option D: Blind reduction with mesh placement forfeits inspection of the bowel and places prosthetic material in a potentially contaminated field.

*A tender irreducible femoral hernia with obstruction must never be reduced by taxis; explore the groin and inspect the contents before repairing the defect.*

*WSES guidelines on emergency repair of complicated abdominal wall hernias*

#### ■ KEY POINT

Come back to this chapter in two days, then in a week, then in three weeks. Do not reread it — cover the tables and say the rules out loud first, then check. Spacing and retrieval are the two things that work; rereading is not.





SECTION 5

# ABDOMINAL WALL AND HERNIA

---

# 5

THIS CHAPTER COVERS

- Groin anatomy, myopectineal orifice, nerves at risk
- Inguinal hernia: watchful waiting, open Lichtenstein, TEP and TAPP
- Femoral hernia and the emergency presentation
- Primary ventral and umbilical hernia
- Incisional hernia: EHS classification, component separation, TAR
- Mesh: type, position, fixation, mesh in the contaminated field
- Chronic post-herniorrhaphy groin pain: prevention and management
- Parastomal, lumbar, Spigelian and obturator hernias

6% of the paper · 300 questions in the bank behind this chapter

Figure 5: Where Abdominal Wall and Hernia sits in a general surgery examination.

### Before you read this chapter

Answer these three now, from what you already know. Write the letter down. Getting them wrong before you read is not a waste — attempting first is what makes the reading stick. The answers are at the end of the chapter, not here.

**Q5.1** A 40-year-old man with no comorbidity is being consented for elective repair of a symptomatic unilateral primary inguinal hernia. He is a self-employed carpenter and his main concern is the chance of being left with lasting groin discomfort, since a colleague has had pain for two years after an open operation. He has had no previous abdominal or pelvic surgery, no prostate operation and no lower midline incision. The unit performs a high volume of laparo-endoscopic hernia work and both consultants on the list are experienced in it. He asks which approach gives him the lowest risk of chronic pain and the quickest return to physical work.

- A Open Lichtenstein repair under local anaesthesia, as it has the lowest learning curve
- B Open Shouldice tissue repair, avoiding mesh altogether in a manual worker
- C Laparo-endoscopic repair, either TEP or TAPP, performed by the experienced team
- D Open plug and patch repair, as the plug obliterates the deep ring
- E Watchful waiting, since he is young and the hernia is unilateral

**Q5.2** A 31-year-old female medical student is being taught the anatomy of the groin during a totally extraperitoneal repair. The consultant asks her to identify the structures bounding a triangular area in which no tacks may be placed. She correctly identifies the vas deferens running medially and the gonadal vessels running laterally, converging towards the deep ring. She is asked what lies within this triangle and why it defines a no-fixation zone. She has already correctly named Cooper's ligament and the iliopubic tract elsewhere in the field.

- A The lateral femoral cutaneous nerve, injury to which causes meralgia paraesthetica
- B The obturator nerve and vessels as they enter the obturator canal
- C The femoral branch of the genitofemoral nerve, injury to which causes chronic neuropathic pain
- D The external iliac artery and vein, which may be catastrophically injured by dissection or tack placement
- E The inferior epigastric vessels, which separate direct from indirect defects

**Q5.3** A 40-year-old woman is admitted with 16 hours of colicky central abdominal pain and vomiting. She last passed flatus that morning. She is afebrile, pulse 96, blood pressure 128/74. The abdomen is distended and tympanitic with generalised discomfort but no peritonism. There is a tender, irreducible 2 cm lump below and lateral to the pubic tubercle on the right, which she had not previously noticed. She has had two vaginal deliveries and no abdominal operations. Plain abdominal radiography shows dilated small bowel loops. Her white cell count is 13.1 and lactate is 1.4 mmol/L.

- A** Attempt gentle taxis of the lump and, if successful, list for elective repair
- B** Admit for nasogastric decompression and intravenous fluids, and reassess in 24 hours
- C** Proceed to emergency operation to reduce and repair the hernia and assess bowel viability
- D** Request a CT of the abdomen and pelvis before making any surgical decision
- E** Arrange an urgent laparoscopic transabdominal preperitoneal repair on a scheduled list next week

## What this chapter covers

### AREA OF THE SYLLABUS

Groin anatomy, myopectineal orifice, nerves at risk  
 Inguinal hernia: watchful waiting, open Lichtenstein, TEP and TAPP  
 Femoral hernia and the emergency presentation  
 Primary ventral and umbilical hernia  
 Incisional hernia: EHS classification, component separation, TAR  
 Mesh: type, position, fixation, mesh in the contaminated field  
 Chronic post-herniorrhaphy groin pain: prevention and management  
 Parastomal, lumbar, Spigelian and obturator hernias  
 Loss of domain, botulinum toxin, preoperative progressive pneumoperitoneum  
 Paediatric inguinal hernia and hydrocele

## The rules that carry marks

| WHEN YOU SEE                                                                  | WHAT IT MEANS, OR WHAT TO DO                                                                                                              |
|-------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| At open inguinal repair, identify all three inguinal nerves and preserve them | divide only a nerve that is already damaged or genuinely obstructing correct mesh placement                                               |
| a contaminated emergency field where the fascia closes without tension        | suture closure and washout beat implanting permanent synthetic mesh                                                                       |
| the expertise exists                                                          | laparo-endoscopic repair of a primary unilateral inguinal hernia gives less chronic pain and earlier return to work than open mesh repair |

|                                                                                                             |                                                                                                                                                             |
|-------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The triangle of doom, between the vas deferens and the gonadal vessels, contains the external iliac vessels | the triangle of pain, lateral to the gonadal vessels, contains the lateral femoral cutaneous and genitofemoral nerves                                       |
| a contaminated or dirty field with bowel resection                                                          | permanent synthetic mesh should be avoided; suture closure with planned elective repair is preferable when biological or biosynthetic mesh is not available |
| Lumbar hernias lack complete fascial boundaries                                                             | repair demands a wide-overlap mesh anchored to the rib, iliac crest and paraspinal fascia rather than a sutured or narrowly overlapped closure              |
| A Spigelian hernia bulges through the semilunar line beneath an intact external oblique                     | it is easily missed clinically, and its narrow neck justifies elective repair once diagnosed                                                                |
| Parastomal hernia repaired by suture alone recurs in most patients                                          | mesh reinforcement is required, and relocation without mesh is not a solution                                                                               |

### What you are expected to know

- Primary ventral and umbilical hernias should be repaired with mesh rather than suture alone even at defect sizes around 1 to 2 cm, because suture repair recurs several times more often.
- A tender irreducible groin lump below and lateral to the pubic tubercle with obstruction is a strangulating femoral hernia and warrants immediate operation, with no place for taxis or for imaging that delays theatre.
- For EHS W3 midline incisional hernias, posterior component separation by transversus abdominis release with retromuscular mesh gives the advancement needed with less wound morbidity than anterior component separation.
- A tender irreducible groin lump below and lateral to the pubic tubercle with small bowel obstruction is a strangulating femoral hernia and requires emergency operation, not taxis and not a period of observation.
- Watchful waiting in groin hernia is decided by symptoms, not by whether the hernia reduces.
- A communicating hydrocele in a child under two is observed because the processus vaginalis usually closes spontaneously; a true inguinal hernia in a child is always repaired.

#### ■ BOARD PEARL

Adult umbilical hernias do not close spontaneously, and mesh reinforcement lowers recurrence even in small defects, so a flat preperitoneal mesh is the default elective repair.

#### ■ BOARD PEARL

Loss of domain, defined by a hernia sac holding more than about a fifth of the peritoneal volume, calls for preoperative preparation such as botulinum toxin or progressive pneumoperitoneum before a posterior component separation and retromuscular mesh.

## Trials you should be able to name

| TRIAL                       | WHAT IT IS ABOUT |
|-----------------------------|------------------|
| STITCH trial (2015, Lancet) | —                |
| PRIMA trial (2016, Lancet)  | —                |

## Guidance this chapter is written against

*HerniaSurge — International guidelines for groin hernia management, 2018 (Hernia 2018;22:1-165, PMID 29330835)*

*European Hernia Society guideline on the treatment of umbilical and epigastric hernias*

*European Hernia Society guideline on the management of umbilical and epigastric hernia*

*CDC surgical wound classification and principles of mesh selection in the contaminated field*

*European Hernia Society classification of primary and incisional abdominal wall hernias*

*CDC surgical wound classification and Ventral Hernia Working Group principles for mesh use in contaminated fields*

*HerniaSurge — International guidelines for groin hernia management, 2018*

*European Hernia Society guidance on the management of complex abdominal wall hernia*

*European Hernia Society guideline on parastomal hernia*

*European Hernia Society principles on complex incisional hernia and component separation*

## Retrieval check

The three you answered before reading. Mark yourself honestly; a wrong answer you now understand is worth more than a right one you guessed.

### Q5.1 CORRECT ANSWER C

For a symptomatic primary unilateral inguinal hernia in a unit with the expertise, a laparo-endoscopic repair offers the lowest chronic pain risk and the fastest return to work.

Why: Randomised evidence consistently shows less chronic groin pain and earlier return to activity after TEP or TAPP than after open mesh repair. The trade-off is a longer learning curve and a requirement for general anaesthesia. Both conditions are met here: the team is experienced and he is a fit young man. He has no prior lower abdominal surgery, so neither approach is contraindicated.

Option A: Lichtenstein is an excellent operation and the right choice where laparoscopic expertise is lacking, but it carries more chronic pain than a laparoscopic repair.

Option C: Correct — it directly addresses his two stated priorities in a unit competent to deliver it.

Option B: Shouldice avoids mesh but has higher recurrence than mesh repair and no advantage in chronic pain.

Option D: Plug repairs offer no benefit over a flat mesh and plug migration and meshoma are recognised problems.

Option E: Watchful waiting applies to minimally symptomatic hernias, and his are symptomatic enough to interfere with his trade.

*Where the expertise exists, laparo-endoscopic repair of a primary unilateral inguinal hernia gives less chronic pain and earlier return to work than open mesh repair.*

*HerniaSurge — International guidelines for groin hernia management, 2018 (Hernia 2018;22:1-165, PMID 29330835)*

**Q5.2 CORRECT ANSWER D**

The triangle bounded by the vas deferens medially and the gonadal vessels laterally is the triangle of doom, and it contains the external iliac vessels.

Why: The peritoneal reflection forms its base. Beneath the thin layer of areolar tissue lie the external iliac artery and vein and, deeper still, the femoral nerve. A tack or a careless sweep of the dissector here produces torrential haemorrhage in a space that is hard to expose laparoscopically. This is why the safe fixation points are Cooper's ligament medially and the tissue above the iliopubic tract laterally.

Option D: Correct — the external iliac vessels lie within the boundaries described, making this a strict no-dissection and no-fixation zone. Option A: The lateral femoral cutaneous nerve lies lateral to the gonadal vessels, in the triangle of pain, not in this triangle. Option B: The obturator structures lie inferior and medial, below Cooper's ligament in the corona mortis territory, not between the vas and the gonadal vessels. Option C: The femoral branch of the genitofemoral nerve is also a triangle of pain structure, lateral to the boundary described. Option E: The inferior epigastric vessels run cephalad on the anterior abdominal wall and form the roof of the dissection, not the contents of this triangle.

*The triangle of doom, between the vas deferens and the gonadal vessels, contains the external iliac vessels; the triangle of pain, lateral to the gonadal vessels, contains the lateral femoral cutaneous and genitofemoral nerves.*

*HerniaSurge — International guidelines for groin hernia management, 2018 (Hernia 2018;22:1-165, PMID 29330835)*

**Q5.3 CORRECT ANSWER C**

This is an obstructed femoral hernia and it needs an emergency operation.

Why: A tender irreducible lump below and lateral to the pubic tubercle with small bowel obstruction is a femoral hernia until proven otherwise. The femoral ring is narrow and rigid, so strangulation follows incarceration quickly. Waiting for lactate to rise or for peritonism to appear means operating on dead bowel. The operation both relieves the obstruction and allows inspection of the contents.

Option A: Taxis risks reducing ischaemic bowel en masse into the abdomen, where it cannot be inspected. Option B: Conservative management of an obstructed femoral hernia allows strangulation to progress. Option C: Correct — emergency exploration relieves the obstruction and permits assessment of bowel viability. Option D: CT may be reasonable when the diagnosis is unclear, but here the clinical findings are diagnostic and imaging only delays theatre. Option E: Any delay of days is unacceptable for an obstructed femoral hernia.

*A tender irreducible groin lump below and lateral to the pubic tubercle with small bowel obstruction is a strangulating femoral hernia and requires emergency operation, not taxis and not a period of observation.*

*HerniaSurge — International guidelines for groin hernia management, 2018*

**■ KEY POINT**

Come back to this chapter in two days, then in a week, then in three weeks. Do not reread it — cover the tables and say the rules out loud first, then check. Spacing and retrieval are the two things that work; rereading is not.





## SECTION 6

# BENIGN HEPATOPANCREATOBILIARY DISEASE

---

### THIS CHAPTER COVERS

- Biliary anatomy, variants, and the critical view of safety
  - Acute cholecystitis: Tokyo severity grading, timing of cholecystectomy
  - Choledocholithiasis: predictors, ERCP versus bile duct exploration
  - Acute cholangitis: diagnosis, drainage, antibiotics
  - Bile duct injury: Strasberg classification, timing and technique of reconstruction
  - Gallstone pancreatitis: severity, timing of cholecystectomy and ERCP
  - Acute pancreatitis: Atlanta classification, fluid strategy, step-up necrosectomy
  - Chronic pancreatitis: pain, exocrine insufficiency, drainage versus resection
-

6% of the paper · 300 questions in the bank behind this chapter

Figure 6: Where Benign Hepatopancreatobiliary Disease sits in a general surgery examination.

### Before you read this chapter

Answer these three now, from what you already know. Write the letter down. Getting them wrong before you read is not a waste — attempting first is what makes the reading stick. The answers are at the end of the chapter, not here.

**Q6.1** A 51-year-old woman is listed for laparoscopic cholecystectomy after two episodes of biliary colic. Preoperative bilirubin was 34 micromol/L falling to 16 micromol/L, alkaline phosphatase 210 U/L and the common bile duct measured 8 mm on ultrasound with stones in the gallbladder only. Magnetic resonance cholangiopancreatography was not obtained. At operation the critical view of safety is achieved easily and intraoperative cholangiography shows a single 4 mm filling defect in the distal common bile duct with contrast passing freely into the duodenum. The proximal ducts are normal. The surgeon is trained in laparoscopic duct exploration and a choledochoscope is available. What is the most appropriate next step?

- A Laparoscopic transcystic common bile duct exploration and stone extraction at this operation
- B Complete the cholecystectomy and arrange postoperative endoscopic retrograde cholangiopancreatography within 48 hours
- C Complete the cholecystectomy and observe, as a 4 mm stone will pass spontaneously
- D Convert to open surgery and perform choledochotomy with T-tube drainage
- E Place a transcystic biliary drain and defer stone clearance for six weeks

**Q6.2** A 47-year-old man is 40 minutes into a laparoscopic cholecystectomy for repeated biliary colic. The gallbladder is chronically fibrotic and Hartmann's pouch is densely adherent to what appears to be a tubular structure running parallel to it. After careful dissection the hepatocystic triangle remains obscured by fibrous tissue, the lower third of the gallbladder cannot be separated from the liver bed, and only one tubular structure can be traced with confidence. Bleeding is minimal. The patient is stable. You have been operating for forty minutes without progress and cannot demonstrate the critical view of safety. An intraoperative cholangiography set is available.

- A Clip and divide the single tubular structure identified as the cystic duct and proceed
- B Continue blunt dissection in the hepatocystic triangle until the anatomy becomes clear
- C Perform a subtotal cholecystectomy, evacuating the stones and closing the gallbladder remnant, with a drain
- D Abandon the operation, close and refer to a hepatobiliary centre for interval surgery
- E Convert to open and perform a top-down dissection from the fundus to the cystic duct

**Q6.3** A 27-year-old woman is referred after an ultrasound performed for dyspepsia showed a 3 cm well-circumscribed lesion in segment IV of the liver. She takes no oral contraception, has never been pregnant and has no history of liver disease. Serology for hepatitis B and C is negative and liver biochemistry is normal. Contrast-enhanced magnetic resonance imaging with a hepatobiliary contrast agent shows a lesion that is homogeneous, isointense to liver on the hepatobiliary phase, with a central stellate scar that enhances late. She is asymptomatic and anxious about cancer. What is the most appropriate management?

- A Reassurance and discharge, with no requirement for routine imaging surveillance
- B Percutaneous core biopsy to obtain a tissue diagnosis
- C Laparoscopic resection of segment IV
- D Six-monthly ultrasound surveillance indefinitely with alpha-fetoprotein measurement
- E Transarterial embolisation to reduce lesion size and prevent haemorrhage

## What this chapter covers

### AREA OF THE SYLLABUS

Biliary anatomy, variants, and the critical view of safety  
 Acute cholecystitis: Tokyo severity grading, timing of cholecystectomy  
 Choledocholithiasis: predictors, ERCP versus bile duct exploration  
 Acute cholangitis: diagnosis, drainage, antibiotics  
 Bile duct injury: Strasberg classification, timing and technique of reconstruction  
 Gallstone pancreatitis: severity, timing of cholecystectomy and ERCP  
 Acute pancreatitis: Atlanta classification, fluid strategy, step-up necrosectomy  
 Chronic pancreatitis: pain, exocrine insufficiency, drainage versus resection  
 Benign liver lesions: haemangioma, FNH, adenoma, hydatid disease  
 Portal hypertension for the general surgeon: variceal bleeding, TIPS, cirrhotic risk  
 Percutaneous cholecystostomy and the unfit patient

## The rules that carry marks

| WHEN YOU SEE                                                                                                       | WHAT IT MEANS, OR WHAT TO DO                                                                                                             |
|--------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| Mirizzi syndrome with a cholecystocholedochal fistula there is no safe plane between gallbladder and duct: convert | perform subtotal cholecystectomy and manage the duct defect deliberately                                                                 |
| the critical view of safety cannot be obtained                                                                     | subtotal cholecystectomy is the bail-out of choice — not top-down dissection, and not conversion to open with the same unsafe dissection |

|                                                                                                       |                                                                                                                                                               |
|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Grade III cholangitis the source of sepsis is the obstructed duct                                     | so antibiotics and organ support are only a bridge to drainage — never a substitute for it                                                                    |
| cirrhotic umbilical hernia                                                                            | control the ascites before the hernia — but do not wait for rupture, which carries far higher mortality than elective repair                                  |
| acute cholangitis                                                                                     | antibiotics buy time but biliary drainage is the treatment, and it should not be deferred for confirmatory imaging when the diagnosis is already clear        |
| chronic pancreatitis                                                                                  | a dilated main duct without a head-dominant inflammatory mass is managed by surgical drainage, and resection is reserved for the mass or for diagnostic doubt |
| intraoperative cholangiography shows a small distal duct stone and transcystic expertise is available | single-stage laparoscopic clearance is preferred over a planned second endoscopic procedure                                                                   |
| the critical view of safety cannot be achieved                                                        | the correct bail-out is subtotal cholecystectomy, not persistence, and not top-down dissection                                                                |

## What you are expected to know

- Rebleeding after adequate endoscopic and vasoactive therapy is an indication for a transjugular intrahepatic portosystemic shunt, not for another attempt at banding.
- The critical view of safety has three components: a cleared hepatocystic triangle, the lowest third of the gallbladder separated from the cystic plate, and only two structures entering the gallbladder.
- Focal nodular hyperplasia that retains hepatobiliary contrast agent is benign, does not bleed and does not degenerate, and requires neither resection nor surveillance.
- Retention of hepatobiliary-specific contrast distinguishes focal nodular hyperplasia from hepatocellular adenoma and, once confident, no treatment or follow-up is required.
- The critical view of safety has three components, and current safe cholecystectomy guidance asks that the achieved view be documented photographically before any structure is divided.
- Mirizzi syndrome with a cholecystocholedochal fistula involving a large part of the duct circumference is not a laparoscopic problem: it needs open subtotal cholecystectomy and biliary-enteric reconstruction.

### ■ BOARD PEARL

Fever and a raised C-reactive protein in the first week of necrotising pancreatitis usually reflect the inflammatory response, not infection; sterile necrosis in an improving patient is managed without drainage or antibiotics.

### ■ BOARD PEARL

In severe acute cholangitis, biliary drainage is definitive treatment — when it cannot be delivered locally, antibiotics and resuscitation are a bridge to immediate transfer, never a substitute for drainage.

## Trials you should be able to name

| TRIAL                                                                                                         | WHAT IT IS ABOUT                                                      |
|---------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|
| POINTER                                                                                                       | immediate versus postponed drainage infected necrotising pancreatitis |
| PANTER; TENSION; POINTER                                                                                      | —                                                                     |
| CHOCOLATE                                                                                                     | laparoscopic cholecystectomy percutaneous cholecystostomy high risk   |
| PANTER                                                                                                        | step-up approach necrotising pancreatitis necrosectomy                |
| CHOLECYSTECTOMY versus percutaneous cholecystostomy in high-risk patients was compared in the CHOCOLATE trial | —                                                                     |
| TENSION; POINTER; PANTER                                                                                      | —                                                                     |
| TENSION                                                                                                       | endoscopic step-up surgical necrotising pancreatitis                  |

## Guidance this chapter is written against

*SAGES multi-society safe cholecystectomy guideline, 2020 (Surg Endosc 2020;34:2827-2855); Strasberg classification of bile duct injury*

*IAP/APA/EPC/IPC/JPS revised guidelines on acute pancreatitis (2025); Revised Atlanta classification of acute pancreatitis (2012)*

*Baveno VII (2022), portal hypertension*

*SAGES multi-society guideline on safe cholecystectomy and prevention of bile duct injury, 2020 (Surg Endosc 2020;34:2827-2855)*

*Tokyo Guidelines TG18 (2018)*

*Baveno VII (2022); ACG guideline on perioperative risk assessment in cirrhosis, 2025*

*UEG/HaPanEU guideline on chronic pancreatitis, 2017 (United European Gastroenterol J 2017;5:153-99)*

*ESGE guideline on endoscopic management of common bile duct stones (2019)*

*SAGES multi-society guideline, safe cholecystectomy and prevention of bile duct injury, 2020 (Surg Endosc 2020;34:2827-2855)*

*EASL clinical practice guidelines on the management of benign liver tumours*

## Retrieval check

The three you answered before reading. Mark yourself honestly; a wrong answer you now understand is worth more than a right one you guessed.

**Q6.1 CORRECT ANSWER A**

A small distal stone found on cholangiography in a stable patient, with the skills and equipment present, is best cleared transcystically at the same anaesthetic.

Why: Single-stage management gives equivalent duct clearance to endoscopic clearance with one anaesthetic and one admission. The transcystic route avoids choledochotomy and its stricture and leak risks. A 4 mm stone with a patent papilla is well suited to transcystic extraction. Postoperative endoscopy commits her to a second procedure and its pancreatitis risk.

Option B: Postoperative endoscopy is a reasonable fallback, but it is second best when a trained surgeon and choledochoscope are already available. Option A: Correct, because single-stage transcystic clearance treats the stone now with one anaesthetic and no papillary intervention. Option C: Expectant management of a demonstrated duct stone risks cholangitis and pancreatitis after discharge. Option D: Choledochotomy with a T-tube is disproportionate for a 4 mm stone reachable through the cystic duct. Option E: Deferring clearance for six weeks leaves an obstructing stone in situ with no advantage.

*When intraoperative cholangiography shows a small distal duct stone and transcystic expertise is available, single-stage laparoscopic clearance is preferred over a planned second endoscopic procedure.*

*ESGE guideline on endoscopic management of common bile duct stones (2019)*

**Q6.2 CORRECT ANSWER C**

When the critical view of safety cannot be achieved, subtotal cholecystectomy is the recommended bail-out.

Why: Every major bile duct injury begins with a surgeon who believed the structure was the cystic duct. Subtotal cholecystectomy removes the stones and the diseased mucosa without dissecting the hepatocystic triangle at all. It carries a higher bile leak rate, most of which is managed endoscopically, and that is a far better trade than a transected common duct. Cholangiography helps when anatomy is uncertain, but it does not make a frozen triangle safe to dissect.

Option A: Clipping a structure you cannot confidently trace to the gallbladder is exactly how the common duct is divided. Option B: Persisting in a fibrotic triangle after forty minutes increases risk rather than clarity. Option C: Correct — it is the recommended bail-out when the critical view cannot be obtained. Option D: Closing without removing the stones leaves the disease untreated and the reoperation harder. Option E: Top-down dissection in severe inflammation risks the right hepatic pedicle and is no longer the preferred bail-out.

*If the critical view of safety cannot be achieved, the correct bail-out is subtotal cholecystectomy, not persistence, and not top-down dissection.*

*SAGES multi-society guideline, safe cholecystectomy and prevention of bile duct injury, 2020 (Surg Endosc 2020;34:2827-2855)*

**Q6.3 CORRECT ANSWER A**

The imaging is diagnostic of focal nodular hyperplasia, a benign lesion with no malignant potential and negligible bleeding risk, so reassurance is sufficient.

Why: Retention of hepatobiliary contrast reflects functioning hepatocytes and bile ductules, which distinguishes focal nodular hyperplasia from adenoma. The central scar with delayed enhancement supports the diagnosis. These lesions do not degenerate and they do not rupture. Once the imaging is characteristic, nothing further is needed.

Option B: Biopsy carries a bleeding and sampling risk to confirm what characteristic magnetic resonance imaging has already established. Option C: Resection exposes a healthy young woman to major hepatic surgery for a lesion that will never harm her. Option A: Correct — characteristic imaging of focal nodular hyperplasia needs neither intervention nor follow-up. Option D: Indefinite surveillance medicalises a benign lesion and alpha-fetoprotein has no role in a non-cirrhotic liver here. Option E: Embolisation is a treatment for symptomatic or bleeding lesions and this lesion is neither.

*Focal nodular hyperplasia that retains hepatobiliary contrast agent is benign, does not bleed and does not degenerate, and requires neither resection nor surveillance.*

*EASL clinical practice guidelines on the management of benign liver tumours*

**■ KEY POINT**

Come back to this chapter in two days, then in a week, then in three weeks. Do not reread it — cover the tables and say the rules out loud first, then check. Spacing and retrieval are the two things that work; rereading is not.





## SECTION 7

# BENIGN COLORECTAL DISEASE

---



### THIS CHAPTER COVERS

- Diverticular disease: classification, non-operative management, elective resection
- Perforated diverticulitis: lavage, Hartmann, primary anastomosis
- Ulcerative colitis: acute severe colitis, colectomy, IPAA and its complications
- Crohn disease: strictureplasty, resection margins, perianal disease
- Toxic megacolon
- Clostridioides difficile colitis and the role of colectomy
- Colonic volvulus and pseudo-obstruction
- Angiodysplasia and colonic bleeding

5% of the paper · 251 questions in the bank behind this chapter

Figure 7: Where Benign Colorectal Disease sits in a general surgery examination.

### Before you read this chapter

Answer these three now, from what you already know. Write the letter down. Getting them wrong before you read is not a waste — attempting first is what makes the reading stick. The answers are at the end of the chapter, not here.

**Q7.1** A 65-year-old woman with hypertension presents with 48 hours of left iliac fossa pain and fever. Temperature is 38.4 degrees Celsius, pulse 98, blood pressure 130/78. There is left iliac fossa tenderness with a palpable tender mass and no generalised peritonitis. White cell count is 16,400 per microlitre and C-reactive protein 188 mg/L. Contrast-enhanced CT shows sigmoid diverticulitis with a 6 cm rim-enhancing pelvic collection containing gas, no free intraperitoneal gas and a small volume of pelvic fluid. She is immunocompetent and haemodynamically stable. Interventional radiology is available on site. What is the most appropriate management?

- A Intravenous antibiotics alone with serial clinical and C-reactive protein monitoring
- B Laparoscopic peritoneal lavage and drain placement
- C Image-guided percutaneous drainage of the collection with intravenous antibiotics
- D Emergency Hartmann procedure
- E Emergency sigmoid resection with primary anastomosis and defunctioning loop ileostomy

**Q7.2** A 57-year-old man is admitted to a rural district hospital with two days of left-sided abdominal pain, fever and vomiting. The nearest CT scanner is ninety minutes away by road and is not staffed overnight; there is no interventional radiology service and no intensive care bed. On examination he has a temperature of 38.4 C, pulse 108, blood pressure 118/70, and generalised abdominal tenderness with involuntary guarding across the lower abdomen. White cell count is 19,000/microlitre and lactate 2.6 mmol/L. An erect chest radiograph shows free gas under both hemidiaphragms. He is fluid responsive and passes urine after two litres of crystalloid.

- A Transfer for CT ninety minutes away to define the Hinchey stage before any operation
- B Start piperacillin-tazobactam and observe for 24 hours with serial examination
- C Immediate laparotomy locally, with sigmoid resection and a decision on anastomosis or end colostomy at operation
- D Laparoscopic peritoneal lavage and drain placement without resection
- E Insert a percutaneous drain under ultrasound guidance and reassess in the morning

**Q7.3** A 37-year-old man with a nine-year history of ileal Crohn disease attends with six months of postprandial cramping, audible borborygmi and weight loss of 5 kg. He has no fever and no palpable mass. Magnetic resonance enterography shows three separate short fibrotic strictures in the mid-ileum over a 70 cm segment, each 3 to 4 cm long, with no penetrating disease, no abscess and no proximal dilatation of the duodenum. He has already undergone a 40 cm ileocaecal resection six years ago. C-reactive protein is 8 mg/L, albumin 38 g/L. He is on azathioprine and is not on corticosteroids.

- A** Resect the entire 70 cm segment containing all three strictures with a single anastomosis
- B** Escalate to an anti-tumour necrosis factor agent and re-image in six months
- C** Perform a side-to-side isoperistaltic strictureplasty across the whole 70 cm segment
- D** Perform Heineke-Mikulicz strictureplasty at each of the three strictures
- E** Create a defunctioning loop ileostomy proximal to the diseased segment

## What this chapter covers

### AREA OF THE SYLLABUS

Diverticular disease: classification, non-operative management, elective resection

Perforated diverticulitis: lavage, Hartmann, primary anastomosis

Ulcerative colitis: acute severe colitis, colectomy, IPAA and its complications

Crohn disease: strictureplasty, resection margins, perianal disease

Toxic megacolon

Clostridioides difficile colitis and the role of colectomy

Colonic volvulus and pseudo-obstruction

Angiodysplasia and colonic bleeding

Stoma formation, complications and reversal

Dysplasia surveillance in inflammatory bowel disease

## The rules that carry marks

| WHEN YOU SEE                                            | WHAT IT MEANS, OR WHAT TO DO                                                                                                                                                                                                      |
|---------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Hinchey III diverticulitis the operation is a resection | and in a stable, immunocompetent, well-nourished patient operated by an experienced surgeon, primary anastomosis with a defunctioning loop ileostomy is preferred over the Hartmann procedure because reversal is far more likely |
| severe lower gastrointestinal haemorrhage on warfarin   | reverse with prothrombin complex concentrate and vitamin K and localise before resecting; where localisation is unavailable, early transfer beats blind surgery                                                                   |

|                                                                                                                            |                                                                                                                                           |
|----------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Increased frequency with fever after ileostomy closure and diffuse pouch body inflammation on endoscopy is acute pouchitis | exclude infection and non-steroidal drugs, then treat first-line with ciprofloxacin or metronidazole before considering escalation        |
| sigmoid volvulus without peritonism or raised lactate                                                                      | endoscopic detorsion is the first step, and the mucosal appearance at endoscopy decides whether resection is needed now or can be planned |

## What you are expected to know

- Short fibrotic Crohn strictures under about 10 cm are treated by Heineke-Mikulicz stricture-plasty to preserve bowel length, with resection reserved for phlegmon, fistula or a suspicious lesion.
- A diverticular abscess of about 4 cm or more that is percutaneously accessible should be drained radiologically with antibiotics, reserving resection for failure of that approach.
- For Hinchey III perforated diverticulitis in a stable, immunocompetent patient, primary anastomosis with a loop ileostomy is preferred over Hartmann because the stoma is far more likely to be reversed.
- Short fibrotic Crohn strictures without sepsis, penetrating disease or malnutrition are treated by Heineke-Mikulicz strictureplasty, which preserves bowel length in patients facing repeated operations.
- Fulminant *Clostridioides difficile* colitis with shock, rising lactate or organ failure requires emergency subtotal colectomy with end ileostomy; the decision is clinical and must not be delayed for imaging.
- A Crohn stricture with normal calprotectin and no mural enhancement is fibrotic, and fibrosis is treated mechanically, not medically.
- A short isolated fibrostenotic terminal ileal stricture in a patient not previously operated on is best treated by limited ileocaecal resection, not by escalating immunosuppression.
- Uncomplicated CT-confirmed diverticulitis in an immunocompetent patient with a low CRP, no fever and adequate home support can be managed as an outpatient without antibiotics.
- Hinchey III peritonitis in a stable, immunocompetent patient with an experienced surgeon favours resection with primary anastomosis and diverting ileostomy over Hartmann, because the permanent stoma rate is lower.
- Fulminant *Clostridioides difficile* colitis with shock, rising lactate, marked leucocytosis or megacolon requires subtotal colectomy with end ileostomy, and delay for further imaging or medical therapy costs lives.

### ■ BOARD PEARL

When a parastomal hernia complicates a potentially reversible stoma in a fit patient, reversal is the definitive repair — assess the rectal stump and sphincter first.

### ■ BOARD PEARL

When free gas and peritonitis already indicate laparotomy, imaging that cannot change the decision must never delay source control, least of all in a hospital without critical care.

## Trials you should be able to name

| TRIAL                    | WHAT IT IS ABOUT                                                             |
|--------------------------|------------------------------------------------------------------------------|
| LADIES                   | laparoscopic peritoneal lavage resection purulent peritonitis diverticulitis |
| DIVERTI                  | primary anastomosis Hartmann perforated diverticulitis                       |
| DIABOLO                  | observational versus antibiotic treatment uncomplicated diverticulitis       |
| LADIES; DIVERTI; SCANDIV | —                                                                            |
| DIVERTI; LADIES          | —                                                                            |
| LOLA                     | laparoscopic lavage Hinchey III perforated diverticulitis                    |

## Guidance this chapter is written against

European Hernia Society guidelines on the prevention and treatment of parastomal hernias

ECCO — Guidelines on therapeutics in Crohn disease — surgical treatment, 2024 (*J Crohns Colitis* 2024;18:1556-1582, PMID 38878002)

WSES — Management of acute colonic diverticulitis in the emergency setting, 2020 update

ECCO — Guidelines on therapeutics in Crohn disease — surgical treatment, 2024

WSES guidelines for the management of *Clostridioides difficile* infection in surgical patients

WSES — Management of acute colonic diverticulitis in the emergency setting, 2020 update (*World J Emerg Surg* 2020;15:32)

WSES guidelines on acute lower gastrointestinal bleeding

ECCO — Guidelines on therapeutics in Crohn disease — surgical treatment, 2024 (*J Crohns Colitis* 2024;18:1556-1582)

ECCO — Guidelines on therapeutics in ulcerative colitis — surgical treatment, 2022 (*J Crohns Colitis* 2022;16:179-189)

WSES guidance on emergency management of colonic obstruction

## Retrieval check

The three you answered before reading. Mark yourself honestly; a wrong answer you now understand is worth more than a right one you guessed.

### Q7.1 CORRECT ANSWER C

A drainable pelvic abscess complicating diverticulitis in a stable patient is treated by image-guided percutaneous drainage with antibiotics.

Why: The collection is 6 cm, well defined and accessible, which is exactly the situation where drainage succeeds. Drainage plus antibiotics resolves most such abscesses and converts an emergency into a planned decision. She has no free perforation and no peritonitis, so nothing mandates a laparotomy tonight. If she fails to settle over the next 48 to 72 hours, resection follows.

Option A: Antibiotics alone are reasonable for small pericolic collections but under-treat a 6 cm gas-containing pelvic abscess. Option B: Lavage does not drain a walled-off pelvic collection reliably and has not proven itself even in purulent peritonitis. Option C: Correct —

source control with the least physiological cost, preserving the option of an elective resection later. Option D: A Hartmann procedure in a stable patient with a drainable abscess commits her to a stoma she may never need. Option E: Resection with anastomosis is an operation for free perforation, not for an abscess amenable to a radiological drain.

*A diverticular abscess of about 4 cm or more that is percutaneously accessible should be drained radiologically with antibiotics, reserving resection for failure of that approach.*

*WSES — Management of acute colonic diverticulitis in the emergency setting, 2020 update*

### Q7.2 CORRECT ANSWER C

He has perforated diverticulitis with peritonitis and pneumoperitoneum, and source control must happen where he is.

Why: The diagnosis of a perforated viscus is already made by clinical signs plus free gas. A CT would refine the stage but not change the need for laparotomy tonight. Transferring an unstable septic patient ninety minutes for imaging, then back again, costs hours of source control. In a hospital with no intensive care bed, delay is the thing most likely to kill him.

Option A: Imaging that cannot change the decision is not worth a three-hour round trip in a septic patient. Option B: Antibiotics alone do not achieve source control in generalised peritonitis with free gas. Option C: Correct — prompt resection with an intraoperative decision on restoring continuity is the safe course here. Option D: Lavage leaves the perforated segment in situ and has a high reoperation rate, which this hospital cannot support. Option E: A percutaneous drain treats a contained abscess, not free perforation with generalised peritonitis.

*When free gas and peritonitis already indicate laparotomy, imaging that cannot change the decision must never delay source control, least of all in a hospital without critical care.*

*WSES — Management of acute colonic diverticulitis in the emergency setting, 2020 update*

### Q7.3 CORRECT ANSWER D

Three short fibrotic strictures in a man with previous small bowel loss are best treated by bowel-conserving strictureplasty at each site.

Why: The disease here is fibrostenotic, not inflammatory, so medical escalation will not open a fibrotic stricture. He has already lost 40 cm of ileum and further long resections move him towards short bowel. Short strictures of 3 to 4 cm are ideally suited to the Heineke-Mikulicz technique. There is no sepsis, no penetrating disease and no malnutrition to contraindicate it.

Option A: Resecting 70 cm to treat 12 cm of stricture sacrifices healthy bowel he cannot spare. Option D: Correct — short fibrotic strictures with no sepsis are the classic indication for Heineke-Mikulicz strictureplasty. Option B: Biologic therapy addresses inflammation, and a fibrotic stricture will not respond to it. Option C: The side-to-side isoperistaltic technique is designed for a long contiguous diseased segment, not for discrete short strictures separated by normal bowel. Option E: Defunctioning leaves the obstruction untreated and commits him to a stoma he does not need.

*Short fibrotic Crohn strictures without sepsis, penetrating disease or malnutrition are treated by Heineke-Mikulicz strictureplasty, which preserves bowel length in patients facing repeated operations.*

*ECCO — Guidelines on therapeutics in Crohn disease — surgical treatment, 2024*

#### ■ KEY POINT

Come back to this chapter in two days, then in a week, then in three weeks. Do not reread it — cover the tables and say the rules out loud first, then check. Spacing and retrieval are the two things that work; rereading is not.





## SECTION 8

# PERIOPERATIVE CARE, ERAS AND PATIENT SAFETY

---



### THIS CHAPTER COVERS

- Preoperative assessment, risk scoring, CPET, frailty
- Cardiac risk and management of antiplatelets and anticoagulants
- ERAS protocols and their evidence, by specialty
- Fluid therapy: goal-directed, restrictive versus liberal
- Analgesia: multimodal, regional blocks, opioid stewardship
- Venous thromboembolism prophylaxis and extended prophylaxis
- Antibiotic prophylaxis and surgical site infection bundles
- WHO checklist, human factors, never events, incident reporting

5% of the paper · 250 questions in the bank behind this chapter

Figure 8: Where Perioperative Care, ERAS and Patient Safety sits in a general surgery examination.

### Before you read this chapter

Answer these three now, from what you already know. Write the letter down. Getting them wrong before you read is not a waste — attempting first is what makes the reading stick. The answers are at the end of the chapter, not here.

**Q8.1** A 47-year-old woman with a body mass index of 26 kg/m<sup>2</sup> and no significant comorbidity undergoes an uncomplicated elective laparoscopic appendicectomy for recurrent right iliac fossa pain. She is mobile on the ward within four hours of returning from theatre and is tolerating a normal diet. She takes no regular medication and has no personal or family history of thrombosis. The junior doctor asks whether she requires pharmacological thromboprophylaxis, noting that the ward protocol prescribes low molecular weight heparin to every surgical inpatient. What is the most appropriate approach to her thromboprophylaxis?

- A Undertake an individual risk assessment balancing thrombosis and bleeding risk, and prescribe accordingly
- B Prescribe extended low molecular weight heparin for twenty-eight days after discharge
- C Prescribe therapeutic-dose low molecular weight heparin until she is fully mobile
- D Withhold all prophylaxis because laparoscopic surgery carries no thrombotic risk
- E Prescribe aspirin 75 mg daily for two weeks as the sole prophylactic measure

**Q8.2** A 59-year-old woman with treated hypertension and a body mass index of 29 kg/m<sup>2</sup> is undergoing an elective open sigmoid colectomy for recurrent diverticulitis with a short stricture. She received intravenous cefuroxime and metronidazole at induction, ten minutes before knife to skin. The operation is difficult because of dense pelvic adhesions. Three and a half hours after induction the anastomosis has not yet been fashioned and measured blood loss is 1.4 litres. Her core temperature is 36.4 degrees Celsius, she is normotensive and forced-air warming is running. The scrub nurse asks whether anything further is needed for infection prevention. What is the most appropriate next step?

- A Give a further dose of cefuroxime now
- B Continue without further antibiotic and start a 24-hour postoperative course
- C Give no further prophylaxis, since the induction dose was correctly timed
- D Switch to piperacillin-tazobactam for the remainder of the operation
- E Give a further dose only if the bowel is opened during the resection

**Q8.3** A 46-year-old woman with no significant comorbidity is listed as the third case on a morning elective list for a laparoscopic cholecystectomy for biliary colic. She weighs 74 kg. She was told at preassessment to fast from midnight and has had nothing at all by mouth since 22:00 the previous evening. It is now 11:40 and she is next on the list, expected in the anaesthetic room at about 13:30. She complains of thirst and headache. Her observations are normal and she has no history of diabetes, gastro-oesophageal reflux or delayed gastric emptying. The anaesthetic registrar asks how her fasting should be managed.

- A** Continue nil by mouth until she goes to theatre, as she is already fasted and the list may run early
- B** Allow clear fluids freely until two hours before her expected anaesthetic time
- C** Start intravenous Hartmann's solution at 125 mL/h and keep her nil by mouth
- D** Allow a light breakfast now, since solids are permitted up to two hours before anaesthesia
- E** Give an intravenous 500 mL crystalloid bolus and prescribe metoclopramide for the headache

## What this chapter covers

### AREA OF THE SYLLABUS

Preoperative assessment, risk scoring, CPET, frailty  
 Cardiac risk and management of antiplatelets and anticoagulants  
 ERAS protocols and their evidence, by specialty  
 Fluid therapy: goal-directed, restrictive versus liberal  
 Analgesia: multimodal, regional blocks, opioid stewardship  
 Venous thromboembolism prophylaxis and extended prophylaxis  
 Antibiotic prophylaxis and surgical site infection bundles  
 WHO checklist, human factors, never events, incident reporting  
 Consent, capacity, and the surgeon-patient conversation  
 Ethics: futility, end-of-life decisions, resource allocation  
 Prehabilitation

## The rules that carry marks

| WHEN YOU SEE                                                                | WHAT IT MEANS, OR WHAT TO DO                                                                |
|-----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| emergency surgery for a compromised obstructed bowel                        | the timing of operation is set by the physiology, not by the anticoagulant washout interval |
| Preoperative fasting is six hours for solids and two hours for clear fluids | nil by mouth from midnight is obsolete and harmful                                          |

|                                                                                                      |                                                                                                                           |
|------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| septic shock from a perforated viscus                                                                | source control is the resuscitation; absent critical care is a reason to phone early, not a reason to delay the operation |
| The no-bridging evidence applies to non-valvular atrial fibrillation                                 | mechanical valve prostheses still require therapeutic heparin bridging, and DOACs are contraindicated in them             |
| a cirrhotic patient facing surgery                                                                   | quantify mortality with the VOCAL-Penn score rather than Child-Pugh or MELD alone                                         |
| Six hours for solids, two hours for clear fluids, plus a carbohydrate drink in non-diabetic patients | prolonged fasting from midnight has no safety advantage                                                                   |
| Clear fluids up to two hours and solids up to six hours before induction is the standard fast        | carbohydrate loading is appropriate in non-diabetic patients without delayed gastric emptying                             |
| Goal-directed fluid therapy is a discipline of small challenge, nominated variable and re-assessment | it can and must be practised even when no cardiac output monitor exists                                                   |

### What you are expected to know

- Thromboprophylaxis is decided by a documented individual risk assessment on admission, not by a blanket ward rule in either direction.
- Repeat intraoperative antibiotic prophylaxis when the operation exceeds about two half-lives of the agent or when blood loss is major, and stop it at wound closure.
- Poor functional capacity, smoking and iron deficiency anaemia before elective major surgery are reasons to defer and optimise, not reasons to proceed with more monitoring.
- Remove an epidural catheter at least 12 hours after a prophylactic dose of low molecular weight heparin, and give the next dose no sooner than four hours after removal.
- Hypotension with warm peripheries and a normal heart rate after a thoracic epidural is usually sympathetic blockade: reduce the infusion and use a vasopressor rather than repeated fluid boluses.
- Patients with non-valvular atrial fibrillation and moderate stroke risk do not need heparin bridging when warfarin is interrupted for surgery; bridging increases major bleeding without reducing thromboembolism.

#### ■ BOARD PEARL

Clear fluids are permitted until two hours before anaesthesia and solids until six hours; midnight fasting for an afternoon list is an avoidable harm, not a safety measure.

#### ■ BOARD PEARL

Perioperative mortality in cirrhosis should be quantified with a cirrhosis-specific score rather than generic tools, and ascites control before elective repair is the most important modifiable factor.

## Trials you should be able to name

| TRIAL                                          | WHAT IT IS ABOUT |
|------------------------------------------------|------------------|
| BRIDGE (2015, New England Journal of Medicine) | —                |

## Guidance this chapter is written against

NELA — National Emergency Laparotomy Audit standards

ERAS Society, enhanced recovery guideline for elective colonic surgery — preoperative fasting and carbohydrate loading

ERAS Society guideline, colorectal surgery

NICE Venous thromboembolism in over 16s (NG89)

WHO global guidelines for the prevention of surgical site infection

ERAS Society guidelines, preoperative fasting and carbohydrate loading

ACG — Perioperative risk assessment in cirrhosis, 2025 (Am J Gastroenterol 2025;120:1968-84, PMID 40899690)

ERAS Society, prehabilitation recommendations within procedure-specific enhanced recovery guidelines

ACCP antithrombotic therapy guidance, perioperative management of antithrombotic therapy

ACG Perioperative risk assessment in cirrhosis, 2025 (Am J Gastroenterol 2025;120:1968-84, PMID 40899690)

## Retrieval check

The three you answered before reading. Mark yourself honestly; a wrong answer you now understand is worth more than a right one you guessed.

### Q8.1 CORRECT ANSWER **A**

Every surgical admission requires a documented individual assessment of thrombosis risk against bleeding risk, and the prescription follows from it.

Why: Blanket prescribing and blanket omission are both errors. In a young, mobile patient after short laparoscopic surgery, mechanical prophylaxis and early mobilisation may be sufficient. The point of assessment is that the answer is derived, not assumed. Reassessment is required if her recovery changes.

Option B: Extended prophylaxis is reserved for major abdominopelvic cancer surgery, not a short benign laparoscopic procedure. Option C: Therapeutic dosing treats established thrombosis and exposes her to bleeding without indication. Option A: Correct — risk assessment is mandatory on admission and determines whether pharmacological prophylaxis is given. Option D: Laparoscopy reduces but does not abolish venous thromboembolic risk, so blanket omission is unsafe. Option E: Aspirin is not an accepted substitute for risk-assessed prophylaxis in general surgical inpatients.

*Thromboprophylaxis is decided by a documented individual risk assessment on admission, not by a blanket ward rule in either direction.*

NICE Venous thromboembolism in over 16s (NG89)

### Q8.2 CORRECT ANSWER **A**

A further dose of cefuroxime is due, because the operation has outlasted the first dose and blood loss has been substantial.

Why: Prophylaxis works by keeping tissue drug concentrations above the minimum inhibitory concentration until the wound is closed. Cefuroxime needs repeating at roughly four-hourly intervals, and major haemorrhage lowers the serum level sooner than that. Metronidazole has a much longer half-life and does not need repeating here. Redosing is still prophylaxis, so it stops when the wound is closed.

Option B: Continuing antibiotics after wound closure does not reduce surgical site infection and selects resistant organisms. Option C: Correct timing at induction does not protect a wound still open three and a half hours and 1.4 litres of blood loss later. Option D: Broadening the spectrum treats an infection she does not have and abandons the agreed local prophylaxis policy. Option A: Correct, because it restores tissue concentrations for the remainder of an operation that has outlasted the induction dose. Option E: A colonic resection is clean-contaminated throughout, so waiting for visible spillage misunderstands when cover is needed.

*Repeat intraoperative antibiotic prophylaxis when the operation exceeds about two half-lives of the agent or when blood loss is major, and stop it at wound closure.*

*WHO global guidelines for the prevention of surgical site infection*

### Q8.3 CORRECT ANSWER **B**

She should be allowed clear fluids until two hours before her anaesthetic, which is the standard fasting rule and a core ERAS element.

Why: Gastric emptying of clear fluids is essentially complete within two hours in a patient with no risk factor for delayed emptying. Prolonged fluid fasting causes thirst, headache, hypovolaemia and worse insulin resistance without reducing aspiration risk. A carbohydrate drink two hours preoperatively serves the same purpose in a non-diabetic patient. Solids remain restricted to six hours before induction.

Option A: Continuing an unnecessary fast is precisely the practice ERAS pathways were designed to abolish, and it makes her feel worse for no safety gain. Option B: Correct — clear fluids up to two hours preoperatively are safe and prevent avoidable dehydration and discomfort. Option C: Intravenous maintenance fluid replaces a problem that oral clear fluid solves better, and needlessly cannulates and immobilises her. Option D: Solids require a six-hour fast, so a breakfast now would push her operation into the afternoon or cancel it. Option E: A fluid bolus and an antiemetic treat symptoms of dehydration rather than correcting the cause, and metoclopramide is not indicated here.

*Clear fluids are permitted up to two hours before anaesthesia and solids up to six hours; fasting from midnight for an afternoon list is an avoidable harm.*

*ERAS Society guidelines, preoperative fasting and carbohydrate loading*

### ■ KEY POINT

Come back to this chapter in two days, then in a week, then in three weeks. Do not reread it — cover the tables and say the rules out loud first, then check. Spacing and retrieval are the two things that work; rereading is not.

## SECTION 9

# BENIGN OESOPHAGOGASTRIC DISEASE

---



### THIS CHAPTER COVERS

- GORD: investigation, pH and manometry, fundoplication and its failures
- Hiatal and paraoesophageal hernia, mesh controversy, gastric volvulus
- Achalasia: Chicago classification, Heller, POEM, pneumatic dilatation
- Barrett oesophagus: surveillance, endoscopic eradication
- Benign oesophageal stricture and caustic injury
- Oesophageal perforation and Boerhaave syndrome
- Peptic ulcer disease: medical management, bleeding, perforation, obstruction
- Gastroparesis and post-gastrectomy syndromes

4% of the paper · 200 questions in the bank behind this chapter

Figure 9: Where Benign Oesophagogastric Disease sits in a general surgery examination.

### Before you read this chapter

Answer these three now, from what you already know. Write the letter down. Getting them wrong before you read is not a waste — attempting first is what makes the reading stick. The answers are at the end of the chapter, not here.

**Q9.1** A 34-year-old teacher has had three years of dysphagia to solids and liquids with regurgitation of undigested food and eight kilograms of weight loss. Endoscopy shows a dilated oesophagus with retained food and a tight but traversable cardia, with no mucosal lesion. Barium swallow shows a smooth tapering distal oesophagus. High-resolution manometry shows absent peristalsis with panoesophageal pressurisation in eight of ten swallows and an elevated integrated relaxation pressure. She has no cardiorespiratory comorbidity and wishes to discuss definitive treatment options.

- A This is type I achalasia and botulinum toxin injection is the appropriate definitive treatment
- B This is type III achalasia and a long myotomy extending well up the oesophageal body is mandatory
- C This is oesophagogastric junction outflow obstruction and treatment should be limited to a proton pump inhibitor
- D This is type II achalasia and she should be offered graded pneumatic dilatation, laparoscopic Heller myotomy or peroral endoscopic myotomy
- E This is absent contractility from systemic sclerosis and myotomy is contraindicated

**Q9.2** A 42-year-old teacher describes eighteen months of heartburn and acid taste in the mouth, occurring five days a week and waking her twice weekly. She has gained six kilograms since her second pregnancy and takes no regular medication. Examination is unremarkable; body mass index is 29 kg per square metre. She has never had an endoscopy. She reports no dysphagia, no weight loss, no vomiting and no anaemia, and there is no family history of upper gastrointestinal cancer. She has tried over-the-counter antacids with partial relief and asks what should be done next.

- A Upper gastrointestinal endoscopy before starting any acid suppression
- B Eight-week trial of a once-daily proton pump inhibitor with lifestyle and weight advice
- C 24-hour pH-impedance monitoring off therapy to confirm the diagnosis
- D High-resolution oesophageal manometry to assess lower oesophageal sphincter pressure
- E Refer directly for laparoscopic Nissen fundoplication



**Q9.3** A 62-year-old woman with type 1 diabetes of thirty years has vomiting, early satiety and postprandial fullness for two years, with a five-kilogram weight loss. Endoscopy shows retained food in the stomach after an overnight fast but no ulcer, stricture or mass, and the pylorus admits the scope easily. A four-hour solid-phase gastric emptying scintigram shows 32% retention at four hours. She takes metformin, a glucagon-like peptide-1 receptor agonist and amitriptyline for neuropathic pain. Glycated haemoglobin is 84 mmol/mol. She has not tried any prokinetic agent.

- A** Refer for laparoscopic subtotal gastrectomy with Roux-en-Y reconstruction
- B** Stop the glucagon-like peptide-1 receptor agonist and the amitriptyline, optimise glycaemic control, adjust diet and start a prokinetic
- C** Insert a gastric electrical stimulator as first-line therapy
- D** Perform endoscopic pyloric balloon dilatation to 20 mm
- E** Place a percutaneous endoscopic gastrostomy for venting and a nasojejunal feeding tube

## What this chapter covers

### AREA OF THE SYLLABUS

GORD: investigation, pH and manometry, fundoplication and its failures  
 Hiatal and paraoesophageal hernia, mesh controversy, gastric volvulus  
 Achalasia: Chicago classification, Heller, POEM, pneumatic dilatation  
 Barrett oesophagus: surveillance, endoscopic eradication  
 Benign oesophageal stricture and caustic injury  
 Oesophageal perforation and Boerhaave syndrome  
 Peptic ulcer disease: medical management, bleeding, perforation, obstruction  
 Gastroparesis and post-gastrectomy syndromes

## The rules that carry marks

| WHEN YOU SEE                                                                      | WHAT IT MEANS, OR WHAT TO DO                                                                                                            |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| Typical heartburn without alarm features warrants an empirical PPI trial          | objective reflux testing is for refractory symptoms or pre-operative assessment                                                         |
| oesophageal perforation with sepsis and no local capability for definitive repair | drainage and resuscitated transfer beat any attempt at heroic local surgery                                                             |
| diabetic gastroparesis                                                            | withdraw emptying-delaying drugs and correct hyperglycaemia and diet before considering pyloric, stimulator or resectional intervention |
| Achalasia is a manometric diagnosis                                               | endoscopy and barium raise the suspicion but high-resolution manometry confirms it and as-                                              |

|                                                             |                                                                                                                                                            |
|-------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                             | signs the Chicago subtype that determines treatment                                                                                                        |
| late oesophageal perforation with septic shock              | source control by debridement and drainage takes precedence over any attempt to restore continuity                                                         |
| stable caustic ingestion without perforation                | early endoscopic grading is the investigation that drives every subsequent decision                                                                        |
| Barrett oesophagus with dysplasia                           | any visible lesion is removed by endoscopic resection first for accurate staging; ablation of the residual segment follows, never precedes, that resection |
| an unstable Boerhaave perforation with no transfer possible | source control comes before imaging: drain the pleural space and operate, because sepsis progresses faster than any radiological confirmation              |

### What you are expected to know

- No antireflux operation should be offered without endoscopy, high-resolution manometry and objective reflux monitoring, because symptoms alone misclassify a substantial minority of candidates.
- Tachycardia, fever and surgical emphysema in the early days after fundoplication indicate perforation until excluded by contrast CT; postoperative pain is a diagnosis of exclusion.
- Type II achalasia is absent peristalsis with panoesophageal pressurisation and raised integrated relaxation pressure, and it has the best response to pneumatic dilatation, Heller myotomy or peroral endoscopic myotomy.
- Any visible lesion in a dysplastic Barrett segment is resected endoscopically before ablation, because only a resection specimen shows depth of invasion.
- Endoscopy, high-resolution manometry and ambulatory reflux monitoring off PPI are mandatory before any antireflux operation, because symptoms alone cannot distinguish pathological reflux from functional heartburn or an occult motility disorder.
- Established caustic strictures are managed by graded wire-guided dilatation with nutritional support, and resection is reserved for failure of that programme.

#### ■ BOARD PEARL

Recurrent symptoms after fundoplication require both anatomical and physiological assessment — endoscopy, contrast study, manometry and pH-impedance — before revisional surgery is planned.

#### ■ BOARD PEARL

In Barrett oesophagus with high-grade dysplasia, resect any visible lesion endoscopically first to obtain depth of invasion, then ablate the remaining segment; oesophagectomy is no longer first-line.

## Trials you should be able to name

| TRIAL                                                                 | WHAT IT IS ABOUT                                                 |
|-----------------------------------------------------------------------|------------------------------------------------------------------|
| REFLUX                                                                | laparoscopic fundoplication medical management randomised reflux |
| POEM (peroral endoscopic myotomy versus pneumatic dilation achalasia) | peroral endoscopic myotomy versus pneumatic dilation achalasia   |
| LOTUS (laparoscopic antireflux surgery esomeprazole reflux)           | laparoscopic antireflux surgery esomeprazole reflux              |

## Guidance this chapter is written against

SAGES — Guidelines for the surgical treatment of gastro-oesophageal reflux, 2021 (*Surg Endosc* 2021;35:4903-4917, PMID 34279710)

SAGES Guidelines for the surgical treatment of gastro-oesophageal reflux, 2021

British Society of Gastroenterology guidelines on the diagnosis and management of Barrett's oesophagus

— — Chicago classification of oesophageal motility disorders, 4.0

BSG guidelines on the diagnosis and management of Barrett's oesophagus

WSES position paper on oesophageal perforation

American College of Gastroenterology clinical guideline, gastroparesis

Chicago classification of oesophageal motility disorders, 4.0

World Society of Emergency Surgery guidelines, oesophageal perforation and Boerhaave syndrome

World Society of Emergency Surgery position paper, caustic ingestion

## Retrieval check

The three you answered before reading. Mark yourself honestly; a wrong answer you now understand is worth more than a right one you guessed.

### Q9.1 CORRECT ANSWER D

Absent peristalsis with panoesophageal pressurisation in at least twenty per cent of swallows and raised integrated relaxation pressure defines type II achalasia, which responds well to all three definitive treatments.

Why: Type II is the subtype with the best outcomes whichever definitive treatment is chosen. Graded pneumatic dilatation, laparoscopic Heller myotomy with a partial fundoplication and peroral endoscopic myotomy are all defensible. The choice turns on local expertise, patient age and the acceptability of post-procedural reflux. Botulinum toxin is reserved for those unfit for anything else because its effect wanes.

Option A: Type I shows no pressurisation and, more importantly, botulinum toxin is temporary and not definitive treatment. Option D: Correct because the manometric pattern is type II and all three definitive options are appropriate to discuss. Option B: Type III requires premature spastic contractions, which are absent here, and a long myotomy is not indicated.

Option C: Outflow obstruction requires preserved peristalsis, and acid suppression would not touch this woman's dysphagia. Option E: Systemic sclerosis produces a hypotensive sphincter with reflux, not the raised relaxation pressure seen here.

*Type II achalasia is absent peristalsis with panoesophageal pressurisation and raised integrated relaxation pressure, and it has the best response to pneumatic dilatation, Heller myotomy or peroral endoscopic myotomy.*

— — *Chicago classification of oesophageal motility disorders, 4.0*

### Q9.2 CORRECT ANSWER **B**

Typical reflux symptoms without alarm features justify an empirical proton pump inhibitor trial alongside weight and lifestyle measures.

Why: In a patient under fifty with classic heartburn and regurgitation and no dysphagia, bleeding or weight loss, the pre-test probability of malignancy is very low. A symptomatic response supports the diagnosis and is both diagnostic and therapeutic. Objective testing belongs to those who fail therapy or who are being considered for an operation. Weight reduction is one of the few lifestyle measures with a real effect on reflux burden.

Option B: Correct — empirical acid suppression with lifestyle modification is the appropriate first step in uncomplicated typical reflux. Option A: Endoscopy first is reserved for alarm features, older age at onset or refractory symptoms, none of which apply here. Option C: pH-impedance testing is a pre-operative or refractory-symptom investigation, not a first-line test for typical heartburn. Option D: Manometry defines motility before antireflux surgery and does not diagnose reflux disease itself. Option E: Offering surgery before any medical trial or objective confirmation of reflux is indefensible.

*Typical heartburn without alarm features warrants an empirical PPI trial; objective reflux testing is for refractory symptoms or pre-operative assessment.*

*SAGES — Guidelines for the surgical treatment of gastro-oesophageal reflux, 2021 (Surg Endosc 2021;35:4903-4917, PMID 34279710)*

### Q9.3 CORRECT ANSWER **B**

The first move in diabetic gastroparesis is to remove the drugs slowing the stomach, fix the glycaemia and diet, and then add a prokinetic.

Why: Glucagon-like peptide-1 receptor agonists delay gastric emptying directly and amitriptyline is anticholinergic. Hyperglycaemia itself impairs antral contractility, and it is reversible. Small, low-fat, low-residue meals reduce the residue load. Invasive options only become reasonable once these have genuinely failed.

Option A: Gastrectomy for gastroparesis is a last-resort operation with substantial morbidity and unpredictable symptom benefit. Option B: Correct — reversible pharmacological and metabolic contributors are addressed before any procedure. Option C: Gastric electrical stimulation is considered only in refractory disease, mainly for nausea and vomiting, after medical therapy fails. Option D: The pylorus admitted the scope freely, so there is no

mechanical obstruction for dilatation to relieve. Option E: Venting and jejunal feeding are for malnourished refractory patients, not for someone who has never had a prokinetic.

*In diabetic gastroparesis, withdraw emptying-delaying drugs and correct hyperglycaemia and diet before considering pyloric, stimulator or resectional intervention.*

*American College of Gastroenterology clinical guideline, gastroparesis*

#### ■ KEY POINT

Come back to this chapter in two days, then in a week, then in three weeks. Do not reread it — cover the tables and say the rules out loud first, then check. Spacing and retrieval are the two things that work; rereading is not.



SECTION 10

# PROCTOLOGY AND PELVIC FLOOR

---

10

THIS CHAPTER COVERS

- Anorectal anatomy and physiology, anorectal physiology testing
  - Haemorrhoids: Goligher grading, office and operative treatment
  - Anal fissure: medical, botulinum, sphincterotomy
  - Anorectal abscess and fistula-in-ano: Parks classification, sphincter-sparing options
  - Pilonidal disease and its recurrence
  - Rectal prolapse and intussusception: perineal versus abdominal approach
  - Obstructed defaecation syndrome
  - Faecal incontinence: sacral neuromodulation, sphincter repair
-

3% of the paper · 150 questions in the bank behind this chapter

Figure 10: Where Proctology and Pelvic Floor sits in a general surgery examination.

### Before you read this chapter

Answer these three now, from what you already know. Write the letter down. Getting them wrong before you read is not a waste — attempting first is what makes the reading stick. The answers are at the end of the chapter, not here.

**Q10.1** A 39-year-old woman is referred with six months of intermittent perianal discharge. There is a single external opening 2 cm from the anal verge in the left lateral position at the 3 o'clock quadrant, with a palpable cord running towards the anal canal. Examination under anaesthesia with a probe demonstrates a tract crossing the lower third of the external sphincter to an internal opening at the dentate line. There is no secondary extension and no abscess cavity. She has normal continence, two previous vaginal deliveries without instrumentation, and no features of Crohn's disease on colonoscopy and small bowel imaging.

- A Placement of a loose draining seton and review in three months
- B Ligation of the intersphincteric fistula tract (LIFT)
- C Fibrin glue injection into the tract
- D Fistulotomy laying open the tract
- E Endorectal advancement flap covering the internal opening

**Q10.2** A 39-year-old woman is referred with ten weeks of severe tearing pain during defaecation that persists for about an hour afterwards, with small amounts of bright blood on the paper. She has been avoiding opening her bowels because of the pain and her stools have become hard. Inspection with gentle parting of the buttocks reveals a superficial linear tear in the posterior midline with no visible sentinel tag, no visible internal sphincter fibres and no induration. Digital examination is not tolerated. She has no diarrhoea, weight loss or perianal Crohn features. What is the most appropriate initial management?

- A Examination under anaesthesia with lateral internal sphincterotomy
- B Botulinum toxin injection into the internal anal sphincter at first attendance
- C Stool softeners, warm baths and topical diltiazem or glyceryl trinitrate
- D Anal advancement flap to cover the fissure base
- E Manual anal dilatation under general anaesthesia



**Q10.3** A 23-year-old male labourer presents to a rural district hospital at two in the morning with three days of throbbing perianal pain, now unable to sit. He is febrile at 38.6 degrees, tachycardic at 106, and looks unwell. There is a tender, fluctuant, erythematous swelling three centimetres lateral to the anal verge on the left, with overlying induration but no crepitus and no scrotal involvement. He is not diabetic. The nearest CT scanner is ninety minutes away by road, there is no interventional radiology service, and the hospital has no intensive care bed. The theatre is free and an anaesthetist is resident on site. What is the most appropriate next step?

- A** Intravenous antibiotics alone with reassessment on the morning ward round
- B** Transfer for pelvic MRI before any intervention to define the fistula tract
- C** Incision and drainage with immediate laying open of any fistula tract found
- D** Incision and drainage under anaesthesia now, with deroofing and no primary fistula surgery
- E** Needle aspiration of the collection in the emergency department under local anaesthesia

## What this chapter covers

### AREA OF THE SYLLABUS

Anorectal anatomy and physiology, anorectal physiology testing  
 Haemorrhoids: Goligher grading, office and operative treatment  
 Anal fissure: medical, botulinum, sphincterotomy  
 Anorectal abscess and fistula-in-ano: Parks classification, sphincter-sparing options  
 Pilonidal disease and its recurrence  
 Rectal prolapse and intussusception: perineal versus abdominal approach  
 Obstructed defaecation syndrome  
 Faecal incontinence: sacral neuromodulation, sphincter repair  
 Pruritus ani, condylomata, anal intraepithelial neoplasia

## The rules that carry marks

| WHEN YOU SEE                                                                                                       | WHAT IT MEANS, OR WHAT TO DO                                                                                                                                                 |
|--------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Secondary haemorrhage after rubber band ligation typically occurs around days 7 to 10                              | in a shocked anticoagulated patient reverse with prothrombin complex concentrate and go straight to examination under anaesthesia and suture ligation rather than to imaging |
| Excise a thrombosed external haemorrhoid if the patient presents within about seventy-two hours and pain is severe | beyond that window, treat conservatively                                                                                                                                     |

|                                                                                                                            |                                                                                                                                                                                                        |
|----------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Low transsphincteric fistulas involving the distal external sphincter in a patient with normal continence can be laid open | sphincter-sparing techniques are for high or complex tracts                                                                                                                                            |
| operating for obstructed defaecation                                                                                       | prove the fault is mechanical: normal transit, normal balloon expulsion and absent dyssynergia must be documented, because operating on a dyssynergic pelvic floor makes symptoms worse                |
| A perianal abscess is a clinical diagnosis requiring immediate drainage                                                    | do not delay for imaging and do not perform fistula surgery at the first drainage                                                                                                                      |
| obstructed defaecation                                                                                                     | a coexisting enterocele contraindicates stapled transanal rectal resection and shifts the operation to an abdominal ventral rectopexy that corrects intussusception, rectocele and enterocele together |
| Fournier's gangrene is a clinical diagnosis                                                                                | radical debridement must not be delayed for imaging, glycaemic optimisation or transfer                                                                                                                |
| necrotising perineal infection the clock that matters is time to debridement                                               | so operate where you are rather than transfer for imaging                                                                                                                                              |

## What you are expected to know

- High-grade anal intraepithelial neoplasia is managed by targeted ablation with high-resolution anoscopic surveillance, not by radical surgery or chemoradiotherapy, which are reserved for invasive disease.
- In fistula-in-ano the volume of external sphincter crossed by the tract decides the operation: high transsphincteric tracts get a seton and a sphincter-sparing repair, not a fistulotomy.
- An absent rectoanal inhibitory reflex on manometry, confirmed at several distension volumes, mandates rectal biopsy to exclude Hirschsprung disease.
- Sacral neuromodulation is the next step for faecal incontinence refractory to optimal conservative therapy, is preceded by a percutaneous test phase, and does not require an intact sphincter to be effective.
- An incarcerated but viable rectal prolapse is reduced first, using sedation and an osmotic agent; emergency perineal resection is reserved for gangrene or failed reduction.
- The height of the tract and the patient's continence reserve, not the surgeon's preference, decide whether a fistula may be laid open.

### ■ BOARD PEARL

Goligher grade I haemorrhoids bleed but do not prolapse, and are managed with fibre, fluid and defaecation retraining before any procedure is offered.

### ■ BOARD PEARL

A fissure is chronic only when there is induration, a sentinel tag or visible sphincter fibres; acute fissures are treated medically first.

## Trials you should be able to name

| TRIAL                                                                              | WHAT IT IS ABOUT                                                    |
|------------------------------------------------------------------------------------|---------------------------------------------------------------------|
| PROSPER (randomised comparison of abdominal and perineal rectal prolapse surgery)  | randomised rectal prolapse surgery abdominal perineal               |
| HubBLe (haemorrhoidal artery ligation versus rubber band ligation)                 | haemorrhoidal artery ligation rubber band ligation                  |
| eTHoS (stapled haemorrhoidopexy versus traditional excisional haemorrhoid surgery) | stapled haemorrhoidopexy traditional excisional haemorrhoid surgery |

## Guidance this chapter is written against

ASCRS clinical practice guideline on anal squamous neoplasms

ASCRS clinical practice guideline for the management of haemorrhoids

ASCRS clinical practice guideline for the management of anorectal abscess and fistula-in-ano

ASCRS clinical practice guideline for the management of anal fissures

ESCP guideline on the management of obstructed defaecation syndrome

ASCRS clinical practice guideline on the management of anorectal abscess and fistula-in-ano

Laboratory Risk Indicator for Necrotising Fasciitis (LRINEC) scoring and principles of necrotising soft tissue infection management

International Anorectal Physiology Working Group consensus on anorectal function testing

WSES/SIS-E consensus on skin and soft tissue infections

ASCRS clinical practice guideline for the treatment of faecal incontinence

## Retrieval check

The three you answered before reading. Mark yourself honestly; a wrong answer you now understand is worth more than a right one you guessed.

### Q10.1 CORRECT ANSWER D

A simple low transsphincteric fistula involving only the distal external sphincter in a continent patient is best treated by fistulotomy.

Why: Laying open gives the highest healing rate of any option and the lowest recurrence. The amount of muscle divided here is small and lies below the puborectalis. Her continence is normal and she has no other risk factor. Sphincter-sparing procedures trade a substantial fall in healing rate for the preservation of muscle she can afford to divide.

Option A: A draining seton controls sepsis but is not definitive treatment for an already-mapped simple tract. Option D: Correct — fistulotomy of a low transsphincteric tract is durable and the continence risk is acceptable. Option B: LIFT is designed for high or complex tracts where fistulotomy would divide too much muscle. Option C: Fibrin glue has poor durability and is reserved for situations where sphincter preservation is paramount. Option E: An advancement flap is a sphincter-sparing option for high or anterior fistulas, not for a low lateral one.

*Low transsphincteric fistulas involving the distal external sphincter in a patient with normal continence can be laid open; sphincter-sparing techniques are for high or complex tracts.*

*ASCRS clinical practice guideline for the management of anorectal abscess and fistula-in-ano*

### **Q10.2 CORRECT ANSWER C**

This is an acute posterior midline fissure and it should be treated medically with laxation and a topical chemical sphincterotomy.

Why: A fissure without a sentinel tag, exposed sphincter fibres or induration is acute rather than chronic. Most acute fissures heal with softened stool and reduced sphincter spasm. Topical diltiazem or glyceryl trinitrate lowers resting pressure and improves perfusion of the posterior commissure. Operative options are reserved for failure of medical therapy.

Option A: Sphincterotomy at first presentation exposes a young woman to lifelong continence risk before medical therapy has been tried. Option C: Correct — softened stool plus topical chemical sphincterotomy is the appropriate first-line approach. Option B: Botulinum toxin is a second-line option after topical therapy has failed, not a first attendance treatment. Option D: An advancement flap is used for chronic fissures with low resting pressure or after failed sphincterotomy. Option E: Uncontrolled manual dilatation causes unpredictable sphincter disruption and has been abandoned.

*A fissure is chronic only when there is induration, a sentinel tag or visible sphincter fibres; acute fissures are treated medically first.*

*ASCRS clinical practice guideline for the management of anal fissures*

### **Q10.3 CORRECT ANSWER D**

A fluctuant perianal abscess needs surgical drainage now; imaging adds nothing and a first presentation is not the moment for fistula surgery.

Why: This is a clinically obvious perianal abscess in a septic young man. Delay converts a simple abscess into perineal necrotising infection. The diagnosis is made by examination, so an absent CT scanner changes nothing. Only a minority of drained abscesses go on to a fistula, and hunting for a tract in inflamed tissue creates false passages.

Option A: Antibiotics do not sterilise an undrained cavity and simply postpone the operation he needs tonight. Option B: MRI is for recurrent or complex fistulating disease, not for an abscess pointing under the skin. Option D: Correct — prompt drainage with adequate deroofing controls the sepsis and preserves the sphincter. Option C: Laying open a tract acutely risks dividing sphincter around an internal opening that cannot be reliably identified in an inflamed field. Option E: Aspiration leaves the cavity and its loculations behind, with high early recurrence.

*A perianal abscess is a clinical diagnosis requiring immediate drainage; do not delay for imaging and do not perform fistula surgery at the first drainage.*

*ASCRS clinical practice guideline on the management of anorectal abscess and fistula-in-ano*

**■ KEY POINT**

Come back to this chapter in two days, then in a week, then in three weeks. Do not reread it — cover the tables and say the rules out loud first, then check. Spacing and retrieval are the two things that work; rereading is not.



# ENDOCRINE SURGERY

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## THIS CHAPTER COVERS

- Thyroid nodule: TIRADS, Bethesda, molecular testing
- Goitre, Graves disease, thyroiditis, retrosternal extension
- Thyroidectomy: technique, nerve monitoring, parathyroid preservation
- Complications: recurrent laryngeal nerve injury, hypocalcaemia, haematoma
- Primary hyperparathyroidism: localisation, focused versus bilateral exploration
- Secondary and tertiary hyperparathyroidism
- Adrenal incidentaloma, pheochromocytoma, Conn and Cushing syndromes
- Minimally invasive adrenalectomy

3% of the paper · 150 questions in the bank behind this chapter

Figure 11: Where Endocrine Surgery sits in a general surgery examination.

### Before you read this chapter

Answer these three now, from what you already know. Write the letter down. Getting them wrong before you read is not a waste — attempting first is what makes the reading stick. The answers are at the end of the chapter, not here.

**Q11.1** A 42-year-old woman is seven hours out from an uncomplicated total thyroidectomy for a large benign multinodular goitre. She reports tingling around the mouth and in the fingertips. She is comfortable, the wound is flat and the voice is normal. Tapping over the facial nerve in front of the ear produces a twitch of the upper lip. Corrected serum calcium is 1.88 mmol/L and parathyroid hormone measured at four hours was 6 pg/mL. She has no cardiac history and the electrocardiogram shows a normal QT interval and sinus rhythm at 78 beats per minute. What is the most appropriate management?

- A Oral calcium carbonate with calcitriol and repeat calcium in six hours
- B Intravenous calcium gluconate 10 mL of 10 per cent by slow bolus
- C Reassure and discharge with advice to return if symptoms worsen
- D Return to theatre to search for and autotransplant devascularised parathyroid tissue
- E Commence intravenous magnesium sulphate alone and withhold calcium

**Q11.2** A 62-year-old woman attends the surgical clinic after a 1.8 cm thyroid nodule was found during investigation of neck discomfort. She is euthyroid, with a normal serum TSH and no family history of thyroid disease. She has never had neck irradiation. Ultrasound describes a purely cystic anechoic lesion in the right lobe with no solid component, no microcalcifications, smooth margins and posterior acoustic enhancement. The remainder of both lobes is normal and there are no abnormal cervical lymph nodes. She has no compressive symptoms, no hoarseness and no dysphagia. What is the most appropriate next step?

- A Ultrasound-guided fine-needle aspiration cytology of the nodule
- B Right hemithyroidectomy for definitive histological diagnosis
- C Clinical and ultrasound follow-up without fine-needle aspiration
- D Radioiodine uptake scanning to characterise the nodule
- E Molecular testing on a core biopsy specimen of the nodule



**Q11.3** A 26-year-old woman is 20 hours out from an uncomplicated total thyroidectomy for a large benign multinodular goitre. Overnight she reports tingling around the mouth and in both hands. She is comfortable, the wound is flat and soft, her voice is normal and she has no stridor. Observations are stable. Tapping over the facial nerve produces a twitch at the corner of the mouth. Corrected serum calcium is 1.92 mmol/L and the parathyroid hormone measured six hours after surgery was 8 pg/mL. She is swallowing without difficulty and tolerating oral fluids.

- A** Immediate bedside opening of the wound
- B** Intravenous calcium gluconate as a single bolus and no oral therapy
- C** Reassure and observe with no supplementation, as the signs are non-specific
- D** Oral calcium carbonate with calcitriol and repeat calcium in the morning
- E** Return to theatre for parathyroid autotransplantation

## What this chapter covers

### AREA OF THE SYLLABUS

Thyroid nodule: TIRADS, Bethesda, molecular testing

Goitre, Graves disease, thyroiditis, retrosternal extension

Thyroidectomy: technique, nerve monitoring, parathyroid preservation

Complications: recurrent laryngeal nerve injury, hypocalcaemia, haematoma

Primary hyperparathyroidism: localisation, focused versus bilateral exploration

Secondary and tertiary hyperparathyroidism

Adrenal incidentaloma, pheochromocytoma, Conn and Cushing syndromes

Minimally invasive adrenalectomy

MEN syndromes

Thyroid and parathyroid cancer at the level a general surgeon is examined on

## The rules that carry marks

| WHEN YOU SEE                                                                                             | WHAT IT MEANS, OR WHAT TO DO                                                                                                 |
|----------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| any patient with a germline RET mutation                                                                 | exclude pheochromocytoma biochemically before thyroid or parathyroid surgery, and resect the adrenal lesion first if present |
| Parathyroid hormone measured four to six hours after total thyroidectomy predicts who will need calcium  | treat symptomatic hypocalcaemia with oral calcium plus calcitriol, reserving intravenous calcium for tetany                  |
| intraoperative neuromonitoring shows loss of signal on the first side during planned total thyroidectomy | stage the operation; a visually intact nerve may still be functionally injured and bilateral palsy is airway-threatening     |

|                                                                                 |                                                                                                                    |
|---------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| Thyrotoxicosis from subacute thyroiditis is hormone release, not overproduction | it is treated with anti-inflammatory drugs and beta-blockade rather than antithyroid drugs, radioiodine or surgery |
|---------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|

## What you are expected to know

- Parathyroid hormone below 15 pg/mL at four to six hours after total thyroidectomy predicts hypocalcaemia, and oral calcium with calcitriol should be started before symptoms escalate.
- A pheochromocytoma with a suggestive family history demands screening for medullary thyroid carcinoma and hyperparathyroidism, and the pheochromocytoma is always resected first.
- Post-thyroidectomy haematoma with airway compromise is decompressed at the bedside without delay, opening both the skin and the strap muscle closure — transfer to theatre and airway attempts come afterwards.
- The decision to aspirate a thyroid nodule is driven by sonographic pattern combined with size, and a purely cystic nodule needs no cytology whatever its diameter.
- A tense, expanding neck after thyroidectomy with respiratory distress is decompressed at the bedside through skin and strap muscles first; theatre comes second.
- The Miami criterion is a fall of more than fifty per cent from the highest pre-excision level within ten minutes and into normal range — a falling but insufficient drop means keep exploring.
- A purely cystic thyroid nodule is a benign sonographic pattern and does not warrant fine-needle aspiration whatever its size.
- An intraoperative hypertensive crisis during pheochromocytoma resection is treated by stopping manipulation and giving short-acting alpha blockade or a vasodilator, never beta blockade first.
- Check the TSH first: if it is normal or raised, a solid nodule meeting the size threshold goes to fine needle aspiration, not to an isotope scan.
- The Miami criterion requires both a fall of more than 50 per cent from the highest pre-excision value and entry into the normal range; meeting only one predicts persistent hyperparathyroidism.

### ■ BOARD PEARL

Secondary hyperparathyroidism is four-gland hyperplasia and requires bilateral exploration with subtotal parathyroidectomy or total parathyroidectomy with autotransplantation, never a focused excision guided by imaging.

### ■ BOARD PEARL

Never take a thyrotoxic patient to elective thyroidectomy before restoring euthyroidism, whatever the pressure on the list.

## Guidance this chapter is written against

AAES — *Definitive management of primary hyperparathyroidism, 2016*

American Thyroid Association guidelines, *hyperthyroidism and other causes of thyrotoxicosis*

ATA — Management guidelines for adult patients with differentiated thyroid cancer, 2025 (Thyroid 2025;35:841-985, PMID 40844370)

ATA — Management guidelines for adult patients with differentiated thyroid cancer, 2025

American Thyroid Association guidelines, medullary thyroid carcinoma

Principles of management of post-thyroidectomy haematoma

British Association of Endocrine and Thyroid Surgeons, guidance on the management of post-thyroidectomy haematoma

AAES clinical practice guideline, thyroidectomy

Bethesda system for reporting thyroid cytopathology

Endocrine Society, clinical practice guideline on pheochromocytoma and paraganglioma

## Retrieval check

The three you answered before reading. Mark yourself honestly; a wrong answer you now understand is worth more than a right one you guessed.

### Q11.1 CORRECT ANSWER **A**

Oral calcium with calcitriol is correct because she has mild symptomatic hypocalcaemia without tetany, and an early parathyroid hormone level that predicts she will need supplementation.

Why: A parathyroid hormone below 15 pg/mL at four to six hours reliably predicts a fall in calcium. Perioral and digital paraesthesia with a positive Chvostek sign is neuromuscular irritability, not tetany. Calcitriol is added because without parathyroid hormone the kidney cannot hydroxylate vitamin D. Intravenous calcium is reserved for carpopedal spasm, seizures, stridor or a prolonged QT interval.

Option A: Correct — oral replacement with active vitamin D treats the deficit and allows safe monitoring on the ward. Option B: Intravenous calcium is unnecessary in a comfortable patient with a normal QT interval and no tetany. Option C: Discharging her without replacement risks progression to tetany once the calcium falls further overnight. Option D: Reoperation cannot restore parathyroid function at this point and adds nerve and haematoma risk for nothing. Option E: Magnesium is worth checking and correcting, but giving it alone leaves the hypocalcaemia untreated.

*Parathyroid hormone below 15 pg/mL at four to six hours after total thyroidectomy predicts hypocalcaemia, and oral calcium with calcitriol should be started before symptoms escalate.*

ATA — Management guidelines for adult patients with differentiated thyroid cancer, 2025 (Thyroid 2025;35:841-985, PMID 40844370)

### Q11.2 CORRECT ANSWER **C**

A purely cystic nodule carries a negligible risk of malignancy, so surveillance rather than cytology is appropriate.

Why: Sonographic pattern, not size alone, drives the decision to aspirate. Purely cystic and spongiform lesions sit in the very low suspicion category. Their malignancy risk is under three per cent, and aspiration of a cystic lesion frequently yields non-diagnostic cytology. That generates a Bethesda I result and a repeat procedure for no clinical gain.

Option A: Aspiration is not indicated for a purely cystic nodule and is likely to return non-diagnostic material. Option B: Lobectomy exposes her to nerve and parathyroid risk for a

lesion with a negligible chance of cancer. Option C: Correct — very low suspicion sonographic pattern justifies surveillance rather than cytology. Option D: Isotope scanning is used to characterise nodules in a patient with a suppressed TSH, and her TSH is normal. Option E: Molecular testing is an adjunct to indeterminate cytology, and no cytology has been obtained or is indicated.

*The decision to aspirate a thyroid nodule is driven by sonographic pattern combined with size, and a purely cystic nodule needs no cytology whatever its diameter.*

ATA — Management guidelines for adult patients with differentiated thyroid cancer, 2025 (Thyroid 2025;35:841-985, PMID 40844370)

### Q11.3 CORRECT ANSWER **D**

Symptomatic hypocalcaemia with a low early postoperative parathyroid hormone is treated with oral calcium and active vitamin D.

Why: A parathyroid hormone below about 15 pg/mL in the first hours after total thyroidectomy predicts hypocalcaemia that needs supplementation. She has paraesthesiae, so she has crossed from biochemical to symptomatic. Calcitriol is added because oral calcium alone is absorbed poorly without parathyroid hormone drive. She is not tetanic, so oral therapy is enough.

Option D: Correct — oral calcium plus calcitriol is standard for symptomatic hypocalcaemia without tetany or arrhythmia. Option A: Opening the wound treats a haematoma; she has a soft flat wound and no airway compromise. Option B: Intravenous calcium is reserved for tetany, laryngospasm or electrocardiographic change, and a bolus alone does not sustain the calcium. Option C: A positive Chvostek sign occurs in some normocalcaemic people, but her calcium is unequivocally low and she is symptomatic. Option E: Autotransplantation is an intraoperative decision for a devascularised gland, not a rescue procedure the following day.

*Parathyroid hormone measured four to six hours after total thyroidectomy predicts who will need calcium — treat symptomatic hypocalcaemia with oral calcium plus calcitriol, reserving intravenous calcium for tetany.*

AAES clinical practice guideline, thyroidectomy

### ■ KEY POINT

Come back to this chapter in two days, then in a week, then in three weeks. Do not reread it — cover the tables and say the rules out loud first, then check. Spacing and retrieval are the two things that work; rereading is not.

## SECTION 12

# BREAST DISEASE

---

### THIS CHAPTER COVERS

- Triple assessment and the one-stop clinic
- Benign breast disease: fibroadenoma, cyst, duct ectasia, papilloma
- Breast infection: lactational and non-lactational, granulomatous mastitis
- Nipple discharge and breast pain
- Phyllodes tumour
- Gynaecomastia
- Breast cancer at the level a general surgeon is examined on: staging, breast conservation, sentinel node, adjuvant principles
- Family history, risk assessment and referral

3% of the paper · 150 questions in the bank behind this chapter

Figure 12: Where Breast Disease sits in a general surgery examination.

### Before you read this chapter

Answer these three now, from what you already know. Write the letter down. Getting them wrong before you read is not a waste — attempting first is what makes the reading stick. The answers are at the end of the chapter, not here.

**Q12.1** A 65-year-old woman with type 2 diabetes attends the one-stop breast clinic after noticing a lump in the upper outer quadrant of the left breast. She is otherwise well and takes metformin. On examination there is a 25 mm firm, irregular, poorly mobile mass with mild skin tethering on arm elevation. There is no palpable axillary lymphadenopathy. Mammography shows a spiculated mass with associated pleomorphic microcalcification, graded M5. Ultrasound of the breast confirms a 24 mm taller-than-wide hypoechoic lesion with posterior acoustic shadowing, and the axilla appears sonographically normal. The radiographer asks what should be arranged during this same clinic attendance.

- A Ultrasound-guided core needle biopsy of the breast lesion with marker clip placement
- B Fine-needle aspiration cytology of the breast lesion alone
- C Excision biopsy of the lesion under general anaesthesia within two weeks
- D Staging computed tomography of the chest, abdomen and pelvis before any biopsy
- E Contrast-enhanced breast magnetic resonance imaging before biopsy

**Q12.2** A 68-year-old woman attends the one-stop clinic having noticed a lump in the left breast six weeks ago. She is on no medication and has no family history. Examination shows a 20 mm firm mass at the ten o'clock position, mobile, with no skin tethering and no palpable nodes. Mammography reports a spiculated mass graded M4 and ultrasound shows a taller-than-wide hypoechoic lesion with posterior shadowing graded U4. Core biopsy of the lesion returns as B1, normal breast tissue only, with no evidence of a lesion. The radiologist confirms the needle track passed through the lesion on the post-biopsy image.

- A Accept the benign histology and discharge with a two-year mammographic recall
- B Arrange fine needle aspiration cytology of the lesion for a second opinion
- C Proceed directly to mastectomy given the M4 and U4 imaging grading
- D Arrange six-month interval imaging surveillance and biopsy only if the lesion enlarges
- E Repeat the core biopsy, and if it is again non-diagnostic proceed to diagnostic excision

**Q12.3** A 53-year-old woman is referred with a lump in the left breast that appeared over a fortnight and is uncomfortable. She is perimenopausal, takes no hormone replacement and has no family history of note. On examination there is a smooth, slightly tender, 3 cm mass in the upper outer quadrant that is mobile with a distinctly rounded edge. Ultrasound shows an anechoic lesion with an imperceptible wall, posterior acoustic enhancement and no internal solid component or mural nodule. Mammography shows a well-circumscribed density corresponding to the ultrasound finding, with no spiculation, no architectural distortion and no associated microcalcification.

- A Ultrasound-guided core biopsy of the lesion wall
- B Send the aspirated fluid for cytology in all cases before discharge
- C Excision biopsy because the lesion measures more than 2 cm
- D Contrast-enhanced breast MRI to exclude an underlying malignancy
- E Ultrasound-guided aspiration of the cyst and discharge if it resolves completely

## What this chapter covers

### AREA OF THE SYLLABUS

Triple assessment and the one-stop clinic

Benign breast disease: fibroadenoma, cyst, duct ectasia, papilloma

Breast infection: lactational and non-lactational, granulomatous mastitis

Nipple discharge and breast pain

Phyllodes tumour

Gynaecomastia

Breast cancer at the level a general surgeon is examined on: staging, breast conservation, sentinel node, adjuvant principles

Family history, risk assessment and referral

## The rules that carry marks

| WHEN YOU SEE                                                                             | WHAT IT MEANS, OR WHAT TO DO                                                                                              |
|------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| Lactational mastitis is treated with flucloxacillin and continued drainage of the breast | failure to improve within 48 hours means re-imaging for an abscess                                                        |
| Triple assessment is only complete when all three arms agree                             | a B1 core against M4 or U4 imaging is discordant and requires repeat biopsy, then diagnostic excision if still unresolved |
| A simple cyst on ultrasound requires no biopsy                                           | aspirate only if symptomatic, and biopsy only if the fluid is bloodstained or a residual mass remains                     |

|                                                                                                                                   |                                                                                                                                      |
|-----------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| phyllodes tumour                                                                                                                  | local control depends on a clear surgical margin, and the axilla is not staged because spread is haematogenous rather than lymphatic |
| Idiopathic granulomatous mastitis is managed conservatively with steroids for progressive disease                                 | early wide excision causes chronic wounds and recurrence                                                                             |
| Preoperative axillary needle biopsy is for sonographically abnormal nodes                                                         | a normal axillary ultrasound is followed by surgical staging with sentinel node biopsy                                               |
| Recurrent subareolar sepsis in a smoker is periductal mastitis: aspirate under ultrasound, cover anaerobes, and treat the smoking | open incision risks a mammary duct fistula                                                                                           |

### What you are expected to know

- Completion axillary dissection may be omitted for one or two positive sentinel nodes only when the tumour is T1 to T2, the patient had breast-conserving surgery with planned whole-breast radiotherapy, and no neoadjuvant chemotherapy was given.
- Recurrent periareolar sepsis in a smoker is periductal mastitis: aspirate, cover anaerobes, and treat the smoking, because duct surgery in a continuing smoker recurs.
- Triple assessment is completed with core needle biopsy, not cytology, because only core tissue establishes invasion, grade and receptor status.
- A papillary lesion diagnosed on core biopsy requires complete excision, because core sampling can miss coexisting atypia or in situ carcinoma within the same lesion.
- Sentinel lymph node biopsy may be omitted in postmenopausal women over 50 with hormone receptor positive, HER2 negative, grade 1 to 2, cT1N0 tumours undergoing breast conservation with whole-breast radiotherapy and endocrine therapy; it does not apply to HER2 positive, triple-negative or post-neoadjuvant patients.
- Aspirated cyst fluid needs cytology only if it is bloodstained or a mass remains after complete aspiration.
- Sentinel node biopsy may be omitted in selected women over fifty with cT1 cN0, hormone receptor positive, HER2 negative disease having conservation, whole-breast radiotherapy and endocrine therapy.
- Phyllodes tumours are treated by wide excision with a clear margin, and the axilla is never dissected because spread is haematogenous, not lymphatic.

#### ■ BOARD PEARL

Phyllodes tumours are excised with a wide margin of normal tissue and never enucleated, and the axilla is not dissected because spread is haematogenous.

#### ■ BOARD PEARL



Idiopathic granulomatous mastitis is a diagnosis of exclusion requiring core biopsy with mycobacterial and fungal studies; conservative management is first line, with steroids reserved for refractory disease and surgery avoided in the active phase.

## Trials you should be able to name

| TRIAL                                              | WHAT IT IS ABOUT |
|----------------------------------------------------|------------------|
| ACOSOG Z0011 (2011, JAMA)                          | —                |
| SOUND (2023, JAMA Oncology)                        | —                |
| NSABP B-06 (2002, New England Journal of Medicine) | —                |

## Guidance this chapter is written against

*ESMO Clinical Practice Guidelines, early breast cancer*

*Association of Breast Surgery, guidance on the management of breast infection*

*NICE guideline, early and locally advanced breast cancer: diagnosis and management*

*Royal College of Pathologists, guidelines for non-operative diagnostic procedures and reporting in breast cancer screening*

*WHO Classification of Tumours of the Breast, fibroepithelial lesions*

*Association of Breast Surgery, guidance on the management of benign breast disease*

*NCCN Guidelines, breast cancer, phyllodes tumour section*

*Association of Breast Surgery guidance on the management of breast infection*

*NCCN Guidelines, breast cancer*

*Association of Breast Surgery guidance on the management of benign breast disease*

## Retrieval check

The three you answered before reading. Mark yourself honestly; a wrong answer you now understand is worth more than a right one you guessed.

### Q12.1 CORRECT ANSWER **A**

Ultrasound-guided core needle biopsy with a marker clip is the correct third component of triple assessment for this M5 lesion.

Why: Core biopsy gives tissue architecture, invasion status, grade and receptor profile. Cytology cannot distinguish invasive disease from in situ disease. A marker clip allows the site to be relocated if neoadjuvant therapy shrinks the tumour. The axilla looks normal on ultrasound, so it is staged surgically at operation rather than sampled now.

Option B: Cytology cannot separate invasive carcinoma from ductal carcinoma in situ and yields no receptor status. Option A: Correct — it completes triple assessment and supplies grade and receptor data for the multidisciplinary meeting. Option C: Operating without a tissue diagnosis forfeits planned single-stage surgery and proper axillary staging. Option D: Routine body staging is not indicated for a clinically node-negative 25 mm tumour and delays diagnosis. Option E: Magnetic resonance imaging has selected indications such as lobular disease or discordance, not routine first-line use.

*Triple assessment is completed with core needle biopsy, not cytology, because only core tissue establishes invasion, grade and receptor status.*

*NICE guideline, early and locally advanced breast cancer: diagnosis and management*

### **Q12.2 CORRECT ANSWER E**

The imaging is highly suspicious but the histology is normal, so this is a discordant triple assessment and the tissue diagnosis must be pursued.

Why: A B1 result on a spiculated M4 or U4 lesion means the lesion has not been sampled representatively, whatever the needle track shows. Discordance is resolved by re-biopsy, not by accepting the more comfortable of the two results. If repeat core is again non-diagnostic, open or vacuum-assisted diagnostic excision gives the answer. Discarding suspicious imaging on the strength of a B1 is the classic missed cancer in this clinic.

Option A: Accepting a B1 against M4 or U4 imaging is exactly how an interval cancer is created. Option E: Correct — discordance mandates repeat sampling and then diagnostic excision if still unresolved. Option B: Cytology is less informative than core biopsy and cannot resolve a discordant result. Option C: Mastectomy without a tissue diagnosis is unjustifiable and removes the option of conservation. Option D: Surveillance defers a diagnosis that suspicious imaging already demands today.

*Triple assessment is only complete when all three arms agree; a B1 core against M4 or U4 imaging is discordant and requires repeat biopsy, then diagnostic excision if still unresolved.*

*Royal College of Pathologists, guidelines for non-operative diagnostic procedures and reporting in breast cancer screening*

### **Q12.3 CORRECT ANSWER E**

This is a simple cyst on ultrasound, and aspiration with complete resolution is both diagnostic and therapeutic.

Why: An anechoic lesion with posterior enhancement and no solid component meets the criteria for a simple cyst. Simple cysts do not need biopsy. Aspiration is offered because it is symptomatic, and the important step is confirming the lump disappears. A residual mass after aspiration is the finding that mandates biopsy.

Option A: Core biopsy of a simple cyst wall yields fibrous tissue and answers a question the ultrasound has already settled. Option E: Correct — aspiration relieves the symptom and complete resolution confirms the benign diagnosis. Option B: Cytology of non-bloodstained fluid from a simple cyst has an extremely low yield and generates unhelpful atypical reports. Option C: Size alone is not an indication to excise a cyst; the ultrasound characteristics determine management. Option D: MRI is not indicated when ultrasound has already characterised the lesion as simple.

*A simple cyst on ultrasound requires no biopsy; aspirate only if symptomatic, and biopsy only if the fluid is bloodstained or a residual mass remains.*

*Association of Breast Surgery, guidance on the management of benign breast disease*

**■ KEY POINT**

Come back to this chapter in two days, then in a week, then in three weeks. Do not reread it — cover the tables and say the rules out loud first, then check. Spacing and retrieval are the two things that work; rereading is not.



## SECTION 13

# VASCULAR SURGERY FOR THE GENERAL SURGEON

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### THIS CHAPTER COVERS

- Abdominal aortic aneurysm: screening, thresholds, open versus EVAR
- Ruptured AAA: recognition and immediate management
- Acute limb ischaemia: Rutherford categories, embolectomy, fasciotomy
- Peripheral arterial disease and the diabetic foot
- Carotid disease: timing after stroke, endarterectomy
- Venous disease, DVT, pulmonary embolism
- Vascular access for dialysis and central venous access complications
- Iatrogenic vascular injury during general surgery

3% of the paper · 150 questions in the bank behind this chapter

Figure 13: Where Vascular Surgery for the General Surgeon sits in a general surgery examination.

### Before you read this chapter

Answer these three now, from what you already know. Write the letter down. Getting them wrong before you read is not a waste — attempting first is what makes the reading stick. The answers are at the end of the chapter, not here.

**Q13.1** A 79-year-old man arrives at a district hospital at three in the morning with sudden severe central abdominal pain radiating to the back and one episode of syncope. The CT scanner is down for maintenance until eight in the morning and there is no interventional radiology service. The nearest aortic centre is 110 minutes away by road. Blood pressure is 78/44 mmHg, heart rate 118, and he is confused but rousable. A tender expansile mass is palpable above the umbilicus. Femoral pulses are weak bilaterally. Two large-bore cannulae are in place and the massive transfusion protocol has been activated. A general surgeon and an anaesthetist are present.

- A Transfuse to a systolic pressure of 120 mmHg, then transfer by road to the aortic centre
- B Proceed immediately to laparotomy locally with supraceliac control, maintaining permissive hypotension during induction
- C Wait until eight in the morning for CT to confirm the diagnosis before committing to any operation
- D Insert an aortic occlusion balloon in the emergency department and then transfer
- E Admit for observation with hourly haemoglobin measurement and reassess at dawn

**Q13.2** A 67-year-old man with type 2 diabetes of eighteen years is admitted with a malodorous ulcer over the plantar aspect of the left first metatarsal head, present for six weeks. There is surrounding cellulitis to the mid-foot, a temperature of 38.1 degrees, white cell count 16.4 and C-reactive protein 190. A probe passes to bone through the ulcer base. Foot pulses are not palpable but the ankle-brachial pressure index measures 1.4 bilaterally. Sensation to a ten gram monofilament is absent. Plain radiographs show cortical erosion of the first metatarsal head. What is the most appropriate interpretation and next step?

- A The index excludes arterial disease, so treat as neuropathic infection alone with antibiotics and debridement
- B The index indicates severe ischaemia, so proceed directly to below-knee amputation
- C Repeat the index after exercise to unmask arterial disease before any surgical intervention
- D The index is falsely elevated by medial calcification, so measure toe pressure or transcutaneous oxygen alongside urgent debridement and antibiotics
- E Start antibiotics alone and re-image in six weeks to confirm osteomyelitis before operating

**Q13.3** A 79-year-old woman with hypertension and chronic kidney disease stage 3 is seen in the outpatient clinic six days after a transient episode of left arm weakness and slurred speech lasting twenty-five minutes, from which she recovered completely. Computed tomography of the head shows small-vessel change only. Carotid duplex reports a 78 per cent stenosis of the right internal carotid artery with a low-velocity, smooth plaque on the left of 40 per cent. She is now on aspirin, clopidogrel and a high-intensity statin, and her blood pressure is 148/82. She lives independently. Which is the most appropriate management?

- A Left carotid endarterectomy within the next week
- B Right carotid endarterectomy within the next week
- C Bilateral staged endarterectomy beginning with the left side
- D Continue medical therapy alone and repeat duplex in six months
- E Defer any intervention for twelve weeks to allow the plaque to stabilise

## What this chapter covers

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### AREA OF THE SYLLABUS

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Abdominal aortic aneurysm: screening, thresholds, open versus EVAR

Ruptured AAA: recognition and immediate management

Acute limb ischaemia: Rutherford categories, embolectomy, fasciotomy

Peripheral arterial disease and the diabetic foot

Carotid disease: timing after stroke, endarterectomy

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Venous disease, DVT, pulmonary embolism

Vascular access for dialysis and central venous access complications

Iatrogenic vascular injury during general surgery

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## The rules that carry marks

| WHEN YOU SEE                                                                                                         | WHAT IT MEANS, OR WHAT TO DO                                                                                                                                                                    |
|----------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| an unstable patient with pain                                                                                        | hypotension and an expansile abdominal mass, the diagnosis of ruptured aneurysm is clinical: operate where you are rather than transfer or wait for a scan                                      |
| An ankle-brachial index above 1.3 is uninterpretable, not reassuring                                                 | use toe pressure or transcutaneous oxygen in diabetes and renal failure                                                                                                                         |
| suspected ruptured aortic aneurysm with refractory hypotension                                                       | go straight to theatre with permissive hypotension; CT and transfer belong only to the haemodynamically stable patient                                                                          |
| In ruptured abdominal aortic aneurysm resuscitate permissively to the lowest pressure that keeps the patient talking | the sole absolute exception is coexisting traumatic brain injury                                                                                                                                |
| Rutherford IIb acute limb ischaemia                                                                                  | sensory loss beyond the toes with motor deficit and an audible venous signal — requires revascularisation within one hour, with completion angiography and fasciotomy after prolonged ischaemia |
| Stable claudication is managed with supervised exercise and cardiovascular risk reduction first                      | revascularisation is for failure of that or for limb-threatening disease                                                                                                                        |
| Stable claudication is first managed with supervised exercise therapy, antiplatelet, statin and smoking cessation    | revascularisation follows only if symptoms remain lifestyle-limiting                                                                                                                            |
| deep vein thrombosis is clinically likely and imaging is delayed beyond a few hours                                  | start therapeutic anticoagulation first and scan afterwards                                                                                                                                     |

## What you are expected to know

- A conscious ruptured aneurysm patient with a systolic pressure above 80 mmHg should have computed tomography angiography under permissive hypotension to decide between endovascular and open repair.
- For a symptomatic severe internal carotid stenosis, endarterectomy on the side that explains the neurological deficit should be performed within two weeks of the index event.
- A haemodynamically unstable patient with suspected ruptured abdominal aortic aneurysm goes directly to theatre with permissive hypotension; CT is only for the stable patient in whom it will change the operative strategy.



- Uncomplicated proximal deep vein thrombosis with normal renal function is treated with a direct oral anticoagulant as an outpatient for at least three months; thrombolysis and caval filters are exceptions, not defaults.
- When a general surgeon encounters unexpected major vessel bleeding, pack and resuscitate rather than dissect: definitive repair begins only after proximal and distal control has been obtained in a dry field.
- An ankle brachial pressure index above 1.3 means calcified incompressible vessels and is uninterpretable; use toe pressures or transcutaneous oximetry instead.

#### ■ BOARD PEARL

In diabetes or renal failure an ankle-brachial index above 1.3 means non-compressible calcified vessels and must never be read as normal; use toe pressure or transcutaneous oximetry instead.

#### ■ BOARD PEARL

Major venous injury during general surgery is controlled by direct pressure and formal proximal and distal exposure, never by blind clamping into blood.

### Trials you should be able to name

| TRIAL                                          | WHAT IT IS ABOUT |
|------------------------------------------------|------------------|
| IMPROVE Trial (2014, BMJ)                      | —                |
| BASIL Trial (2005, Lancet)                     | —                |
| EVAR-1 (2010, New England Journal of Medicine) | —                |

### Guidance this chapter is written against

*ESVS guidelines, chronic limb-threatening ischaemia and diabetic foot*

*ESVS guideline on the management of abdominal aorto-iliac artery aneurysms*

*ESVS guideline on peripheral arterial disease and the diabetic foot*

*ESVS guidelines, abdominal aortic aneurysm*

*ESVS guidelines, carotid disease*

*Principles of vascular control in surgical haemorrhage*

*ESVS guidelines, acute limb ischaemia*

*ESVS guidelines, peripheral arterial disease*

*ESVS guideline on peripheral arterial disease*

*ESVS guideline on venous thrombosis*

### Retrieval check

The three you answered before reading. Mark yourself honestly; a wrong answer you now understand is worth more than a right one you guessed.

**Q13.1 CORRECT ANSWER B**

This is a haemodynamically unstable ruptured aneurysm diagnosed clinically, and the only survivable option in a hospital without CT or interventional radiology is immediate local laparotomy with proximal control.

Why: Pain, hypotension, syncope and an expansile mass make the diagnosis without imaging. Imaging is for stable patients choosing between open and endovascular repair. A 110-minute transfer in a shocked patient is a decision to let him exsanguinate in an ambulance. Permissive hypotension matters most at induction, because loss of abdominal wall tone and sympathetic drive frequently precipitates cardiovascular collapse.

Option A: Aggressive transfusion to a normal pressure disrupts the retroperitoneal tamponade before the neck is clamped. Option C: Waiting five hours for a scan in a patient who is already shocked will not produce a live patient to scan. Option B: Correct — clinical diagnosis, local operation, proximal control first, hypotension tolerated until the clamp is on. Option D: An occlusion balloon requires fluoroscopy and expertise this hospital does not have, and it is a bridge to repair, not a transfer device. Option E: Observation of a ruptured aneurysm is observation of a death.

*In an unstable patient with pain, hypotension and an expansile abdominal mass, the diagnosis of ruptured aneurysm is clinical: operate where you are rather than transfer or wait for a scan.*

*ESVS guideline on the management of abdominal aorto-iliac artery aneurysms*

**Q13.2 CORRECT ANSWER D**

An ankle-brachial index above 1.3 in a long-standing diabetic reflects incompressible calcified vessels and cannot be used to exclude ischaemia, so perfusion must be assessed by another means while the infection is drained.

Why: Medial arterial calcification stiffens the tibial vessels so the cuff cannot occlude them. Digital arteries are usually spared, which is why toe pressure or transcutaneous oxygen remains valid. Meanwhile a probe-to-bone test with these inflammatory markers and radiographic erosion is osteomyelitis with spreading infection. Source control and antibiotics cannot wait for the perfusion result.

Option A: Treating this as purely neuropathic misses coexisting arterial disease and predicts failed healing after debridement. Option D: Correct — it recognises the falsely high index and still deals with the infected foot promptly. Option B: A high index is not evidence of ischaemia, and major amputation before perfusion assessment and source control is premature. Option C: Exercise testing is for claudication, and this man cannot walk on an infected ulcerated foot. Option E: Delaying debridement for six weeks in spreading infection with systemic upset risks the limb.

*An ankle-brachial index above 1.3 is uninterpretable, not reassuring — use toe pressure or transcutaneous oxygen in diabetes and renal failure.*

*ESVS guideline on peripheral arterial disease and the diabetic foot*

**Q13.3 CORRECT ANSWER B**

The symptomatic side is the right internal carotid artery, the stenosis is severe, and endarterectomy should be performed as soon as possible within two weeks of the event.

Why: Left arm weakness and dysphasia localise to the right hemisphere, so the right carotid is the culprit vessel. Recurrent stroke risk is highest in the first fortnight after a transient ischaemic attack and falls steeply thereafter. That is why the benefit of endarterectomy is concentrated in early surgery. Her age and renal impairment do not exclude her; she is independent and medically stable.

Option B: Correct — it treats the symptomatic severe stenosis inside the window where the absolute benefit is greatest. Option A: The left carotid is asymptomatic and only moderately stenosed, so operating on it offers no benefit and carries a stroke risk. Option C: A staged bilateral approach begins on the wrong side and delays treatment of the vessel that actually caused the event. Option D: Medical therapy alone under-treats a severe symptomatic stenosis in a patient fit for surgery. Option E: Deferring for twelve weeks wastes precisely the period in which surgery prevents the most strokes.

*For a symptomatic severe internal carotid stenosis, endarterectomy on the side that explains the neurological deficit should be performed within two weeks of the index event.*

*ESVS guidelines, carotid disease*

**■ KEY POINT**

Come back to this chapter in two days, then in a week, then in three weeks. Do not reread it — cover the tables and say the rules out loud first, then check. Spacing and retrieval are the two things that work; rereading is not.



SECTION 14

# PAEDIATRIC SURGERY FOR THE GENERAL SURGEON

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THIS CHAPTER COVERS

- Neonatal surgical emergencies and when to transfer
  - Hypertrophic pyloric stenosis
  - Intussusception
  - Appendicitis in children
  - Paediatric inguinal hernia, hydrocele, undescended testis
  - Paediatric trauma and non-accidental injury
  - Foreign body ingestion and caustic injury
  - Fluid, electrolyte and analgesic prescribing in children
-

3% of the paper · 150 questions in the bank behind this chapter

Figure 14: Where Paediatric Surgery for the General Surgeon sits in a general surgery examination.

### Before you read this chapter

Answer these three now, from what you already know. Write the letter down. Getting them wrong before you read is not a waste — attempting first is what makes the reading stick. The answers are at the end of the chapter, not here.

**Q14.1** A 9-year-old girl weighing 30 kg is admitted with a 26-hour history of right iliac fossa pain, anorexia and two episodes of vomiting. She is febrile at 38.1 degrees, heart rate 118, and has localised tenderness with guarding at McBurney's point. White cell count is 16.4 with a neutrophilia and C-reactive protein is 62. Ultrasound shows a non-compressible blind-ending tubular structure of 9 mm with surrounding echogenic fat. She is booked for laparoscopic appendicectomy on the emergency list in three hours. She has had no analgesia beyond paracetamol given by her mother six hours ago. Which prescribing plan is most appropriate?

- A Withhold all analgesia until the surgical decision is confirmed, to avoid masking the physical signs
- B Intramuscular pethidine 1 mg/kg as a single dose and nothing further until theatre
- C Intravenous paracetamol 15 mg/kg six-hourly plus intravenous morphine 0.1 mg/kg titrated for breakthrough pain, with an antiemetic prescribed
- D Oral codeine 1 mg/kg six-hourly with oral ibuprofen
- E Intravenous morphine infusion at a fixed background rate of 20 micrograms/kg/hour without bolus provision

**Q14.2** A 3-year-old boy with a known left inguinal hernia attends a district hospital at midnight with four hours of a tender, irreducible left groin lump and vomiting. He is crying, tachycardic at 160 beats per minute, but well perfused with a normal capillary refill. The overlying skin is normal in colour and not oedematous. The abdomen is mildly distended and soft, with no guarding. He has had no previous surgery. The single emergency theatre is occupied with an adult laparotomy expected to run for a further two hours, and the nearest paediatric surgical unit is two hours away by road.

- A Transfer immediately to the paediatric unit without attempting reduction
- B Analgesia, Trendelenburg position and gentle taxis, and if it reduces, plan repair on the next available elective list within 24 to 48 hours
- C Bump the adult laparotomy and take him to theatre now for emergency exploration
- D Apply ice to the groin and review in the morning with no attempt at reduction
- E Attempt reduction, and if it succeeds, discharge home with an outpatient appointment in three months

**Q14.3** A term girl, 34 hours old, is reviewed on the postnatal ward because she has vomited three times, the last vomit clearly green. She was born by normal delivery at 39 weeks with a birth weight of 3.2 kg. The abdomen is soft with mild upper abdominal fullness and no tenderness. She has passed meconium once. Observations are normal and capillary refill is two seconds. Plain abdominal radiograph shows a moderately distended stomach and proximal duodenum with scanty gas distally. She is in a hospital with a paediatric department, a theatre and a general surgeon, but no paediatric surgeon and no out-of-hours contrast fluoroscopy.

- A** Trial of feeding with a thickened formula and reassessment in six hours
- B** Nasogastric decompression, intravenous fluids and immediate discussion with the paediatric surgical centre for urgent transfer
- C** Rectal washout and suction rectal biopsy locally to exclude Hirschsprung's disease before transfer
- D** Wait for the fluoroscopy service in the morning and transfer only if the contrast study is abnormal
- E** Local laparotomy by the general surgeon tonight to exclude midgut volvulus

## What this chapter covers

### AREA OF THE SYLLABUS

Neonatal surgical emergencies and when to transfer  
 Hypertrophic pyloric stenosis  
 Intussusception  
 Appendicitis in children  
 Paediatric inguinal hernia, hydrocele, undescended testis  
 Paediatric trauma and non-accidental injury  
 Foreign body ingestion and caustic injury  
 Fluid, electrolyte and analgesic prescribing in children

## The rules that carry marks

| WHEN YOU SEE                                                                | WHAT IT MEANS, OR WHAT TO DO                                                                                            |
|-----------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| a stable child without peritonitis                                          | ileocolic intussusception is reduced by air enema after resuscitation, with a surgeon and theatre on standby            |
| a child with clinically convincing appendicitis and a diagnostic ultrasound | proceed to appendicectomy — CT adds radiation without changing management                                               |
| Bilious vomiting in a neonate is malrotation with volvulus until excluded   | the stable infant gets an urgent upper gastrointestinal contrast study and the unstable one goes directly to laparotomy |

|                                                                                           |                                                                                                                                                                 |
|-------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Bilious vomiting in a neonate is malrotation with midgut volvulus until excluded          | a soft abdomen and normal observations buy no time, and in a hospital without paediatric surgery the correct next step is resuscitation and immediate retrieval |
| Bilious vomiting in a neonate is midgut volvulus until proven otherwise                   | in a hospital without paediatric surgery or fluoroscopy, resuscitate and transfer immediately rather than investigate locally                                   |
| A unilateral impalpable testis goes straight to diagnostic laparoscopy by 12 to 18 months | imaging does not change management and hormonal therapy is not first-line                                                                                       |
| Maintenance intravenous fluid in children must be isotonic                                | hypotonic solutions cause hyponatraemic encephalopathy — and a dehydrated but normotensive child needs deficit replacement, not a bolus                         |
| paediatric blunt splenic injury                                                           | haemodynamic status and not CT grade or contrast blush determines the need for intervention                                                                     |

### What you are expected to know

- Codeine has no place in paediatric analgesia, and opioids should be given for confirmed or suspected appendicitis rather than withheld to preserve clinical signs.
- A well-walled-off appendiceal mass in a child who is improving on antibiotics is treated medically, with drainage reserved for failure to settle and appendectomy deferred rather than forced.
- An incarcerated paediatric inguinal hernia without ischaemic signs is reduced by taxis under analgesia and repaired within 24 to 48 hours, not months later.
- Bruising in a pre-mobile infant, particularly of the ear or torso, and posterior rib fractures are markers of non-accidental injury and mandate admission, safeguarding referral, skeletal survey and neuroimaging.
- A double-rim or halo on a plain film means button battery, and an oesophageal button battery is removed immediately regardless of how well the child looks.
- Non-operative management of paediatric blunt splenic injury is decided by haemodynamic status, not by injury grade, and a stable child does not need an operation simply because interventional radiology is unavailable.

#### ■ BOARD PEARL

Postoperative children must receive isotonic maintenance fluid; hypotonic solutions in the presence of ADH excess cause hyponatraemic encephalopathy, treated acutely with a 3% saline bolus.

#### ■ BOARD PEARL

A spiral femoral fracture in a barely ambulant infant with bruises of differing ages is non-accidental injury until disproven: admit for safety and refer to safeguarding before any further investigation.



## Guidance this chapter is written against

APSA clinical practice guideline, management of intussusception in children

WSES Jerusalem guidelines for diagnosis and management of acute appendicitis

APSA clinical practice guidance on the management of paediatric appendicitis

APSA clinical practice guideline, appendicitis in children

APSA clinical practice guideline, inguinal hernia in infants and children

APSA — American Pediatric Surgical Association clinical practice guidelines, perioperative fluid management in children

APSA clinical practice guideline, malrotation and midgut volvulus

APSA — American Pediatric Surgical Association clinical practice guidelines, malrotation and midgut volvulus

APSA clinical practice guideline, malrotation

NICE guideline, child maltreatment: when to suspect maltreatment in under 18s

## Retrieval check

The three you answered before reading. Mark yourself honestly; a wrong answer you now understand is worth more than a right one you guessed.

### Q14.1 CORRECT ANSWER **C**

Weight-based intravenous paracetamol with titrated morphine boluses and an antiemetic is the appropriate regimen for a fasting child with acute appendicitis awaiting theatre.

Why: The diagnosis is already established clinically, biochemically and radiologically, so there are no signs left to mask. Opioid analgesia does not reduce diagnostic accuracy in paediatric appendicitis. Titrated boluses allow the dose to be matched to effect in a child who will shortly receive an anaesthetic. Oral routes are unreliable in a vomiting child who is nil by mouth.

Option A: Withholding analgesia to preserve signs is an outdated practice that causes unnecessary suffering and does not improve diagnosis. Option C: Correct, because it combines a safe baseline non-opioid with a titratable opioid and anticipates opioid-induced vomiting. Option B: Pethidine has a poor paediatric profile with a neurotoxic metabolite, and a single intramuscular dose provides no ongoing plan. Option D: Codeine is contraindicated in children for analgesia because of unpredictable CYP2D6 metabolism, and the oral route is inappropriate when nil by mouth. Option E: A background morphine infusion without rescue boluses risks both accumulation and inadequate control of incident pain.

*Codeine has no place in paediatric analgesia, and opioids should be given for confirmed or suspected appendicitis rather than withheld to preserve clinical signs.*

*APSA clinical practice guidance on the management of paediatric appendicitis*

### Q14.2 CORRECT ANSWER **B**

An incarcerated but non-ischaemic paediatric inguinal hernia should be reduced with adequate analgesia, then repaired on a semi-elective basis within one to two days.

Why: Most incarcerated hernias in children reduce with opioid analgesia, head-down positioning and sustained gentle pressure. There are no signs of strangulation here: the skin is normal, the child is perfused and the abdomen is soft. Successful reduction converts a hazardous emergency operation in an oedematous field into a safe one. The delay of 24 to 48 hours lets cord and bowel oedema settle, but is short enough to avoid re-incarceration.

Option A: Transferring an unreduced hernia two hours away wastes the window in which taxis usually succeeds. Option B: Correct — reduce first, then repair on a planned list within one to two days. Option C: Emergency exploration is reserved for failed reduction or suspected ischaemia, neither of which applies. Option D: Ice and overnight neglect risk progression to strangulation and testicular infarction. Option E: A three-month wait carries a high re-incarceration rate in a child of this age.

*An incarcerated paediatric inguinal hernia without ischaemic signs is reduced by taxis under analgesia and repaired within 24 to 48 hours, not months later.*

*APSA clinical practice guideline, inguinal hernia in infants and children*

### **Q14.3 CORRECT ANSWER B**

Bilious vomiting in a neonate is malrotation with midgut volvulus until proven otherwise, and the correct step here is resuscitation with immediate transfer.

Why: Time from volvulus to infarction can be under six hours. This hospital cannot perform the diagnostic upper gastrointestinal contrast study tonight and has no paediatric surgeon. The child is currently stable, so transfer with a nasogastric tube and intravenous fluids is safe and fastest to definitive care. The decision is driven by what this hospital lacks, not by how well she looks.

Option B: Correct — decompression, fluids and immediate transfer get her to a contrast study and a Ladd's procedure in the shortest time. Option A: Feeding a neonate with bilious vomiting is dangerous and delays the diagnosis. Option C: Hirschsprung's disease does not typically present at 34 hours with bilious vomiting and a gasless distal abdomen. Option D: Waiting until morning for fluoroscopy may cost the entire midgut. Option E: A general surgeon opening a stable neonate without paediatric support is a worse option than a forty-minute transfer.

*Bilious vomiting in a neonate is midgut volvulus until proven otherwise; in a hospital without paediatric surgery or fluoroscopy, resuscitate and transfer immediately rather than investigate locally.*

*APSA clinical practice guideline, malrotation*

### **■ KEY POINT**

Come back to this chapter in two days, then in a week, then in three weeks. Do not reread it — cover the tables and say the rules out loud first, then check. Spacing and retrieval are the two things that work; rereading is not.

# BARIATRIC AND METABOLIC SURGERY

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15

## THIS CHAPTER COVERS

- Indications, patient selection and the multidisciplinary team
- Sleeve gastrectomy and Roux-en-Y gastric bypass: steps and anatomy
- One-anastomosis gastric bypass and revisional surgery
- Early complications: leak, bleeding, obstruction
- Late complications: internal hernia, marginal ulcer, reflux after sleeve
- Nutritional deficiencies and long-term surveillance
- Metabolic mechanisms of type 2 diabetes remission
- The bariatric patient presenting to the emergency surgeon

2% of the paper · 100 questions in the bank behind this chapter

Figure 15: Where Bariatric and Metabolic Surgery sits in a general surgery examination.

### Before you read this chapter

Answer these three now, from what you already know. Write the letter down. Getting them wrong before you read is not a waste — attempting first is what makes the reading stick. The answers are at the end of the chapter, not here.

**Q15.1** A 49-year-old man is reviewed twenty-two months after one-anastomosis gastric bypass performed in another country. He has lost 44 kilograms and his diabetes is in remission, but for six months he has had burning epigastric pain, a bitter taste and vomiting of green fluid, worse at night and when lying flat. Proton pump inhibitors and sucralfate have not helped. He has lost a further four kilograms because he is afraid to eat in the evening. Endoscopy shows a pool of bile in the gastric tube, erythematous gastritis from the anastomosis upwards, and oesophagitis in the distal oesophagus. Biopsies show no *Helicobacter* and no dysplasia.

- A Double the proton pump inhibitor dose and add a nocturnal H<sub>2</sub> receptor antagonist
- B Convert the one-anastomosis bypass to a Roux-en-Y configuration
- C Add ursodeoxycholic acid and a prokinetic and review in six months
- D Reverse the bypass to restore normal gastroduodenal anatomy
- E Perform a Nissen fundoplication around the distal oesophagus

**Q15.2** A 26-year-old woman is on day two after an uncomplicated laparoscopic Roux-en-Y gastric bypass. She has vomited persistently since the evening of surgery and has tolerated almost no oral fluids. Overnight she becomes confused and unsteady. On examination she is afebrile with a pulse of 96 beats per minute and a soft, non-tender abdomen. She has horizontal nystagmus, bilateral lateral rectus weakness and a broad-based gait. Capillary glucose is 3.2 mmol/L. The nursing staff have prepared intravenous 10% dextrose and antiemetics and are asking permission to start the infusion. What is the most appropriate immediate action?

- A Give the intravenous dextrose first, then start intravenous thiamine once she is more alert
- B Obtain an urgent CT of the head before administering any specific treatment
- C Give intravenous thiamine before any glucose-containing fluid is administered
- D Start high-dose intravenous vitamin B<sub>12</sub> and oral folate replacement
- E Arrange urgent upper gastrointestinal contrast study to exclude gastrojejunal obstruction

**Q15.3** A 54-year-old man is undergoing laparoscopic one-anastomosis gastric bypass for a body mass index of 48 kg/m<sup>2</sup> with insulin-treated type 2 diabetes. The long lesser-curve gastric tube has been created over a 36Fr bougie, beginning horizontally at the level of the crow's foot and extending to the angle of His. The surgeon now measures the biliopancreatic limb from the duodenojejunal flexure before constructing the single loop gastrojejunostomy. The assistant asks what governs the length chosen. Which consideration should most directly determine the length of the biliopancreatic limb in this operation?

- A The length of the Roux limb needed to reach the pouch without tension
- B The need to keep the anastomosis below the transverse mesocolon to prevent internal hernia
- C The total small bowel length required to keep the common channel under 100 centimetres
- D The balance between metabolic effect and the risk of protein-energy malnutrition
- E The bougie size used to calibrate the gastric tube

## What this chapter covers

### AREA OF THE SYLLABUS

Indications, patient selection and the multidisciplinary team  
 Sleeve gastrectomy and Roux-en-Y gastric bypass: steps and anatomy  
 One-anastomosis gastric bypass and revisional surgery  
 Early complications: leak, bleeding, obstruction  
 Late complications: internal hernia, marginal ulcer, reflux after sleeve  
 Nutritional deficiencies and long-term surveillance  
 Metabolic mechanisms of type 2 diabetes remission  
 The bariatric patient presenting to the emergency surgeon

## The rules that carry marks

| WHEN YOU SEE                                                                                                               | WHAT IT MEANS, OR WHAT TO DO                                                                    |
|----------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| one-anastomosis gastric bypass the biliopancreatic limb length determines the degree of malabsorption                      | and excessive length is the principal cause of protein-energy malnutrition requiring revision   |
| Complete mobilisation of the posterior fundus to the left crus is essential before the final sleeve firings                | a retained fundus causes weight regain and distorts the most vulnerable part of the staple line |
| Intractable reflux after sleeve gastrectomy is an indication for conversion to Roux-en-Y gastric bypass with hiatal repair | fundoplication is anatomically impossible and re-sleeve makes reflux worse                      |

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|                                                                                                                   |                                                                                  |
|-------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| Post-bypass hyperinsulinaemic hypoglycaemia is strictly postprandial with raised endogenous insulin and C-peptide | fasting hypoglycaemia after bypass should prompt a search for insulinoma instead |
|-------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|

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## What you are expected to know

- Refractory bile reflux is the characteristic late failure of one-anastomosis gastric bypass and is corrected by conversion to a Roux-en-Y, not by acid suppression.
- Diabetes improvement after gastric bypass begins within days through incretin and ghrelin mechanisms driven by altered nutrient transit, and is sustained later by weight loss and improved insulin sensitivity.
- Macrocytosis with dorsal column signs several years after gastric bypass is vitamin B12 deficiency until proven otherwise, because the bypassed gastric body no longer produces intrinsic factor.
- Tachycardia with a falling haemoglobin on the day of a bypass is intra-abdominal staple line bleeding, and an unstable patient goes back to theatre rather than to endoscopy or radiology.
- Intractable bile reflux after one-anastomosis gastric bypass is treated by conversion to Roux-en-Y gastric bypass, which diverts bile from the pouch and allows limb lengths to be corrected at the same time.
- Refractory reflux with erosive oesophagitis after sleeve gastrectomy is managed by conversion to Roux-en-Y gastric bypass with concurrent hiatal hernia repair, not by fundoplication.
- Petersen's space exists in both antecolic and retrocolic gastric bypass and both mesenteric defects should be closed with non-absorbable suture at the index operation.
- Metabolic surgery is indicated at a body mass index of 30 to 34.9 kg/m<sup>2</sup> when an obesity-related comorbidity such as type 2 diabetes is inadequately controlled by medical therapy.
- A haemodynamically unstable patient with a suspected sleeve gastrectomy leak needs immediate laparoscopy, washout and wide drainage — do not over-sew the friable staple line, and do not delay for imaging or transfer.
- Current indications for bariatric surgery are a body mass index of 35 kg/m<sup>2</sup> or above regardless of comorbidity, or 30 to 34.9 kg/m<sup>2</sup> with an obesity-related comorbidity such as type 2 diabetes, sleep apnoea or steatohepatitis.

### ■ BOARD PEARL

Glycaemic control improves within days of Roux-en-Y gastric bypass through enhanced GLP-1 and peptide YY secretion from the distal gut, before any weight-dependent mechanism can operate.

### ■ BOARD PEARL

Any bariatric patient with persistent vomiting who develops confusion, ophthalmoplegia or ataxia needs parenteral thiamine before any glucose-containing fluid.

## Trials you should be able to name

| TRIAL      | WHAT IT IS ABOUT                                            |
|------------|-------------------------------------------------------------|
| STAMPEDE   | bariatric surgery versus intensive medical therapy diabetes |
| YOMEGA     | one anastomosis gastric bypass Roux-en-Y                    |
| SM-BOSS    | sleeve gastrectomy Roux-en-Y gastric bypass weight loss     |
| SLEEVEPASS | sleeve gastrectomy Roux-en-Y gastric bypass randomised      |

## Guidance this chapter is written against

*ADA Standards of Care, metabolic surgery for type 2 diabetes*

*IFSO position statement on one anastomosis gastric bypass*

*ADA Standards of Medical Care in Diabetes, metabolic surgery section*

*ASMBS nutritional guideline for the metabolic and bariatric surgery patient*

*IFSO position statement on sleeve gastrectomy*

*ASMBS nutritional guidelines for the metabolic and bariatric surgery patient*

*IFSO position statement on gastro-oesophageal reflux and sleeve gastrectomy*

*ASMBS clinical issues statement on perioperative bleeding in bariatric surgery*

*IFSO position statement on one-anastomosis gastric bypass*

*IFSO/EAES guideline on laparoscopic Roux-en-Y gastric bypass technique*

## Retrieval check

The three you answered before reading. Mark yourself honestly; a wrong answer you now understand is worth more than a right one you guessed.

### Q15.1 CORRECT ANSWER **B**

Refractory bile reflux after one-anastomosis gastric bypass is treated by converting to a Roux-en-Y configuration.

Why: The loop anastomosis exposes the gastric tube and oesophagus to biliopancreatic content. Acid suppression cannot help, because the injurious agent is bile and not acid. Creating a Roux limb diverts biliopancreatic secretions distally and is the only manoeuvre that reliably abolishes the reflux. His endoscopic oesophagitis and weight loss from food avoidance make continued medical temporising unjustifiable.

Option A: Escalating acid suppression targets the wrong agent and will not stop alkaline bile reaching the oesophagus. Option C: Ursodeoxycholic acid and prokinetics may modestly ease symptoms but do not divert the bile stream. Option B: Correct — Roux-en-Y conversion diverts biliopancreatic content away from the gastric tube and oesophagus. Option D: Full reversal sacrifices a good metabolic result and risks weight regain and recurrent diabetes. Option E: A fundoplication is not feasible after this reconstruction and does not address biliopancreatic reflux.

*Refractory bile reflux is the characteristic late failure of one-anastomosis gastric bypass and is corrected by conversion to a Roux-en-Y, not by acid suppression.*

*IFSO position statement on one anastomosis gastric bypass*

**Q15.2 CORRECT ANSWER C**

This is Wernicke's encephalopathy from thiamine depletion after protracted post-operative vomiting, and thiamine must precede any glucose load.

Why: Body thiamine stores last only two to three weeks and vomiting exhausts them quickly. Confusion, ophthalmoplegia and ataxia are the classic triad. Giving glucose first drives thiamine-dependent metabolism and can precipitate irreversible neurological damage. Treatment is time critical and given on clinical suspicion alone.

Option A: Reversing the order is the specific error that converts a treatable state into permanent Korsakoff syndrome.

Option C: Correct — parenteral thiamine is given first and before any dextrose.

Option B: Imaging delays a treatment that costs nothing and must be given on clinical grounds.

Option D: B12 and folate deficiency do not present acutely at two days and do not cause this syndrome.

Option E: A contrast study is a reasonable later step for her vomiting but does nothing for the neurological emergency in front of you.

*Any bariatric patient with persistent vomiting who develops confusion, ophthalmoplegia or ataxia needs parenteral thiamine before any glucose-containing fluid.*

*ASMBS nutritional guideline for the metabolic and bariatric surgery patient*

**Q15.3 CORRECT ANSWER D**

Biliopancreatic limb length in one-anastomosis gastric bypass sets the malabsorptive dose, and it is chosen to trade metabolic benefit against nutritional risk.

Why: A longer biliopancreatic limb increases weight loss and diabetes remission but shortens the absorptive common channel. Limbs beyond about 200 centimetres carry a real incidence of hypoalbuminaemia, steatorrhoea and revision for malnutrition. Contemporary practice has shortened the limb and tailors it to total small bowel length. There is no Roux limb in this operation to measure at all.

Option A: There is no Roux limb in a one-anastomosis bypass; the loop is brought up intact.

Option D: Correct — limb length is the malabsorptive dial and is set by the malnutrition-versus-metabolic-effect trade-off. Option B: Position relative to the mesocolon does not determine limb length, and the single anastomosis leaves few mesenteric defects. Option C: A common channel deliberately kept under 100 centimetres would guarantee protein malabsorption, not prevent it. Option E: Bougie size calibrates the gastric tube diameter and has nothing to do with limb measurement.

*In one-anastomosis gastric bypass the biliopancreatic limb length determines the degree of malabsorption, and excessive length is the principal cause of protein-energy malnutrition requiring revision.*

*IFSO position statement on one anastomosis gastric bypass*

**■ KEY POINT**



Come back to this chapter in two days, then in a week, then in three weeks. Do not reread it — cover the tables and say the rules out loud first, then check. Spacing and retrieval are the two things that work; rereading is not.



SECTION 16

# SKIN, SOFT TISSUE AND NECROTISING INFECTION

---

THIS CHAPTER COVERS

- Cellulitis, abscess and the surgical site infection
- Necrotising soft tissue infection: LRINEC, timing of debridement, adjuncts
- Hidradenitis suppurativa
- Benign skin lesions and when to excise
- Melanoma and non-melanoma skin cancer at general surgeon level
- Soft tissue sarcoma: the red flags and the referral rule
- Diabetic foot infection
- Antibiotic stewardship in soft tissue infection

2% of the paper · 100 questions in the bank behind this chapter

Figure 16: Where Skin, Soft Tissue and Necrotising Infection sits in a general surgery examination.

### Before you read this chapter

Answer these three now, from what you already know. Write the letter down. Getting them wrong before you read is not a waste — attempting first is what makes the reading stick. The answers are at the end of the chapter, not here.

**Q16.1** A 62-year-old man is seen in the general surgical clinic having noticed a lesion on the upper back that his wife says has changed over the past six months. It is a 9 mm asymmetrical macule with an irregular notched border and two shades of brown with a black eccentric area. There is no ulceration, no bleeding and no palpable lymphadenopathy in either axilla. He is a keen sailor with a history of blistering sunburn in youth and has two previous basal cell carcinomas excised from the face. He is otherwise well. What is the most appropriate next step?

- A Excisional biopsy with a 2 mm clinical margin and full-thickness to subcutaneous fat
- B Punch biopsy of the darkest area to establish the diagnosis
- C Wide local excision with a 2 cm margin at the first operation
- D Shave biopsy of the lesion sent for histology
- E Photographic surveillance with review in three months

**Q16.2** A 61-year-old man with type 2 diabetes on gliclazide presents to a rural hospital at 23:00 with 18 hours of severe right thigh pain after a minor scratch. He is confused, temperature 38.9°C, pulse 128, blood pressure 88/54 mmHg. The thigh is tense and dusky with two small bullae and pain far exceeding the modest erythema. The nearest CT scanner is ninety minutes away by road, there is no interventional radiology service and no intensive care bed in the hospital. Bloods show white cells  $24 \times 10^9/L$ , C-reactive protein 310 mg/L, sodium 128 mmol/L, creatinine 190  $\mu\text{mol/L}$ . What is the most appropriate next step?

- A Resuscitate, start broad-spectrum antibiotics and take him to the local theatre immediately for exploration and radical debridement
- B Transfer by road for CT of the thigh to confirm fascial gas before committing to surgery
- C Start broad-spectrum intravenous antibiotics and reassess the limb in four hours
- D Arrange emergency retrieval to the tertiary centre and defer all surgery until he arrives there
- E Perform a bedside incisional biopsy of the fascia and await frozen section before deciding

**Q16.3** A 68-year-old woman with type 2 diabetes of eighteen years and known peripheral neuropathy presents with a plantar ulcer under the first metatarsal head, present for six weeks. The ulcer is 2 cm across with surrounding erythema extending 3 cm, purulent discharge and probing to bone with a sterile probe. She is afebrile, heart rate 82 beats per minute, white cell count  $12.8 \times 10^9/L$ , C-reactive protein 88 mg/L, HbA1c 84 mmol/mol. Both dorsalis pedis and posterior tibial pulses are palpable. Plain radiography of the foot shows cortical irregularity of the first metatarsal head. What is the most appropriate management?

- A Immediate transmetatarsal amputation because bone is exposed
- B Treat as diabetic foot osteomyelitis with bone-directed antibiotics after deep tissue sampling, plus offloading and glycaemic control
- C Seven days of oral flucloxacillin guided by a superficial wound swab
- D Urgent lower limb angiography and revascularisation before any antibiotic therapy
- E Topical antiseptic dressings alone with review in six weeks

## What this chapter covers

### AREA OF THE SYLLABUS

Cellulitis, abscess and the surgical site infection  
 Necrotising soft tissue infection: LRINEC, timing of debridement, adjuncts  
 Hidradenitis suppurativa  
 Benign skin lesions and when to excise  
 Melanoma and non-melanoma skin cancer at general surgeon level  
 Soft tissue sarcoma: the red flags and the referral rule  
 Diabetic foot infection  
 Antibiotic stewardship in soft tissue infection

## The rules that carry marks

| WHEN YOU SEE                                                                                                  | WHAT IT MEANS, OR WHAT TO DO                                                                                                |
|---------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| A lesion suspicious for melanoma is removed by full-thickness excisional biopsy with a 2 mm margin            | definitive wide excision is decided only after Breslow thickness is known                                                   |
| Necrotising soft tissue infection is a clinical diagnosis                                                     | when it is unequivocal, debride immediately in the hospital you are in rather than delaying for imaging, scores or transfer |
| In suspected necrotising soft tissue infection the LRINEC score and imaging never override clinical judgement | a low score does not exclude the diagnosis and nothing may delay debridement                                                |

|                                                                                                                         |                                                                                            |
|-------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|
| necrotising soft tissue infection is clinically unequivocal                                                             | operate where the patient is — imaging and transfer must never delay the first debridement |
| A positive probe-to-bone test in a diabetic foot ulcer indicates osteomyelitis                                          | sample deep tissue, offload the foot and do not rely on superficial swabs                  |
| Recurrent flexural nodules with sinus tracts and scarring are hidradenitis suppurativa                                  | repeated incision and drainage is a failure of diagnosis, not a treatment                  |
| A superficial incisional surgical site infection is opened and drained                                                  | antibiotics are added only for spreading cellulitis, systemic signs or immunosuppression   |
| Any soft tissue mass that is over 5 cm, deep to fascia, growing or painful goes to a sarcoma unit for core biopsy first | never an unplanned local excision                                                          |

## What you are expected to know

- Second-look debridement at 24 to 48 hours is mandatory in necrotising soft tissue infection, and clindamycin is continued for toxin suppression while the patient remains toxaemic.
- Any soft tissue mass larger than 5 cm, deep to the deep fascia, enlarging or painful must be referred to a sarcoma service for MRI and a planned core biopsy before excision; unplanned marginal excision is the single most damaging error in sarcoma care.
- Any soft tissue lump larger than 5 cm, deep to fascia, enlarging or painful goes to the sarcoma multidisciplinary team before biopsy or excision.
- Basal cell carcinoma kills by local invasion, not metastasis, so management is about margin clearance — excise and confirm histologically rather than destroy blind.
- In an infected diabetic foot ulcer a positive probe-to-bone test predicts osteomyelitis even when the plain radiograph is normal; confirm with MRI, culture bone rather than a surface swab, and treat with prolonged directed therapy plus offloading.
- A pearly, telangiectatic papule with a rolled edge on sun-exposed skin is a basal cell carcinoma — treat with narrow-margin complete excision, never with wide margins or nodal surgery.

### ■ BOARD PEARL

A fluctuant cutaneous abscess is treated by drainage; antibiotics are an adjunct for surrounding cellulitis or systemic features, never a substitute.

### ■ BOARD PEARL

A deep incisional infection around macroporous mesh in a stable patient is opened, debrided and drained first — explantation is the answer to failed salvage, not the opening move.

## Guidance this chapter is written against

WSES guidance on skin and soft tissue infections

AJCC/UICC melanoma staging, 8th edition

Surviving Sepsis Campaign — International guidelines for sepsis and septic shock, 2026 (*Intensive Care Med* 2026;52:863-936)

*CDC criteria for surgical site infection*

*Soft tissue sarcoma referral criteria and principles of planned biopsy*

*IWGDF guidance on diagnosis and treatment of foot infection in persons with diabetes*

*European Dermatology Forum guideline on hidradenitis suppurativa*

*ESMO Clinical Practice Guidelines, soft tissue sarcoma*

*NCCN Guidelines, basal cell skin cancer*

*Principles of diabetic foot infection assessment, probe-to-bone testing and bone culture*

## Retrieval check

The three you answered before reading. Mark yourself honestly; a wrong answer you now understand is worth more than a right one you guessed.

### Q16.1 CORRECT ANSWER **A**

A pigmented lesion suspicious for melanoma is diagnosed by narrow-margin excisional biopsy taken full-thickness.

Why: The whole lesion is needed to measure Breslow thickness accurately, and thickness determines the definitive margin and the need for sentinel node biopsy. A 2 mm margin removes the lesion without disturbing the lymphatic drainage that a later sentinel node biopsy depends on. Definitive wide excision is a second procedure once the histology is known.

Option A: Correct — it gives complete histology, preserves staging options and does not commit the patient to an unnecessarily large excision. Option B: Punch biopsy samples one point and can miss the thickest part of the tumour, understaging the lesion. Option C: A 2 cm margin before histology is a large excision that may prove unnecessary and can disrupt lymphatic mapping. Option D: Shave biopsy transects the base and destroys the Breslow measurement on which all subsequent management rests. Option E: Surveillance of a changing, asymmetrical, multicoloured lesion in a high-risk patient delays a potentially curable diagnosis.

*A lesion suspicious for melanoma is removed by full-thickness excisional biopsy with a 2 mm margin; definitive wide excision is decided only after Breslow thickness is known.*

*AJCC/UICC melanoma staging, 8th edition*

### Q16.2 CORRECT ANSWER **A**

This is a clinically unequivocal necrotising soft tissue infection with septic shock, and the operation must happen where he is, now.

Why: Pain out of proportion, dusky tense skin, bullae, hyponatraemia and shock make the diagnosis clinical. Time from presentation to first debridement is the strongest modifiable predictor of death. A ninety-minute journey each way to obtain an image that will not change the decision is time spent letting the infection advance. Resuscitation and surgery run in parallel, not in sequence.

Option B: CT is for unclear cases and surgical planning; here it only delays a decision already made on clinical grounds. Option C: Antibiotics alone do not penetrate necrotic, avascular tissue and a four-hour wait is lethal. Option A: Correct — immediate local debridement with concurrent resuscitation is the only intervention that alters survival. Option D: Deferring debridement until retrieval adds hours of delay for a procedure a general surgeon can start

locally. Option E: Frozen section is rarely available out of hours and biopsy without debridement leaves the necrotic field untreated.

*When necrotising soft tissue infection is clinically unequivocal, operate where the patient is — imaging and transfer must never delay the first debridement.*

*Surviving Sepsis Campaign — International guidelines for sepsis and septic shock, 2026 (Intensive Care Med 2026;52:863-936)*

### Q16.3 CORRECT ANSWER **B**

A probe-to-bone test that is positive, alongside cortical change on plain film, in an ulcer of six weeks' duration means osteomyelitis until proven otherwise.

Why: In this clinical setting the positive probe-to-bone test has a high positive predictive value for bone infection. Superficial swabs grow colonisers and mislead, so deep tissue or bone sampling directs therapy. Offloading is as important as the antibiotic, because an ulcer that continues to be walked on will not heal whatever is prescribed. Palpable pulses make critical ischaemia unlikely, which changes the priority order.

Option B: Correct — it combines microbiological accuracy, mechanical offloading and metabolic control. Option A: Major amputation is not the first response to a neuropathic ulcer in a well-perfused foot. Option C: Superficial swab-guided narrow therapy for a short course undertreats bone infection. Option D: Revascularisation is central when pulses are absent, and both pulses are present here. Option E: Dressings without offloading, sampling or antibiotics allow the osteomyelitis to progress unopposed.

*A positive probe-to-bone test in a diabetic foot ulcer indicates osteomyelitis; sample deep tissue, offload the foot and do not rely on superficial swabs.*

*IWGDF guidance on diagnosis and treatment of foot infection in persons with diabetes*

### ■ KEY POINT

Come back to this chapter in two days, then in a week, then in three weeks. Do not reread it — cover the tables and say the rules out loud first, then check. Spacing and retrieval are the two things that work; rereading is not.



## SECTION 17

# THORACIC SURGERY FOR THE GENERAL SURGEON

---

### THIS CHAPTER COVERS

- Chest drain insertion, management and complications
- Pneumothorax: primary, secondary, persistent air leak
- Pleural effusion and empyema: staging and decortication
- Chest trauma revisited from the thoracic side
- Mediastinal masses and the mediastinitis emergency
- Oesophageal perforation crossing into thoracic territory
- Lung cancer at the level a general surgeon is examined on

2% of the paper · 100 questions in the bank behind this chapter

Figure 17: Where Thoracic Surgery for the General Surgeon sits in a general surgery examination.

### Before you read this chapter

Answer these three now, from what you already know. Write the letter down. Getting them wrong before you read is not a waste — attempting first is what makes the reading stick. The answers are at the end of the chapter, not here.

**Q17.1** A 48-year-old man is admitted with a left pleural effusion. He has ankle oedema, orthopnoea and a known dilated cardiomyopathy with an ejection fraction of 28%. He is on furosemide and ramipril. Serum protein is 68 g/L and serum LDH is 190 IU/L, with a laboratory upper limit of normal of 240 IU/L. Diagnostic aspiration yields straw-coloured fluid with protein 30 g/L and LDH 130 IU/L. He is afebrile with a white cell count of 8.1. The fluid is not turbid and has no odour.

- A The fluid is an exudate; arrange thoracoscopic pleural biopsy
- B The fluid is an exudate; insert an intercostal drain and start antibiotics
- C The fluid is a transudate; optimise diuresis and treat the heart failure
- D The result is indeterminate; measure pleural fluid pH and drain if below 7.2
- E The fluid is a transudate; insert an indwelling pleural catheter for symptom control

**Q17.2** A 58-year-old man is admitted with a four-day history of fever, cough and right-sided pleuritic pain. He has a community-acquired pneumonia and has received forty-eight hours of intravenous co-amoxiclav. His temperature remains 38.6 degrees and his C-reactive protein has risen. A chest radiograph shows a moderate right-sided effusion with blunting of the costophrenic angle and a meniscus reaching the mid-zone. Bedside ultrasound confirms a moderate, septated collection. A diagnostic pleural aspiration returns turbid fluid. The laboratory reports a pleural fluid pH of 7.08, glucose 1.6 mmol/L and LDH 1420 IU/L. Gram stain is negative and cultures are pending.

- A Continue intravenous antibiotics alone and repeat the ultrasound in forty-eight hours
- B Change to a broader-spectrum antibiotic and await culture results before any drainage
- C Perform repeated therapeutic thoracenteses every twenty-four hours as required
- D Insert an intercostal chest drain now and continue antibiotics
- E Proceed directly to thoracotomy and decortication

**Q17.3** A 38-year-old man is brought to a rural district hospital after his tractor overturned onto his left chest. The nearest CT scanner is ninety minutes away by road, there is no interventional radiology service and the single theatre is currently occupied by a caesarean section. On arrival he is agitated, respiratory rate 34, saturations 88% on high-flow oxygen, heart rate 132 and blood pressure 82/50. The trachea is deviated to the right, the left hemithorax is hyper-resonant with absent breath sounds, and the neck veins are distended. There is subcutaneous emphysema over the left chest wall.

- A Immediate needle or finger decompression of the left chest followed by intercostal drain insertion
- B Transfer by road for urgent CT of the chest before any chest intervention
- C Intubation and positive-pressure ventilation, then reassess the chest
- D Erect chest radiograph in the resuscitation room to confirm the diagnosis before decompression
- E Pericardiocentesis under ultrasound guidance for suspected tamponade

## What this chapter covers

### AREA OF THE SYLLABUS

Chest drain insertion, management and complications  
 Pneumothorax: primary, secondary, persistent air leak  
 Pleural effusion and empyema: staging and decortication  
 Chest trauma revisited from the thoracic side  
 Mediastinal masses and the mediastinitis emergency  
 Oesophageal perforation crossing into thoracic territory  
 Lung cancer at the level a general surgeon is examined on

## The rules that carry marks

| WHEN YOU SEE                                                                   | WHAT IT MEANS, OR WHAT TO DO                                                                                                                |
|--------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| a septated empyema with a patent but non-draining tube                         | give tissue plasminogen activator with DNase — neither agent alone is effective                                                             |
| Light's criteria misclassify diuretic-treated cardiac effusions as exudates    | when a single criterion is borderline and the clinical picture is heart failure, treat the heart before investigating the pleura            |
| The indications for surgery in pneumothorax are not the same as fitness for it | when single-lung ventilation is not survivable, chemical pleurodesis through the drain or under local anaesthesia is the correct compromise |
| Tension pneumothorax is diagnosed and treated at the bedside                   | imaging of any kind delays the only intervention that works                                                                                 |

|                                                                                                |                                                                                                             |
|------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| primary spontaneous pneumothorax the decision to intervene rests on symptoms and size together | not on the presence of air alone; a small pneumothorax in a comfortable patient is observed                 |
| failed drainage of septated pleural infection                                                  | tPA and DNase work only as a combination — either agent alone is no better than placebo                     |
| Tension pneumothorax is a clinical diagnosis treated before imaging                            | where the chest wall is thick or equipment limited, finger thoracostomy beats needle decompression          |
| Never clamp a bubbling chest drain                                                             | a persistent air leak with an expanded lung is managed on underwater seal, not by occlusion or high suction |

### What you are expected to know

- A persistent air leak beyond five days after drainage of a secondary pneumothorax triggers thoracic surgical referral, and in poor-reserve patients the aim of that referral is to choose the least invasive effective option, not automatically to operate.
- A pleural fluid pH below 7.2 in a parapneumonic effusion mandates intercostal drainage, regardless of whether the Gram stain is positive.
- A PET-positive mediastinal node must be sampled, normally by endobronchial ultrasound with needle aspiration, because imaging alone neither confirms nor excludes N2 disease.
- Intercostal drains go through the triangle of safety and pass over the superior border of the lower rib, because the neurovascular bundle lies in the costal groove beneath the rib above.
- In a septated complicated parapneumonic effusion, intercostal drainage combined with intrapleural tPA and DNase is the standard escalation before surgical referral; either drug alone is ineffective.
- In suspected oesophageal perforation, resuscitation, antimicrobial cover and pleural drainage take precedence over confirmatory imaging when imaging is not immediately available.

#### ■ BOARD PEARL

A PET-avid mediastinal node in otherwise operable lung cancer must be confirmed histologically by EBUS-TBNA before treatment is decided, because PET positivity alone is not specific enough.

#### ■ BOARD PEARL

Chest drains go in the triangle of safety at the fifth intercostal space, and the needle always rides the upper border of the lower rib because the neurovascular bundle sits under the rib above.

### Trials you should be able to name

| TRIAL | WHAT IT IS ABOUT |
|-------|------------------|
|-------|------------------|

MIST2 (Rahman NM et al. N Engl J Med 2011;365:518-526) —

JCOG0802/WJOG4607L (Saji H et al. Lancet 2022;399:1607-1617) —

## Guidance this chapter is written against

BTS — Guideline for pleural disease, 2023 (Thorax 2023;78:s1-s42, PMID 37433578)

ESMO Clinical Practice Guidelines, early and locally advanced non-small-cell lung cancer

BTS — Guideline for pleural disease, 2023 (Thorax 2023;78:s1-s42)

ESMO Clinical Practice Guidelines, non-small cell lung cancer

Advanced Trauma Life Support principles, thoracic trauma

NCCN Guidelines, non-small cell lung cancer

IASLC/UICC TNM classification for lung cancer

Advanced Trauma Life Support principles, management of massive haemothorax

ITMIG consensus statements on mediastinal masses

ESMO Clinical Practice Guidelines, early-stage non-small cell lung cancer

## Retrieval check

The three you answered before reading. Mark yourself honestly; a wrong answer you now understand is worth more than a right one you guessed.

### Q17.1 CORRECT ANSWER C

Applying Light's criteria, all three are negative, so the fluid is a transudate and the treatment is of the heart failure that caused it.

Why: The protein ratio is 30 over 68, which is 0.44 and below 0.5. The LDH ratio is 130 over 190, which is 0.68 — but the criterion compares pleural LDH with two thirds of the serum upper limit of normal, which is 160, and 130 is below that. Only the ratio-based LDH criterion is met, and a single borderline ratio in a patient on diuretics is the classic pseudoexudate. The clinical picture is unambiguous heart failure.

Option C: Correct — the picture is a cardiac transudate, and diuresis treats the cause rather than the fluid. Option A: Pleural biopsy is for suspected malignancy or tuberculosis, neither of which is suggested here. Option B: There is no fever, no leucocytosis and no turbid fluid, so pleural infection is not supported. Option D: Pleural pH matters in a parapneumonic effusion, and this is not one. Option E: An indwelling catheter is for refractory, usually malignant, effusion, not first-line for untreated heart failure.

*Light's criteria misclassify diuretic-treated cardiac effusions as exudates; when a single criterion is borderline and the clinical picture is heart failure, treat the heart before investigating the pleura.*

BTS — Guideline for pleural disease, 2023 (Thorax 2023;78:s1-s42, PMID 37433578)

### Q17.2 CORRECT ANSWER D

This is a complicated parapneumonic effusion and it requires tube drainage alongside antibiotics.

Why: A pleural fluid pH below 7.2 is the single strongest indication for drainage in a parapneumonic effusion. The low glucose and the very high LDH point the same way. A negative Gram stain does not downgrade the effusion, because organisms are frequently not seen even

in established pleural infection. Left undrained, a collection with these biochemical features progresses to frank empyema and to a surgical problem.

Option A: Antibiotics alone fail once the fluid has become biochemically complicated, and waiting allows loculation to organise. Option B: Broader antibiotic cover does not address a collection that has already crossed the drainage threshold. Option D: Correct — a pH below 7.2 with low glucose and high LDH mandates prompt intercostal drainage with continued antibiotics. Option C: Repeated aspiration does not achieve sustained drainage of a septated collection and repeatedly punctures the chest. Option E: Decortication is for organised, trapped lung after drainage has failed, not as the first intervention.

*A pleural fluid pH below 7.2 in a parapneumonic effusion mandates intercostal drainage, regardless of whether the Gram stain is positive.*

*BTS — Guideline for pleural disease, 2023 (Thorax 2023;78:s1-s42)*

### Q17.3 CORRECT ANSWER **A**

Tension pneumothorax is a clinical diagnosis and demands immediate decompression, followed by a formal intercostal drain.

Why: Tracheal deviation, absent breath sounds, hyper-resonance and distended neck veins with shock are the complete picture. Any delay for imaging risks cardiac arrest from obstructed venous return. In a hospital without a scanner or a free theatre, this is precisely the decision that must be made on examination alone.

Option A: Correct — decompression relieves the obstructive shock in seconds and needs no equipment beyond a cannula or a finger. Option B: A ninety-minute transfer with an untreated tension pneumothorax will kill him. Option C: Positive-pressure ventilation before decompression accelerates the tension and precipitates arrest. Option D: Waiting for a radiograph in a patient this unstable is the classic error the diagnosis is designed to prevent. Option E: Distended neck veins here are explained by the tension pneumothorax; tamponade would not give a hyper-resonant, silent hemithorax.

*Tension pneumothorax is diagnosed and treated at the bedside; imaging of any kind delays the only intervention that works.*

*BTS — Guideline for pleural disease, 2023 (Thorax 2023;78:s1-s42, PMID 37433578)*

### ■ KEY POINT

Come back to this chapter in two days, then in a week, then in three weeks. Do not reread it — cover the tables and say the rules out loud first, then check. Spacing and retrieval are the two things that work; rereading is not.

# EVIDENCE, STATISTICS AND CRITICAL APPRAISAL

---

## THIS CHAPTER COVERS

- Study designs and their hierarchy, IDEAL framework for surgical innovation
- Randomisation, blinding, allocation concealment in surgical trials
- Bias, confounding, effect modification
- Descriptive and inferential statistics, p values, confidence intervals
- Survival analysis, Kaplan-Meier, Cox regression
- Diagnostic test performance: sensitivity, specificity, predictive values, ROC
- Systematic review and meta-analysis, heterogeneity, GRADE
- Reporting guidelines: CONSORT, STROBE, PRISMA

2% of the paper · 100 questions in the bank behind this chapter

Figure 18: Where Evidence, Statistics and Critical Appraisal sits in a general surgery examination.

### Before you read this chapter

Answer these three now, from what you already know. Write the letter down. Getting them wrong before you read is not a waste — attempting first is what makes the reading stick. The answers are at the end of the chapter, not here.

**Q18.1** A 45-year-old man with a symptomatic parastomal hernia is being counselled using a newly published systematic review of eight randomised trials of prophylactic mesh. The pooled odds ratio favours mesh at 0.42, but the I-squared value is 84 per cent and the forest plot shows two trials with effects on the opposite side of the line of no effect. The authors used a fixed effect model and present a single narrow summary estimate. Your registrar asks how the heterogeneity should have changed the analysis and the conclusion offered to this patient.

- A The heterogeneity is irrelevant because all eight trials were randomised
- B The two discordant trials should be excluded to restore a homogeneous pool
- C A funnel plot with eight trials would resolve the heterogeneity statistically
- D A random effects model with exploration of heterogeneity should have been used
- E The pooled estimate should be converted to a number needed to treat and quoted directly

**Q18.2** A 66-year-old man is being counselled about elective repair of a 4 cm incisional hernia. You show him a trial of 300 patients comparing an absorbable synthetic mesh with standard polypropylene. Recurrence at two years was 11 per cent with the new mesh and 8 per cent with polypropylene, giving a risk difference of 3 percentage points with a 95 per cent confidence interval from minus 4 to plus 10 percentage points, and a p value of 0.42. The authors conclude the two meshes are equivalent and recommend the new mesh. He asks whether that conclusion is sound. What is the most appropriate interpretation?

- A The trial proves the two meshes give equal recurrence rates
- B The p value above 0.05 confirms the null hypothesis is true
- C The confidence interval includes differences that would matter clinically, so equivalence is not established
- D The trial shows polypropylene is superior because its recurrence rate is numerically lower
- E The result should be reanalysed per protocol to reach significance



**Q18.3** A 49-year-old woman is admitted with acute cholecystitis and consents to join a randomised trial comparing early laparoscopic cholecystectomy with delayed surgery. The trial protocol states that eligible patients are allocated by the admitting registrar opening the next envelope from a numbered box kept on the ward. The envelopes are white, unsealed and the group assignment is legible when the envelope is held to the ward light. The primary outcome is length of stay, assessed by an independent research nurse who is blinded. You are asked to identify the principal methodological defect.

- A** Failure to blind the operating surgeon to the allocated timing
- B** Inadequate allocation concealment, permitting selection bias at enrolment
- C** Failure to blind the outcome assessor to the allocated group
- D** Use of length of stay rather than mortality as the primary outcome
- E** Absence of a formal washout period between the two treatment strategies

## What this chapter covers

### AREA OF THE SYLLABUS

Study designs and their hierarchy, IDEAL framework for surgical innovation  
 Randomisation, blinding, allocation concealment in surgical trials  
 Bias, confounding, effect modification  
 Descriptive and inferential statistics, p values, confidence intervals  
 Survival analysis, Kaplan-Meier, Cox regression  
 Diagnostic test performance: sensitivity, specificity, predictive values, ROC  
 Systematic review and meta-analysis, heterogeneity, GRADE  
 Reporting guidelines: CONSORT, STROBE, PRISMA  
 Registries and administrative data, their uses and their traps  
 Research ethics and informed consent for research

## The rules that carry marks

| WHEN YOU SEE                                                                                        | WHAT IT MEANS, OR WHAT TO DO                                                                                          |
|-----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| Substantial heterogeneity requires a random effects model and an explicit explanation of its source | it is never resolved by deleting the discordant trials                                                                |
| A non-significant superiority trial is not an equivalence trial                                     | look at what the confidence interval still permits before accepting a claim of no difference                          |
| Administrative databases give large numbers but no physiology                                       | a mortality comparison between operative approaches in such data is dominated by unmeasured confounding by indication |

|                                                                                                       |                                                                                                                                                                       |
|-------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| observational surgical comparisons                                                                    | a crude survival difference that attenuates towards one after multivariable adjustment usually reflects confounding by indication rather than a true treatment effect |
| Under GRADE, randomised evidence starts high and observational evidence starts low                    | observational evidence can be rated up for a large effect, a dose-response gradient, or confounding that would attenuate the effect                                   |
| quoting a hazard ratio                                                                                | check proportional hazards; if the log-minus-log lines cross, report a time-varying effect or restricted mean survival time instead of one summary figure             |
| a non-inferiority trial the whole confidence interval must fall within the prespecified margin        | and intention-to-treat and per-protocol analyses must both support the claim                                                                                          |
| Allocation concealment prevents selection bias at enrolment and is achievable in every surgical trial | blinding prevents detection bias afterwards and, when patient and surgeon cannot be blinded, an assessor-blinded design is the acceptable standard                    |

## What you are expected to know

- A study that applies an index test and a reference standard to the same patients at the same time is a cross-sectional diagnostic accuracy study, whatever the clinical setting.
- Allocation concealment is mandatory in every randomised trial and is distinct from blinding: concealment prevents selection bias at enrolment, blinding prevents biased assessment afterwards.
- Registry and claims data buy precision, not validity: a very large  $n$  narrows the confidence interval around an estimate that residual confounding and coding misclassification may have placed in the wrong position entirely.
- First-in-human use of a modified operation is IDEAL Stage 1 and requires prospective registration, consent that explicitly names the innovation, and reporting of every case including failures.
- A novel operation still undergoing technical modification belongs in an IDEAL stage 2a prospective development study with oversight and specific written consent, not in an unregistered personal series and not yet in a randomised trial.
- Absence of evidence of a difference is not evidence of no difference; read the confidence interval, not the  $p$  value.

### ■ BOARD PEARL

Non-inferiority is established only when the confidence limit closest to the margin excludes it, and both intention-to-treat and per-protocol analyses must agree.

### ■ BOARD PEARL

Registry-derived volume-outcome relationships are hypothesis-generating; residual confounding by unmeasured case mix persists after statistical adjustment, and the risk of acting on them must be weighed against the risk of delay.

## Guidance this chapter is written against

CONSORT — Reporting randomised trials, 2010

STROBE — Reporting observational studies, 2007

PRISMA — Reporting systematic reviews, 2020

IDEAL Collaboration — Framework for surgical innovation

GRADE Working Group — Grading evidence and recommendations

Declaration of Helsinki, ethical principles for medical research involving human subjects

STARD principles for reporting diagnostic accuracy studies

## Retrieval check

The three you answered before reading. Mark yourself honestly; a wrong answer you now understand is worth more than a right one you guessed.

### Q18.1 CORRECT ANSWER **D**

An I-squared of 84 per cent indicates substantial between-study variation, which requires a random effects model and an explicit search for its source before any pooled figure is quoted to a patient.

Why: A fixed effect model assumes one true underlying effect and only sampling error. That assumption fails here. A random effects model widens the interval to reflect genuine variation between studies. Subgroup analysis or meta-regression should then explore mesh position, stoma type and follow-up duration as explanations.

Option A: Randomisation protects within a trial but says nothing about whether trials of different meshes and follow-up can be combined. Option D: Correct — high heterogeneity mandates a random effects model plus investigation of why the effects differ. Option B: Deleting inconvenient trials to force homogeneity is a post hoc manipulation that biases the summary estimate. Option C: A funnel plot examines small study effects and publication bias, and is unreliable with fewer than about ten studies. Option E: A number needed to treat derived from a heterogeneous pool gives the patient false precision about their own risk.

*Substantial heterogeneity requires a random effects model and an explicit explanation of its source; it is never resolved by deleting the discordant trials.*

PRISMA — Reporting systematic reviews, 2020

### Q18.2 CORRECT ANSWER **C**

The confidence interval stretches to a 10 percentage point excess in recurrence, which no surgeon would accept, so the trial has not shown equivalence.

Why: A non-significant p value means the data are compatible with no difference. It does not mean no difference exists. Absence of evidence is not evidence of absence. Equivalence and

non-inferiority require a pre-specified margin, and the confidence interval must lie entirely within it. This trial was designed for superiority and simply lacked power.

Option A: Proving equality is impossible; a trial can only exclude differences larger than a stated margin. Option B: A p value never confirms the null hypothesis, it only fails to reject it. Option C: Correct, because a plausible 10 point excess in recurrence is clinically unacceptable and remains uncontradicted. Option D: A difference this imprecise gives no basis for declaring either mesh superior. Option E: Switching analysis populations to chase significance introduces selection bias and is a reporting fault.

*A non-significant superiority trial is not an equivalence trial; look at what the confidence interval still permits before accepting a claim of no difference.*

CONSORT — Reporting randomised trials, 2010

### Q18.3 CORRECT ANSWER **B**

The allocation sequence can be read before the patient is entered, so allocation concealment has failed and the randomisation no longer guarantees comparable groups.

Why: Concealment protects the moment of enrolment. If the recruiter can foresee the next allocation, sicker or fitter patients can be steered into or away from a group. This is selection bias and it happens before any treatment is given. Central telephone or web randomisation is the reliable remedy.

Option B: Correct — a translucent, unsealed, sequentially numbered envelope gives the recruiter foreknowledge, which is the one bias randomisation exists to prevent. Option A: Blinding a surgeon to whether the operation is today or in six weeks is impossible, so this is an inherent limitation rather than a defect. Option C: The outcome assessor is in fact blinded, which is the achievable standard for a surgical trial. Option D: Length of stay is a legitimate primary outcome for a trial of operative timing in a disease with low mortality. Option E: Washout applies to crossover designs; this is a parallel group trial and no washout is relevant.

*Allocation concealment is mandatory in every randomised trial and is distinct from blinding: concealment prevents selection bias at enrolment, blinding prevents biased assessment afterwards.*

CONSORT — Reporting randomised trials, 2010

### ■ KEY POINT

Come back to this chapter in two days, then in a week, then in three weeks. Do not reread it — cover the tables and say the rules out loud first, then check. Spacing and retrieval are the two things that work; rereading is not.

## SECTION 19

# TRANSPLANTATION AND ORGAN DONATION

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### THIS CHAPTER COVERS

- Brain death and donation after circulatory death
- Organ retrieval and preservation principles
- Indications for liver and kidney transplantation
- Immunosuppression: agents and their surgical implications
- The transplant recipient presenting to the general surgeon
- Allocation and ethics of organ distribution

1% of the paper · 49 questions in the bank behind this chapter

Figure 19: Where Transplantation and Organ Donation sits in a general surgery examination.

### Before you read this chapter

Answer these three now, from what you already know. Write the letter down. Getting them wrong before you read is not a waste — attempting first is what makes the reading stick. The answers are at the end of the chapter, not here.

**Q19.1** You are the surgical registrar in a district hospital with no computed tomography scanner between six in the evening and eight in the morning, no interventional radiology and no intensive care bed available tonight. A 53-year-old woman who is five years post kidney transplant, on tacrolimus, mycophenolate and prednisolone, presents at eleven at night with twelve hours of right iliac fossa pain, anorexia and vomiting. Temperature 37.4 degrees Celsius, pulse 112, blood pressure 104/62 mmHg, lactate 2.9 mmol/L. The graft sits in the left iliac fossa. The abdomen is tender in the right iliac fossa with voluntary guarding. The nearest scanner is ninety minutes away by ambulance. What is the most appropriate management?

- A Give intravenous fluids and antibiotics, and observe with serial examination until the scanner is available in the morning
- B Transfer her by ambulance for an out-of-hours computed tomography scan and return her afterwards for a decision
- C Arrange an urgent ultrasound of the transplanted kidney to exclude graft pyelonephritis before considering surgery
- D Start intravenous antibiotics, reduce the mycophenolate dose, and proceed to diagnostic laparoscopy in the local theatre tonight
- E Treat empirically with intravenous antibiotics alone as an immunosuppressed patient with presumed appendicitis

**Q19.2** You are the surgical registrar in a rural hospital with no out-of-hours CT scanner, no interventional radiology and no intensive care bed; the nearest tertiary centre is two hours by road. A 63-year-old man who received a deceased donor kidney into the left iliac fossa nine years ago attends with two days of left iliac fossa pain, fever of 38.4 degrees Celsius and looser stools. He takes tacrolimus, azathioprine and prednisolone. The abdomen is tender over the graft and in the left lower quadrant, with localised guarding but no generalised peritonism. Pulse is 104, blood pressure 118/70. Creatinine has risen from a baseline of 128 to 176 micromol/L.

- A** Immediate laparotomy in the local theatre on the assumption of perforated diverticulitis
- B** Oral antibiotics and discharge with review in forty-eight hours
- C** Increase prednisolone to 40 mg daily on the assumption of acute rejection and observe locally
- D** Local percutaneous drainage of any collection under ultrasound guidance by the on-call radiographer
- E** Fluid resuscitation, broad-spectrum antibiotics, bedside ultrasound of the graft and urgent transfer to the transplant centre for cross-sectional imaging

**Q19.3** You are the on-call surgical registrar in a district hospital that has no CT scanner after six in the evening, no interventional radiology and a single intensive care bed that is currently occupied. A 49-year-old woman who received a deceased donor kidney four years ago attends with twelve hours of right iliac fossa pain, anorexia and vomiting. She takes tacrolimus, mycophenolate and prednisolone 5 mg daily. Her graft sits in the left iliac fossa. Temperature is 37.1 degrees, pulse 104, and she has guarding over the right iliac fossa. White cell count is 9.1 and C-reactive protein 62 mg/L. Which of the following is the most appropriate management?

- A** Admit for intravenous antibiotics and reassess when the CT scanner opens in the morning
- B** Stop tacrolimus and mycophenolate immediately and observe for twenty-four hours
- C** Proceed to appendicectomy on clinical grounds and continue the immunosuppression perioperatively
- D** Transfer her urgently to the transplant centre before any operative decision is made
- E** Arrange an urgent graft ultrasound to exclude graft rejection as the cause of the pain

## What this chapter covers

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### AREA OF THE SYLLABUS

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Brain death and donation after circulatory death

Organ retrieval and preservation principles

Indications for liver and kidney transplantation

---

---

Immunosuppression: agents and their surgical implications  
 The transplant recipient presenting to the general surgeon  
 Allocation and ethics of organ distribution

---

## The rules that carry marks

| WHEN YOU SEE                                                                                                               | WHAT IT MEANS, OR WHAT TO DO                                                                                                                                          |
|----------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| cross-sectional imaging is unavailable                                                                                     | diagnostic laparoscopy is the appropriate substitute in an immunosuppressed patient with localised peritonism and a rising lactate                                    |
| a transplant recipient with iliac fossa sepsis and no local imaging                                                        | resuscitate and transfer rather than operate blind through the graft bed                                                                                              |
| Organ allocation balances utility against equity                                                                           | priority for highly sensitised candidates accepts a small efficiency loss to prevent an unchosen immunological disadvantage becoming permanent exclusion              |
| Tacrolimus is metabolised by CYP3A4                                                                                        | diltiazem, verapamil, azole antifungals and macrolides raise levels into the toxic range, while rifampicin, phenytoin and carbamazepine lower them and risk rejection |
| Immunosuppression masks the signs of intra-abdominal sepsis                                                                | a transplant recipient with peritonism needs an earlier operation and a lower threshold than a normal host, not more investigation                                    |
| Acute cholecystitis in a transplant recipient looks milder than it is                                                      | operate early and keep the immunosuppression running with appropriate steroid cover                                                                                   |
| an immunosuppressed transplant recipient                                                                                   | absent peritonism and a normal white cell count do not exclude a surgical abdomen; image early and operate on suspicion                                               |
| Decompensated cirrhosis with refractory ascites, encephalopathy and hyponatraemia warrants transplant referral immediately | hyponatraemia predicts waitlist mortality beyond MELD alone                                                                                                           |

## What you are expected to know

- Brain death is diagnosed clinically, but only after an irreversible structural cause is established and every reversible confounder — drugs, hypothermia, metabolic and endocrine derangement — has been excluded.
- MELD-Na exists because hyponatraemia predicts waitlist death independently of bilirubin, creatinine and INR, and is a marker of severe portal hypertension.
- Geographical inequity in transplantation usually arises before allocation, and is better corrected by improving referral and listing than by adding non-physiological priority points to a validated severity score.



- In donation after circulatory death the liver's bile ducts, not its hepatocytes, are the limiting tissue — functional warm ischaemia time drives ischaemic cholangiopathy.
- MELD underestimates the need for transplantation in cholestatic disease; recurrent cholangitis and intractable pruritus justify an exception request rather than waiting for the score to rise.
- Immunosuppression masks the signs of intra-abdominal catastrophe, so a transplant recipient with peritonism and a raised lactate warrants a lower threshold for laparotomy, not a higher one.

#### ■ BOARD PEARL

Sudden anuria with a painful, swollen renal graft and no flow on Doppler is vascular thrombosis until proved otherwise — go straight to theatre, do not biopsy or rescan.

#### ■ BOARD PEARL

Functional warm ischaemia time in donation after circulatory death runs from the first agonal threshold — systolic pressure below 50 mmHg or saturation below 70 per cent — to cold perfusion, not from withdrawal of treatment and not from asystole.

### Guidance this chapter is written against

*KDIGO — Care of kidney transplant recipients, 2022*

*Maastricht classification of donation after circulatory death*

*World Brain Death Project consensus statement on determination of brain death*

*EASL — Liver transplantation, 2024 (J Hepatol 2024;81:1040-86, PMID 39487043)*

*WSES guidelines on the management of acute left-sided colonic diverticulitis*

*Determination of death by neurological criteria, national brainstem death testing standards*

*Legal and professional criteria for the diagnosis of death by neurological criteria*

*Principles of hypothermic organ preservation, static cold storage*

*Principles of hypothermic organ preservation*

*ESPEN guideline on chronic intestinal failure in adults*

### Retrieval check

The three you answered before reading. Mark yourself honestly; a wrong answer you now understand is worth more than a right one you guessed.

#### Q19.1 CORRECT ANSWER **D**

She has a probable perforated or gangrenous appendicitis with early physiological compromise, and in a hospital without imaging or interventional support the safest diagnostic and therapeutic step is theatre.

Why: Tachycardia, hypotension and a rising lactate in an immunosuppressed patient signal advanced pathology behind understated signs. Waiting nine hours for a scanner, or spending three hours in an ambulance, is how these patients decompensate. Laparoscopy answers the question and treats the cause in the same anaesthetic. The graft is on the opposite side, so it is not the source and it is not in the operative field.

Option A: Serial observation in a steroid-treated patient with a lactate of 2.9 is watching a deterioration you cannot detect. Option B: A three-hour round trip delays source control and removes her from the only theatre available. Option D: Correct — laparoscopy is both the investigation and the treatment where imaging is unavailable. Option C: Ultrasound of a left-sided graft will not explain right iliac fossa peritonism. Option E: Antibiotics alone will not control a perforated appendix and antibiotic-first strategies exclude immunosuppressed patients with sepsis.

*Where cross-sectional imaging is unavailable, diagnostic laparoscopy is the appropriate substitute in an immunosuppressed patient with localised peritonism and a rising lactate.*

*KDIGO — Care of kidney transplant recipients, 2022*

### **Q19.2 CORRECT ANSWER E**

Resuscitate, start antibiotics, use the one imaging tool you have to assess the graft, and transfer for definitive imaging and decision-making.

Why: Left iliac fossa pain in this man could be diverticulitis, a peri-graft collection, graft pyelonephritis or graft rejection, and the physical signs cannot separate them. His creatinine rise makes graft pathology a live possibility, and the graft sits in exactly the field you would open. Operating without imaging risks entering the transplant bed and injuring the graft vessels or ureter. Bedside ultrasound is available and answers a narrow but useful question about hydronephrosis and perigraft fluid.

Option A: A laparotomy without imaging in a patient who is not peritonitic risks damaging the graft that occupies the operative field. Option E: Correct — it stabilises him, covers the sepsis and gets him to where the diagnosis can actually be made. Option B: Discharging an immunosuppressed man with fever, tachycardia and rising creatinine is unsafe. Option C: Pulsed steroids treat a diagnosis that has not been made and would worsen an undrained intra-abdominal infection. Option D: Blind drainage without cross-sectional imaging near a transplanted kidney and its vessels is hazardous.

*In a transplant recipient with iliac fossa sepsis and no local imaging, resuscitate and transfer rather than operate blind through the graft bed.*

*KDIGO — Care of kidney transplant recipients, 2022*

### **Q19.3 CORRECT ANSWER C**

This is a clinical appendicitis in an immunosuppressed patient and she should go to theatre without waiting for imaging.

Why: Steroids and calcineurin inhibitors blunt the fever, the white cell count and the peritonism. The examination therefore understates the severity of the disease, and perforation is often already present. Delay in a transplant recipient carries a higher mortality than in an immunocompetent patient. The graft is on the opposite side and is not the source of the pain.

Option A: Waiting overnight for a scan in a patient whose signs are already masked by immunosuppression risks perforation and sepsis. Option C: Correct — operate on clinical

grounds and maintain immunosuppression to protect the graft. Option B: Abruptly stopping maintenance immunosuppression risks acute rejection and does nothing for the abdominal pathology. Option D: Transfer delays definitive treatment for a condition any general surgeon can manage; the transplant unit should be informed, not awaited. Option E: Rejection does not present with right iliac fossa peritonism when the graft lies in the left iliac fossa.

*Immunosuppression masks the signs of intra-abdominal sepsis, so a transplant recipient with peritonism needs an earlier operation and a lower threshold than a normal host, not more investigation.*

*KDIGO — Care of kidney transplant recipients, 2022*

#### ■ KEY POINT

Come back to this chapter in two days, then in a week, then in three weeks. Do not reread it — cover the tables and say the rules out loud first, then check. Spacing and retrieval are the two things that work; rereading is not.



# SURGICAL ONCOLOGY

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## THIS CHAPTER COVERS

- Principles: margins, lymphadenectomy, multidisciplinary decision-making
- Staging systems and their editions; the general surgeon and the MDT
- Colorectal cancer: screening, surgery, obstruction, liver metastases
- Gastric and oesophageal cancer: staging, neoadjuvant therapy, resection
- Pancreatic and periampullary cancer: resectability, Whipple, palliation
- Hepatocellular carcinoma and liver metastases
- Breast cancer surgical management
- Thyroid and endocrine malignancy

15% of the paper · 750 questions in the bank behind this chapter

Figure 20: Where Surgical Oncology sits in a general surgery examination.

### Before you read this chapter

Answer these three now, from what you already know. Write the letter down. Getting them wrong before you read is not a waste — attempting first is what makes the reading stick. The answers are at the end of the chapter, not here.

**Q20.1** A 47-year-old woman is found on ultrasound to have a 2.8 cm solid nodule in the right thyroid lobe with microcalcification and irregular margins. Fine needle aspiration reports papillary thyroid carcinoma. Ultrasound of the neck shows no abnormal lymph nodes in the central or lateral compartments. She has no hoarseness, no history of neck irradiation and no family history of thyroid disease. Vocal cord assessment is normal. She works as a teacher and is anxious about her voice. What is the most appropriate operation?

- A Total thyroidectomy with prophylactic bilateral central compartment dissection
- B Total thyroidectomy without prophylactic nodal dissection
- C Total thyroidectomy with ipsilateral lateral compartment dissection
- D Active surveillance with six-monthly ultrasound
- E Right hemithyroidectomy with therapeutic dissection only if nodes are found intraoperatively

**Q20.2** A 55-year-old woman with no comorbidity is found on ultrasound performed for neck discomfort to have a 2.6 cm solid hypoechoic thyroid nodule in the right lobe with microcalcification and an irregular margin. There is no cervical lymphadenopathy on ultrasound. Fine needle aspiration reports papillary thyroid carcinoma. She is euthyroid, has no hoarseness, no family history of thyroid disease and no history of neck irradiation. Flexible laryngoscopy shows normally mobile vocal cords. Cross-sectional imaging demonstrates no extrathyroidal extension and no retrosternal component. She asks what operation she requires.

- A Total thyroidectomy with prophylactic bilateral central compartment dissection
- B Total thyroidectomy with prophylactic bilateral lateral neck dissection
- C Right hemithyroidectomy with isthmusectomy and no prophylactic nodal dissection
- D Active surveillance with six-monthly ultrasound and no operation
- E Nodule enucleation with intraoperative frozen section of the capsule

**Q20.3** A 43-year-old woman with no comorbidity is being reviewed after an emergency operation performed three weeks ago at a hospital eighty kilometres away for what was thought to be a perforated ovarian cyst. The operative note describes copious gelatinous mucinous material throughout the abdomen and a perforated appendix, and records an appendicectomy with washout only. Histology reports a low-grade appendiceal mucinous neoplasm with acellular and cellular mucin on the peritoneal surfaces. She has recovered well, is eating normally and has no pain. Tumour markers are pending.

- A** Referral to a designated peritoneal malignancy centre for assessment for cytoreductive surgery with HIPEC
- B** Interval right hemicolectomy at the local unit, followed by surveillance imaging
- C** Six cycles of systemic fluoropyrimidine-based chemotherapy, then reassessment
- D** Serial CT surveillance every six months, intervening only if the mucin volume increases
- E** Repeat laparoscopy at the local unit for washout and peritoneal biopsies to map disease extent

## What this chapter covers

### AREA OF THE SYLLABUS

Principles: margins, lymphadenectomy, multidisciplinary decision-making  
 Staging systems and their editions; the general surgeon and the MDT  
 Colorectal cancer: screening, surgery, obstruction, liver metastases  
 Gastric and oesophageal cancer: staging, neoadjuvant therapy, resection  
 Pancreatic and periampullary cancer: resectability, Whipple, palliation  
 Hepatocellular carcinoma and liver metastases  
 Breast cancer surgical management  
 Thyroid and endocrine malignancy  
 Melanoma and soft tissue sarcoma: referral and initial management  
 Oncological emergencies: obstruction, perforation, bleeding, neutropenic sepsis  
 Peritoneal malignancy: when to refer, what CRS and HIPEC are  
 Palliative surgery and the decision not to operate

## The rules that carry marks

| WHEN YOU SEE                        | WHAT IT MEANS, OR WHAT TO DO                                                                                                             |
|-------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| obstructing left-sided colon cancer | a caecal diameter approaching 12 cm mandates decompression that night; where stenting is unavailable, resection with an end colostomy is |

|                                                                                                                      |                                                                                                                    |
|----------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
|                                                                                                                      | safer than an anastomosis in an unprepared colon                                                                   |
| Mesorectal plane grading is an independent predictor of local recurrence after TME and a measure of surgical quality | it is not the same thing as circumferential margin status                                                          |
| malignant gastric outlet obstruction the choice between stent and bypass turns on expected survival                  | and a patient with peritoneal disease, cachexia and poor performance status belongs on the stent side of that line |
| Neutropenic sepsis requires blood cultures and broad-spectrum intravenous antibiotics within one hour                | absent peritonism does not exclude intra-abdominal pathology because the inflammatory response is abolished        |
| breast-conserving surgery for invasive cancer                                                                        | the margin standard is no ink on tumour; ink on tumour means re-excision, wider clearance adds nothing             |

### What you are expected to know

- Venous contact over 180 degrees with a reconstructible vein and no arterial involvement is borderline resectable pancreatic cancer, and the correct next step is neoadjuvant therapy with restaging, not immediate resection.
- Refractory postoperative hypocalcaemia after thyroidectomy is usually magnesium-dependent: hypomagnesaemia both suppresses parathyroid hormone secretion and blocks its action, so correct magnesium alongside calcium and active vitamin D.
- Siewert type is defined by the tumour epicentre relative to the cardia: type III (2 to 5 cm below) is managed as gastric cancer with extended total gastrectomy and D2 lymphadenectomy.
- Unifocal papillary thyroid carcinoma of 1 to 4 cm with no extrathyroidal extension and a node-negative neck can be treated by lobectomy, with completion thyroidectomy held in reserve for adverse histology.
- Malignant small bowel obstruction with multiple transition points in chemorefractory carcinomatosis is managed medically with a venting gastrostomy and palliative care, not by operation.
- Worrisome features in a pancreatic cystic neoplasm trigger endoscopic ultrasound, whereas high-risk stigmata such as jaundice, an enhancing nodule of 5 mm or more, or a main duct of 10 mm or more trigger resection.
- Superior mesenteric or portal vein contact over 180 degrees with contour irregularity but a reconstructable vein, and no arterial encasement, defines borderline resectable pancreatic cancer — neoadjuvant therapy precedes resection.
- A nodal yield below twelve in colon cancer is a pathology problem to be corrected before it becomes a staging conclusion.
- A retroperitoneal mass suspicious for sarcoma is diagnosed by image-guided coaxial core biopsy through a retroperitoneal route, not by open, laparoscopic or fine needle sampling.

#### ■ BOARD PEARL



Any mucin outside the appendix in a low-grade appendiceal mucinous neoplasm, even acellular, means peritoneal disease — refer to a peritoneal malignancy centre and do not perform a right hemicolectomy or a local laparoscopy first.

#### ■ BOARD PEARL

A large retroperitoneal mass is biopsied percutaneously by a coaxial retroperitoneal route after referral to a sarcoma centre, because subtype dictates treatment and the first resection is the definitive one.

### Trials you should be able to name

| TRIAL                                         | WHAT IT IS ABOUT |
|-----------------------------------------------|------------------|
| FLOT4 (2019, Lancet)                          | —                |
| MERCURY Study Group (2006, BMJ)               | —                |
| ACOSOG Z0011 (Giuliano, JAMA 2011)            | —                |
| CROSS (2012, New England Journal of Medicine) | —                |
| AMAROS (2014, Lancet Oncology)                | —                |
| FLOT4-AIO (2019, Lancet)                      | —                |

### Guidance this chapter is written against

*NCCN Guidelines, pancreatic adenocarcinoma*

*PSOGI consensus on pseudomyxoma peritonei and appendiceal neoplasia*

*American Thyroid Association guidelines, differentiated thyroid cancer*

*NCCN Guidelines, gastric cancer*

*WSES guidelines on the management of obstructing colon cancer*

*ESMO Clinical Practice Guidelines, management of malignant bowel obstruction*

*ESMO Clinical Practice Guidelines, rectal cancer*

*ESMO Clinical Practice Guidelines, soft tissue sarcoma*

*IAP — Fukuoka consensus on IPMN, 2017*

*ESMO Clinical Practice Guidelines, gastric cancer*

### Retrieval check

The three you answered before reading. Mark yourself honestly; a wrong answer you now understand is worth more than a right one you guessed.

#### Q20.1 CORRECT ANSWER E

A solitary papillary carcinoma of 2.8 cm with a clinically and radiologically negative neck can be treated by lobectomy alone, and prophylactic nodal dissection is not indicated.

Why: Unifocal papillary carcinoma up to 4 cm without extrathyroidal extension or nodal disease is a low-risk tumour. Lobectomy gives equivalent survival and halves the risk to the recurrent laryngeal nerve and parathyroids. Prophylactic central dissection increases transient

hypoparathyroidism and nerve injury without a demonstrated survival benefit. Completion thyroidectomy remains available if the final histology shows adverse features.

Option A: Prophylactic central dissection adds parathyroid and nerve morbidity that a clinically node-negative neck does not justify. Option B: Total thyroidectomy commits her to lifelong replacement and bilateral nerve risk for no survival gain in a low-risk tumour. Option E: Correct — lobectomy is oncologically sufficient here and preserves function, with completion surgery held in reserve. Option C: Lateral compartment dissection is only ever therapeutic, performed for cytologically proven nodal disease. Option D: Surveillance is reserved for subcentimetre papillary microcarcinoma, not a 2.8 cm tumour.

*Unifocal papillary thyroid carcinoma up to 4 cm with a negative neck and no extrathyroidal extension can be treated with lobectomy alone; prophylactic central neck dissection buys morbidity, not survival.*

*American Thyroid Association guidelines, differentiated thyroid cancer*

#### **Q20.2 CORRECT ANSWER C**

A unifocal papillary carcinoma between 1 and 4 cm, confined to one lobe with no nodal disease and no extrathyroidal extension, is adequately treated by hemithyroidectomy.

Why: The evidence supporting routine total thyroidectomy for all papillary cancers has been steadily narrowed. Lobectomy in this risk group gives equivalent survival with half the recurrent laryngeal nerve exposure and no lifelong hypoparathyroidism risk. Prophylactic central node dissection raises hypoparathyroidism and nerve injury rates without a demonstrated survival gain. Completion thyroidectomy remains available if the pathology upstages her.

Option C: Correct — a lobectomy with isthmusectomy treats the disease and preserves contralateral parathyroid and nerve function. Option A: Total thyroidectomy plus prophylactic central dissection doubles the complication burden for a low-risk tumour. Option B: Lateral neck dissection is indicated only for biopsy-proven lateral nodal disease, which she does not have. Option D: Surveillance is discussed for subcentimetre papillary microcarcinoma, not for a 2.6 cm lesion with suspicious sonographic features. Option E: Enucleation leaves tumour at the margin and has no place in thyroid cancer surgery.

*Unifocal, intrathyroidal, node-negative papillary carcinoma between 1 and 4 cm can be treated with lobectomy alone; prophylactic central neck dissection adds morbidity without proven survival benefit.*

*American Thyroid Association guidelines, differentiated thyroid cancer*

#### **Q20.3 CORRECT ANSWER A**

This is pseudomyxoma peritonei from a perforated low-grade appendiceal mucinous neoplasm and she should be referred to a peritoneal malignancy centre.

Why: Cellular mucin on the peritoneal surfaces means viable tumour is disseminated, not simply spilled acellular mucus. Complete cytoreduction combined with heated intraperitoneal chemotherapy is the only treatment that offers long-term survival in this disease. Outcome depends almost entirely on achieving a complete cytoreduction, which depends

on being operated in a centre that does this work regularly. Referral should be early, before repeated local surgery scars the abdomen and makes cytoreduction harder.

Option B: A right hemicolectomy alone does not address disseminated peritoneal mucinous disease and compromises a later cytoreduction. Option C: Low-grade mucinous neoplasms respond poorly to systemic chemotherapy, which is not the primary treatment. Option A: Correct — it puts her on the only pathway with a realistic prospect of long-term disease control. Option D: Watching cellular peritoneal disease allows the peritoneal cancer index to rise and complete cytoreduction to become impossible. Option E: Repeated non-therapeutic surgery adds adhesions and risk without changing the management plan.

*Cellular mucin on peritoneal surfaces from a perforated appendiceal mucinous neoplasm is pseudomyxoma peritonei — refer early to a peritoneal malignancy centre, because every intervening local operation reduces the chance of complete cytoreduction.*

*PSOGI consensus on pseudomyxoma peritonei and appendiceal neoplasia*

#### ■ KEY POINT

Come back to this chapter in two days, then in a week, then in three weeks. Do not reread it — cover the tables and say the rules out loud first, then check. Spacing and retrieval are the two things that work; rereading is not.



SECTION II

# THE HUNDRED-QUESTION PA- PER



Sit this in one go, timed, before you look at a single answer. Two hours.

The questions are deliberately **not** grouped by chapter. Mixing topics — interleaving — feels harder and produces better retention and better transfer than blocking them, which is why every examination does it and why revising one chapter at a time flatters you.

**Q1** A 25-year-old man is undergoing an elective open repair of a right indirect inguinal hernia under spinal anaesthesia. The external oblique aponeurosis has been opened and the cord structures mobilised. As the surgeon dissects the sac free from the cord, the patient reports no pain but the assistant asks about the nerve running on the anterior surface of the cord, lying just deep to the external oblique aponeurosis, which supplies sensation to the root of the penis and the upper scrotum. Which nerve is this and where does it enter the canal?

- A The ilioinguinal nerve, which enters through the deep inguinal ring with the cord
- B The genital branch of the genitofemoral nerve, which enters through the deep inguinal ring
- C The iliohypogastric nerve, which runs within the cord to supply the scrotum
- D The femoral branch of the genitofemoral nerve, which passes deep to the inguinal ligament
- E The ilioinguinal nerve, which pierces the internal oblique and enters the canal through its anterior wall

**Q2** A 28-year-old man is in theatre for exploration of a groin swelling that has been present for two years and is now painful on exertion. At operation the external oblique aponeurosis is opened and a sac is identified. The sac lies lateral to the inferior epigastric vessels and passes through the deep ring alongside the spermatic cord structures. The surgeon asks the registrar to identify the structure that forms the posterior wall of the inguinal canal medially, since this is where a direct defect would appear. Which structure is this?

- A The external oblique aponeurosis reinforced by the lacunar ligament
- B The internal oblique muscle arising from the inguinal ligament
- C The conjoint tendon and the transversalis fascia
- D The iliopubic tract and the femoral sheath
- E The cremasteric fascia derived from the internal oblique

**Q3** A 68-year-old man with chronic obstructive pulmonary disease is on the fourth day after an elective open sigmoid colectomy for diverticular stricture. He has been vomiting and has had a nasogastric tube on free drainage delivering two litres daily for forty-eight hours. He looks dry. His blood pressure is 104 over 62 millimetres of mercury and his pulse is 104 beats per minute. Arterial blood gas on air shows pH 7.51, partial pressure of carbon dioxide 6.2 kilopascals, bicarbonate 36 millimoles per litre. Sodium is 134, potassium 2.9 and chloride 88 millimoles per litre. Which single intravenous fluid is the most appropriate initial choice?

- A Compound sodium lactate (Hartmann's solution) without added potassium
- B Glucose 5 per cent with potassium chloride supplementation
- C Sodium chloride 0.9 per cent with potassium chloride supplementation
- D Sodium bicarbonate 1.26 per cent
- E Human albumin solution 4.5 per cent

**Q4** A 74-year-old woman is on the fourth day after an emergency laparotomy for a perforated duodenal ulcer performed in a rural hospital. There is no intensive care bed and the nearest CT scanner is ninety minutes away by road. She has become drowsy and has passed only 350 millilitres of urine in twenty-four hours. She has received five litres of 0.9 per cent sodium chloride daily since surgery. Blood gas on the ward machine shows pH 7.28, bicarbonate 17 millimoles per litre, sodium 141, chloride 116 and lactate 1.1 millimoles per litre. Her abdomen is soft and she is apyrexial.

- A Continue 0.9 per cent sodium chloride and give intravenous sodium bicarbonate 8.4 per cent
- B Arrange urgent transfer for CT of the abdomen to exclude an anastomotic leak
- C Start an intravenous furosemide infusion to increase urine output
- D Switch maintenance fluid to a balanced crystalloid and reassess volume status clinically
- E Give two units of fresh frozen plasma to correct the metabolic acidosis

**Q5** A 37-year-old man is undergoing an elective open repair of a right femoral defect under general anaesthesia. The trainee opens the femoral sheath and finds the sac medial to the femoral vein. During dissection of the neck of the sac, brisk arterial bleeding occurs from the superior margin of the femoral ring. The bleeding is controlled with direct pressure. The consultant asks the trainee to name the vessel most likely responsible before deciding how to extend the exposure and secure it.

- A An aberrant obturator artery arising from the inferior epigastric artery
- B The superficial circumflex iliac artery
- C The deep circumflex iliac artery
- D The superficial external pudendal artery
- E The ascending branch of the lateral circumflex femoral artery

**Q6** A 62-year-old woman is undergoing an elective laparoscopic cholecystectomy in a hospital with no on-site interventional radiology. The gallbladder is acutely inflamed and the surgeon uses a monopolar hook diathermy on a coagulation setting to dissect the gallbladder off the liver bed. Ten minutes later, the assistant notices a small full-thickness burn on the transverse colon well away from the operative field, at a point where a metal 5 mm port had been introduced through a plastic threaded anchoring sleeve in the left iliac fossa. The hook was never in contact with the colon and the patient plate was correctly applied to the thigh.

- A Direct coupling between the hook and the metal port during activation
- B Return electrode burn from a partially detached patient plate
- C Capacitive coupling caused by the metal port within a plastic anchoring sleeve
- D Thermal spread from the ultrasonic shears used earlier in the procedure
- E Insulation failure of the hook shaft transmitting current at the port site

**Q7** A 71-year-old woman receives four units of red cells and two units of fresh frozen plasma during an emergency laparotomy for a perforated duodenal ulcer. Forty minutes after the fourth unit she becomes hypoxic with a peripheral oxygen saturation of 86 per cent on 60 per cent oxygen, and copious frothy secretions appear in the endotracheal tube. Her blood pressure is 104/62 mmHg, her jugular venous pressure is not raised and her central venous pressure is 6 mmHg. She is afebrile. There is no urticaria and no bronchospasm. Which is the most likely diagnosis?

- A Transfusion-related acute lung injury
- B Transfusion-associated circulatory overload
- C Acute haemolytic transfusion reaction from ABO incompatibility
- D Anaphylactic reaction to plasma proteins in a recipient with IgA deficiency
- E Aspiration of gastric contents at induction of anaesthesia

**Q8** A 63-year-old man is on the second day after a total gastrectomy for benign caustic stricture. He was profoundly malnourished before surgery, with a six-month history of minimal oral intake and 22 per cent weight loss. Parenteral nutrition was started on the first postoperative day at full calculated calorie requirement. He now has new confusion, a rising respiratory rate and generalised weakness. Blood tests show phosphate 0.28 mmol/L, magnesium 0.52 mmol/L, potassium 2.8 mmol/L and normal sodium. Thiamine has not been given. His electrocardiogram shows frequent ventricular ectopics.

- A Increase the calorie load to overcome persistent catabolism
- B Reduce the calorie delivery, replace phosphate, magnesium and potassium, and give thiamine
- C Stop all nutrition completely for 72 hours and give intravenous saline alone
- D Replace phosphate alone and continue the current parenteral regimen unchanged
- E Switch immediately to full-rate enteral feeding through a nasojejunal tube



**Q9** A 27-year-old man is brought to a hospital with no out-of-hours CT, no interventional radiology and no intensive care bed, forty minutes after a high-speed motorcycle collision. He has an obviously unstable pelvis and a rigid abdomen. Systolic pressure is 74 mmHg. He receives six units of red cells and six units of fresh frozen plasma over ninety minutes during laparotomy and pelvic packing. Bleeding continues from raw surfaces. Ionised calcium is 0.72 mmol/L, core temperature 34.1°C and the patient has become bradycardic with a prolonged QT interval on the monitor. Which single intervention should be prioritised now?

- A Give a further four units of red cells alone to raise the haemoglobin before addressing anything else
- B Give intravenous calcium chloride and continue active rewarming alongside ongoing blood product resuscitation
- C Give intravenous sodium bicarbonate to correct the presumed acidosis
- D Give recombinant activated factor VII as a rescue haemostatic agent
- E Give a two-litre bolus of warmed 0.9% sodium chloride to restore preload

**Q10** A 37-year-old woman with no significant past medical history presents to the emergency department with two days of increasing right loin pain, rigors and vomiting. She is drowsy but rousable. Temperature is 39.1°C, pulse 126 beats per minute, blood pressure 82/48 mmHg and respiratory rate 28 per minute. Urine dipstick shows nitrites and leucocytes. Ultrasound shows a dilated right renal pelvis with a 9 mm stone at the pelviureteric junction. Lactate is 4.2 mmol/L and creatinine 186 µmol/L. Two large-bore cannulae are in place. Which is the most appropriate next step?

- A Transfer immediately for percutaneous nephrostomy before antibiotics, so that pus can be sent for culture first
- B Start a noradrenaline infusion through a peripheral cannula and restrict fluids to 500 mL to avoid pulmonary oedema
- C Give intravenous antibiotics and observe for six hours, deferring drainage if the blood pressure improves
- D Take blood cultures, start broad-spectrum intravenous antibiotics and begin a 30 mL/kg crystalloid infusion, then arrange urgent ureteric decompression
- E Arrange emergency ureteroscopy and laser fragmentation of the stone to achieve definitive clearance in one procedure

**Q11** A 29-year-old previously well man is brought to a district general hospital after a fall from a roof. He is agitated, cold and clammy. Heart rate is 132 per minute, blood pressure 96/78 mmHg, respiratory rate 30 per minute and urine output over the first hour is 18 mL. There is obvious deformity of both femurs and a tender pelvis. He responds transiently to a 500 mL crystalloid bolus and then drifts back. Chest examination and chest radiograph are normal, and there is no external haemorrhage. Which class of haemorrhagic shock do these findings correspond to?

- A Class III
- B Class I
- C Class II
- D Class IV
- E Neurogenic shock rather than haemorrhagic shock

**Q12** A 44-year-old woman is admitted after a fall from a first-floor window. She has a fractured pelvis and a splenic laceration managed non-operatively. On arrival she is anxious, cool and clammy, with a heart rate of 118, blood pressure 106/86 mmHg, respiratory rate 24 and urine output of 20 mL over the last hour. Haemoglobin is 118 g/L. There is no head injury and the Glasgow Coma Scale is 15. Estimated blood loss from the pelvic fracture is around 1200 mL. Which single finding best characterises the class of haemorrhagic shock she is in?

- A A normal haemoglobin concentration, which excludes significant blood loss
- B Frank hypotension with a systolic pressure below 90 mmHg, indicating class III shock
- C A narrowed pulse pressure with maintained systolic pressure, indicating compensated class II shock
- D Anuria and confusion, indicating class IV shock
- E A heart rate below 100 with normal urine output, indicating class I shock

**Q13** A 60-year-old woman is ventilated on day four after an emergency right hemicolectomy complicated by anastomotic leak and washout. She is now apyrexial, off vasopressors for 24 hours, and her chest radiograph is clear. She is alert and obeys commands on a light sedation regimen. Ventilator settings are pressure support 8 cmH<sub>2</sub>O, PEEP 5 cmH<sub>2</sub>O, FiO<sub>2</sub> 0.3, with oxygen saturation 97 per cent. Respiratory rate is 22 per minute with a tidal volume of 380 mL. She has a strong cough and modest secretions. The team is considering extubation. Which finding best supports proceeding?

- A A negative inspiratory force of minus 10 cmH<sub>2</sub>O
- B A PaO<sub>2</sub> to FiO<sub>2</sub> ratio of 180 mmHg
- C A positive cuff leak test performed only after a failed extubation
- D A rapid shallow breathing index of approximately 58 breaths/min/L during a spontaneous breathing trial
- E A minute ventilation requirement of 18 litres per minute to maintain normocapnia

**Q14** A 59-year-old man is on day three after an emergency laparotomy for a strangulated obstruction with resection and primary anastomosis. He is in a district hospital with two high-dependency beds, no interventional radiology and no out-of-hours CT — the nearest scanner is ninety minutes away by ambulance. He is oliguric with a rising creatinine, distended and tense abdomen, peak airway pressure risen from 24 to 38 cmH<sub>2</sub>O, and blood pressure 92/56 mmHg on noradrenaline. Bladder pressure measured through the urinary catheter is 26 mmHg on two readings. What is the most appropriate next step?

- A** Transfer for CT of the abdomen before any surgical decision is made
- B** Give neuromuscular blockade, drain the nasogastric tube and reassess bladder pressure while continuing supportive care
- C** Attempt percutaneous drainage of intraperitoneal fluid at the bedside under ultrasound
- D** Proceed to decompressive laparotomy with a temporary abdominal closure
- E** Increase noradrenaline to raise the mean arterial pressure and repeat the bladder pressure in twelve hours

**Q15** A 65-year-old man with hypertension is on day five in intensive care after an emergency laparotomy and Hartmann's procedure for perforated diverticulitis. He has been ventilated throughout. He is now afebrile, off vasopressors for 24 hours, on pressure support of 8 cmH<sub>2</sub>O with positive end-expiratory pressure 5 cmH<sub>2</sub>O and a fraction of inspired oxygen of 0.35, with oxygen saturations of 97%. He obeys commands, has an effective cough and manageable secretions. His abdomen is soft. A spontaneous breathing trial on a T-piece is planned. During the trial his respiratory rate is 26 per minute and tidal volume 380 mL.

- A** Rapid shallow breathing index is approximately 68, which predicts weaning failure and mandates continued ventilation
- B** Rapid shallow breathing index is approximately 15, which is too low to interpret reliably
- C** Rapid shallow breathing index cannot be calculated without an arterial blood gas
- D** Rapid shallow breathing index is approximately 105, which is the threshold and therefore indeterminate
- E** Rapid shallow breathing index is approximately 68, which favours successful extubation

**Q16** A 66-year-old man is on day two in intensive care after emergency endovascular repair of a ruptured abdominal aortic aneurysm. He received twelve units of red cells, eight units of plasma and eight litres of crystalloid. He is sedated and ventilated. Over twelve hours his peak airway pressure has risen from 26 to 41 cmH<sub>2</sub>O, urine output has fallen from 60 to 8 mL per hour, and his abdomen is tense. Mean arterial pressure is 68 mmHg on noradrenaline. Bladder pressure measured on three occasions is 27, 29 and 28 mmHg. Nasogastric drainage is free, he is deeply sedated and paralysed, and he is not constipated.

- A Proceed to decompressive laparotomy with temporary abdominal closure
- B Increase the positive end-expiratory pressure to overcome the raised airway pressures
- C Give a further three litres of crystalloid to restore urine output
- D Continue medical measures with repeat bladder pressures in twelve hours
- E Start continuous renal replacement therapy with aggressive ultrafiltration as definitive treatment

**Q17** A 57-year-old man is presented at the departmental outcomes meeting. He underwent an elective right hemicolectomy and had four separate complications during his admission: an ileus managed with a nasogastric tube, a superficial wound infection opened on the ward, a pneumonia requiring intravenous antibiotics, and a collection drained percutaneously under radiological guidance. He was discharged on day nineteen. The department is comparing its outcomes with a unit that reports only the single worst complication per patient and wants a measure that reflects the whole burden.

- A Report the Comprehensive Complication Index, which integrates every complication into a single weighted score
- B Report the highest Clavien-Dindo grade recorded for the patient
- C Report the P-POSSUM predicted morbidity for the patient
- D Report the admission APACHE II score
- E Report the maximum SOFA score during the admission

**Q18** A 52-year-old man is on day one in intensive care after an emergency oesophagectomy complicated by intraoperative haemorrhage. He is ventilated, on noradrenaline at 0.35 micrograms per kilogram per minute, and lactate is 4.2 mmol/L and static. A jejunostomy was placed at operation. The dietitian calculates a requirement of 25 kilocalories per kilogram per day. The intensivist asks whether feeding should begin. He has had no oral or enteral intake for four days before surgery, has lost 12 per cent of body weight over three months and has a phosphate of 0.61 millimoles per litre and magnesium of 0.58 millimoles per litre.

- A** Start full-target enteral feed through the jejunostomy immediately to meet the calculated 25 kilocalories per kilogram
- B** Start full parenteral nutrition today to guarantee delivery of the calculated target while the gut is unreliable
- C** Withhold all nutrition until vasopressors have been discontinued, then start at full target
- D** Correct electrolytes, give thiamine, and begin low-dose trophic enteral feed with slow escalation over several days under electrolyte monitoring
- E** Insert a nasogastric tube and start bolus gastric feeding at full rate, bypassing the jejunostomy

**Q19** A 65-year-old man with a splenectomy performed six weeks ago for a grade V blunt splenic injury attends the surgical clinic. He received pneumococcal, meningococcal and Haemophilus influenzae type b vaccination before discharge. He lives 90 minutes from the nearest hospital and works as a lorry driver, often travelling abroad. He asks what else he must do. He takes no regular medication, has no allergies and has had no infective episodes since discharge. He is otherwise well with a healed midline wound.

- A** No further measures are required now that he has been vaccinated
- B** Lifelong daily oral aciclovir with an emergency antibiotic supply
- C** Repeat the full vaccination schedule every six months indefinitely
- D** Daily antibiotic prophylaxis, an emergency standby antibiotic supply, a patient-held alert card or bracelet and annual influenza vaccination
- E** Weekly intramuscular benzylpenicillin for two years

**Q20** A 15-year-old boy is brought in after being struck in the left flank by the handlebar of his bicycle during a downhill fall. He is fully alert with a heart rate of 96 and a blood pressure of 118/72 mmHg, unchanged over 40 minutes of observation. He has left upper quadrant tenderness without guarding. Contrast-enhanced CT shows a grade III splenic laceration with a moderate perisplenic haematoma and no contrast extravasation. Haemoglobin is 118 g/L. There are no other injuries. Paediatric surgical and interventional radiology cover are available on site.

- A Laparoscopic splenectomy on the current admission
- B Splenic artery embolisation to secure the injury before mobilisation
- C Admission for observation with serial examination, bed rest and monitored haemoglobin
- D Discharge the same day with written advice and outpatient review in one week
- E Diagnostic laparoscopy to exclude an associated hollow viscus injury

**Q21** A 25-year-old man weighing 80 kg sustains flame burns when a bonfire was doused with petrol. He arrives forty minutes after injury. He is alert, with no facial or airway involvement and a clear voice. Examination shows deep partial-thickness burns to the whole of both upper limbs circumferentially and to the anterior trunk, estimated at 27 per cent total body surface area by the Lund and Browder chart. Heart rate is 106, blood pressure 124/74 mmHg. He has no other injuries. Intravenous access has been secured in unburned skin and analgesia given.

- A Calculate the first 24-hour resuscitation volume from body weight and burn surface area, give half over the first 8 hours from the time of injury, and titrate to urine output
- B Give a 2-litre crystalloid bolus, then start maintenance fluid only
- C Start human albumin solution as the primary resuscitation fluid from the outset
- D Withhold fluid until the burn depth has been reassessed at 48 hours
- E Give the calculated 24-hour volume evenly across the 24 hours from the time of admission

**Q22** A 29-year-old man sustains an isolated closed femoral shaft fracture and a splenic laceration after a car collision. Ninety minutes into resuscitation he has received six units of red cells and six units of plasma and remains hypotensive at 82/48 with a heart rate of 130. Temperature is 34.2 degrees Celsius, arterial pH 7.16, base deficit minus 11 and the surgical field is oozing diffusely from cut edges despite no identifiable arterial bleeding. The spleen has been removed and the small bowel has two resected segments left in discontinuity. The anaesthetist reports rising vasopressor requirement.

- A Complete both bowel anastomoses and close the abdomen with fascial sutures
- B Continue operating to perform a definitive repair of every injury before leaving theatre
- C Pack, apply a temporary abdominal closure and transfer to intensive care for rewarming and correction of coagulopathy
- D Perform an on-table thromboelastogram and give factor concentrate before deciding whether to close
- E Close the skin only with a running suture and plan relaparotomy in seven days

**Q23** A 26-year-old woman is brought in after a high-speed frontal collision in which she was restrained by a lap belt only. She is alert with a Glasgow Coma Scale of 15. Pulse is 104 beats per minute and blood pressure 112/70 mmHg. There is a transverse band of ecchymosis across the lower abdomen and diffuse tenderness without rigidity. FAST shows a trace of free fluid in the pelvis and no solid organ abnormality. Contrast-enhanced CT reports a small volume of free fluid between bowel loops, mesenteric fat stranding adjacent to a segment of jejunum, and focal bowel wall thickening. There is no free intraperitoneal gas and no solid organ injury. What is the most appropriate management?

- A Admission with serial abdominal examination and a repeat CT at 24 hours
- B Angioembolisation of the injured mesenteric vessel
- C Discharge after six hours of observation because there is no free gas
- D Nasogastric decompression with total parenteral nutrition and re-imaging in one week
- E Laparotomy or diagnostic laparoscopy to inspect the small bowel and mesentery

**Q24** A 56-year-old woman is admitted after a car struck her at low speed while she was walking. She is alert and complains of pelvic pain. Heart rate is 118 per minute and blood pressure 88/52 mmHg on arrival. A pelvic binder has been applied by the ambulance crew. Bedside ultrasound of the abdomen is negative for free fluid and the pericardium is clear. Chest radiograph is normal. Pelvic radiograph shows a vertically unstable left hemipelvis with wide diastasis of the sacroiliac joint. After two units of red cells and one of plasma the blood pressure is 84/50 mmHg and the heart rate 124 per minute. There is no interventional radiology service and the nearest angiography suite is two hours away.

- A Remove the binder to allow full assessment of pelvic instability, then reapply and transfer for angioembolisation
- B Laparotomy with packing of all four abdominal quadrants
- C Transfer immediately for angioembolisation, continuing transfusion en route
- D Computed tomography of the abdomen and pelvis with contrast to identify the bleeding vessel before any intervention
- E Preperitoneal pelvic packing through a suprapubic incision with external fixation, continuing haemostatic resuscitation

**Q25** A 29-year-old man sustains a shotgun wound to the left thigh at close range. The wound is in the medial thigh at the level of the adductor canal. The limb distal to the injury is cool and pale, there is no palpable popliteal or pedal pulse, and the ankle brachial index on that side cannot be recorded. Sensation over the dorsum of the foot is reduced. There is an obvious mid-shaft femoral fracture on the plain film. He is haemodynamically normal after two units of blood. There are no other injuries. Theatre is available now.

- A Immediate operative exploration with vascular shunt insertion, then skeletal fixation, then definitive repair
- B CT angiography of the limb before any operative intervention
- C Definitive vein graft reconstruction first, followed by external fixation of the femur
- D External fixation of the femur first, then reassessment of the pulses before deciding on exploration
- E Systemic heparinisation and serial vascular observation with repeat ankle brachial index



**Q26** A 40-year-old woman sustains a pancreatic injury in a road traffic collision. At laparotomy performed for haemodynamic instability from a mesenteric bleed, the pancreas is transected completely at the neck, immediately over the superior mesenteric vessels, with clear disruption of the main duct. The duodenum, common bile duct and ampulla are uninjured. After control of the mesenteric bleeding her temperature is 35.8 degrees, pH 7.28 and base deficit 7 mmol/L. She has had six units of red cells. Which operative strategy is most appropriate?

- A Pancreaticoduodenectomy at this operation to remove the transected gland and duodenum
- B Wide external drainage alone with no resection and planned reassessment
- C Distal pancreatectomy with splenic preservation and closure of the proximal stump, with drainage
- D Roux-en-Y pancreaticojejunostomy to the distal stump at this operation
- E Primary duct-to-duct repair over a transampullary stent

**Q27** A 9-year-old girl is brought in after falling from a climbing frame onto her left side. She is alert, heart rate 104 per minute, blood pressure 106/64 mmHg, capillary refill under two seconds. CT with intravenous contrast shows a splenic laceration greater than 3 cm in depth with a subcapsular haematoma involving more than half the surface, no contrast extravasation and a moderate haemoperitoneum. Haemoglobin is 108 g/L. She has received one bolus of 10 mL/kg of crystalloid and has remained stable for three hours. Paediatric surgical and intensive care support are available on site. What is the most appropriate management?

- A Non-operative management with bed rest and monitoring, using her physiological status rather than the injury grade to guide length of observation
- B Splenectomy, with vaccination against encapsulated organisms before discharge
- C Splenic angioembolisation to reduce the risk of delayed rupture
- D Laparotomy with splenorrhaphy and mesh wrap to preserve splenic tissue
- E Discharge home the same day with instructions to avoid contact sport for six weeks

**Q28** A 57-year-old man with a laparotomy for a stab wound eleven years ago is admitted with 26 hours of colicky central abdominal pain, bilious vomiting and absolute constipation. He is comfortable between spasms. Pulse is 84 per minute, blood pressure 132/78 mmHg, temperature 36.8 degrees Celsius. The abdomen is distended and tympanitic with high-pitched bowel sounds and no localised tenderness, guarding or rebound. There is no hernia. Lactate is 1.2 mmol/L, white cell count  $9.8 \times 10^9/L$ , creatinine 96 micromol/L. Abdominal radiograph shows dilated small bowel loops with no gas in the rectum.

- A Immediate laparotomy and adhesiolysis
- B Neostigmine infusion under cardiac monitoring
- C Nasogastric decompression, intravenous fluids and a water-soluble contrast challenge
- D Diagnostic laparoscopy within six hours
- E Oral laxatives and a phosphate enema

**Q29** A 22-year-old woman attends with 14 hours of periumbilical pain that has moved to the right iliac fossa, anorexia and one episode of vomiting. Temperature is 37.9 degrees Celsius, pulse 96 per minute, blood pressure 118/70 mmHg. There is localised tenderness and rebound at McBurney's point with voluntary guarding, but the abdomen is otherwise soft. White cell count is  $15.2 \times 10^9/L$  and C-reactive protein 62 mg/L. A urinary pregnancy test is negative and urinalysis is clear. Her Alvarado score is calculated as 9. Contrast-enhanced computed tomography is available immediately in the emergency department.

- A Contrast-enhanced computed tomography of the abdomen and pelvis before any decision
- B Admit for 24 hours of observation with serial examination and repeat inflammatory markers
- C Discharge on oral co-amoxiclav with outpatient review in 48 hours
- D Diagnostic laparoscopy only if the pain persists beyond a further 12 hours
- E Proceed to laparoscopic appendicectomy without further imaging

**Q30** A 29-year-old man with no comorbidity is admitted with a tender, irreducible lump in the right groin present for five hours. He has vomited twice. Pulse is 92 per minute, blood pressure 130/80 mmHg, temperature 37.2 degrees Celsius. The lump lies above and medial to the pubic tubercle, is tense and exquisitely tender, and the overlying skin is normal. The abdomen is soft with active bowel sounds and no distension. Lactate is 1.4 mmol/L and white cell count is  $11.8 \times 10^9$  per litre. Two attempts at gentle reduction with analgesia and head-down positioning have failed. What is the most appropriate management?

- A Repeat reduction attempts under deep sedation on the ward
- B Emergency exploration of the groin with reduction and repair
- C Computed tomography of the abdomen and pelvis before any intervention
- D Admit for observation, analgesia and reassessment in the morning
- E Apply ice, admit and list for elective repair within six weeks

**Q31** A 44-year-old woman presents with 30 hours of periumbilical pain that has shifted to the right iliac fossa, anorexia and two episodes of vomiting. She is haemodynamically stable, temperature 37.9°C, with localised right iliac fossa tenderness and no guarding elsewhere. White cell count is  $14.2 \times 10^9$ /L and CRP is 62 mg/L. Contrast-enhanced CT shows a 12 mm appendix with periappendiceal fat stranding, no extraluminal gas, no free fluid and no collection. She has no significant comorbidity, is not pregnant, and asks whether she can avoid an operation because she is due to travel for work. Which is the most appropriate management?

- A Proceed directly to emergency laparoscopic appendicectomy without further discussion, as surgery is the only accepted treatment
- B Admit for intravenous antibiotics and arrange interval appendicectomy in eight weeks in all cases
- C Discharge on oral antibiotics with no follow-up arrangement, as recurrence is rare after a single episode
- D Request an urgent MRI abdomen before committing to any treatment pathway
- E Discuss antibiotic-first non-operative management and laparoscopic appendicectomy as alternatives, and agree a plan by shared decision-making

**Q32** A 53-year-old man who smokes and takes ibuprofen for back pain presents with six hours of sudden severe epigastric pain that is now generalised. He is unwell, with pulse 118, blood pressure 96/58, respiratory rate 26 and temperature 38.1°C. The abdomen is rigid with generalised guarding. Lactate is 3.6 mmol/L, creatinine 148 micromol/L, white cells  $19.2 \times 10^9/L$ . Erect chest radiograph shows free subdiaphragmatic gas. Resuscitation is started with crystalloid, antibiotics and a proton pump inhibitor. He is taken to theatre and a 7 mm anterior duodenal perforation is found with purulent contamination. What is the most appropriate operative management?

- A Distal gastrectomy with Billroth II reconstruction
- B Truncal vagotomy and pyloroplasty incorporating the perforation
- C Omental patch repair of the perforation with thorough peritoneal lavage
- D Simple closure with drainage and no lavage, to avoid spreading contamination
- E Pyloric exclusion with gastrojejunostomy and wide drainage

**Q33** A 59-year-old woman with hypertension and chronic kidney disease stage 3 is admitted with three days of abdominal distension, absolute constipation and colicky pain. She is not tender and has no peritonism. Pulse is 92 per minute, blood pressure 148/86 mmHg, temperature normal. Lactate is 1.3 mmol/L. Computed tomography with rectal contrast shows a dilated colon to a tight stricturing lesion in the sigmoid with a caecal diameter of 9 cm and no free gas or perforation. Biopsy is not yet available. She is otherwise fit and independent, and the multidisciplinary team has not yet met.

- A Emergency Hartmann's procedure tonight
- B Endoscopic self-expanding metal stent as a bridge to elective resection after staging
- C Emergency subtotal colectomy with ileorectal anastomosis
- D Loop transverse colostomy as a permanent solution
- E Nasogastric decompression and phosphate enemas with reassessment in 48 hours

**Q34** A 68-year-old woman with hypertension and a 30 pack-year smoking history is admitted with 20 hours of abdominal pain and one episode of diarrhoea. The pain is diffuse and severe but the abdomen is soft with only mild tenderness. Pulse is 104 per minute in sinus rhythm, blood pressure 138/82 mmHg, lactate 2.6 mmol/L. She has lost 6 kg over three months and describes pain after meals. Computed tomography angiography shows an occluded superior mesenteric artery at its origin with heavy calcification, a small-calibre coeliac axis with a tight ostial stenosis, and small bowel that enhances poorly in the mid jejunum without pneumatosis or free fluid.

- A Anticoagulation with therapeutic heparin alone and repeat imaging at 24 hours
- B Endovascular revascularisation of the superior mesenteric artery, with laparotomy to assess bowel viability
- C Immediate laparotomy with resection of the poorly enhancing jejunum and primary anastomosis
- D Papaverine infusion into the superior mesenteric artery and admission to the intensive care unit
- E Antiplatelet therapy, statin and outpatient vascular clinic referral for chronic mesenteric ischaemia

**Q35** A 59-year-old woman with cirrhosis of unknown cause and no varices on a recent endoscopy is admitted with 48 hours of dull, constant periumbilical pain, nausea and no bowel motion for a day. Pulse is 96 per minute, blood pressure 126/74 mmHg, temperature 37.6 degrees Celsius. The abdomen is mildly distended with diffuse tenderness and no guarding. Lactate is 1.8 mmol/L, white cell count  $13.2 \times 10^9/L$ . CT with portal venous phase shows a filling defect in the superior mesenteric vein extending into the portal vein, mesenteric fat stranding, bowel wall thickening with preserved enhancement and a small amount of free fluid. What is the most appropriate management?

- A Immediate laparotomy with resection of the thickened small bowel segment
- B Antibiotics alone with repeat CT in one week
- C Prompt therapeutic anticoagulation with close clinical and biochemical observation
- D Emergency surgical thrombectomy of the superior mesenteric vein
- E Transjugular intrahepatic portosystemic shunt as the initial intervention

**Q36** A 26-year-old man with no comorbidity and no allergies attends with 24 hours of right iliac fossa pain, anorexia and low-grade fever. Pulse is 88 per minute, blood pressure 126/76 mmHg, temperature 37.6°C. There is localised tenderness without guarding. White cell count is  $13.1 \times 10^9/L$  and C-reactive protein 42 mg/L. Computed tomography shows an 8 mm appendix with periappendiceal fat stranding, no appendicolith, no free fluid and no perforation. He is a merchant seaman about to join a vessel for a four-month voyage with no medical facility on board, and he asks whether he can avoid an operation. He has been told about antibiotic treatment by a friend.

- A Antibiotics alone, since the appendicitis is uncomplicated and non-operative treatment is an accepted option
- B Antibiotics now with a planned interval appendicectomy in eight weeks
- C Laparoscopic appendicectomy, after explaining why non-operative treatment fits his circumstances poorly
- D Discharge on oral antibiotics with instructions to seek help if pain worsens at sea
- E Observation without antibiotics, reserving surgery for clinical deterioration

**Q37** A 34-year-old man is undergoing an open Lichtenstein repair for a symptomatic left indirect inguinal hernia under spinal anaesthesia. After opening the external oblique aponeurosis you identify the spermatic cord and reduce a moderate indirect sac. While preparing the bed for the mesh you note a nerve running on the anterosuperior surface of the cord, and a second nerve emerging with the cord at the deep ring alongside the cremasteric vessels. Both appear healthy and are not encircled by scar or tumour. You are about to lay a lightweight polypropylene mesh over the floor of the canal. What is the most appropriate handling of these nerves?

- A Divide both nerves close to the deep ring and bury the proximal ends in muscle
- B Identify and preserve both nerves, keeping them clear of the mesh edge and the fixation sutures
- C Divide the ilioinguinal nerve routinely and preserve the genital branch
- D Leave the nerves undissected and place the mesh over them without deliberately identifying them
- E Infiltrate both nerves with absolute alcohol to produce a chemical neurolysis

**Q38** A 27-year-old woman attends clinic four months after an uncomplicated vaginal delivery. She has noticed a small bulge at the umbilicus that appeared during the third trimester and has not resolved. She has no pain, no episodes of irreducibility and no change in bowel habit. Her body mass index is 24 and she has no other medical problems. On examination there is a soft reducible swelling at the umbilicus with a fascial defect of approximately 1.5 cm. There is no overlying skin change. She is not planning further pregnancies and asks whether she needs an operation and, if so, what sort. What is the most appropriate management?

- A Reassure her and discharge, as umbilical hernias of this size resolve spontaneously in adults
- B Offer elective open primary suture repair without mesh, as the defect is small
- C Offer laparoscopic intraperitoneal onlay mesh repair with tack fixation
- D Offer elective open repair with a preperitoneal flat mesh
- E Advise an abdominal support garment and review in twelve months

**Q39** A 63-year-old woman with a body mass index of 26 is listed for repair of a symptomatic epigastric hernia in the upper midline, 6 cm above the umbilicus. She has no previous abdominal operations. On examination there is a tender, partially reducible swelling and the fascial defect admits a fingertip, measured at approximately 1.5 cm. Ultrasound confirms a single defect of 15 mm containing incarcerated preperitoneal fat, with no second defect above or below. She takes no anticoagulants and has no diabetes. She asks whether the operation can be done with a simple stitch, as her sister had that done many years ago.

- A Open repair with simple interrupted suture closure of the defect
- B Open repair with an onlay mesh sutured over the closed defect
- C Laparoscopic intraperitoneal onlay mesh repair with tack fixation
- D Component separation with retromuscular mesh reinforcement
- E Open repair with a flat mesh placed in the preperitoneal or retromuscular plane

**Q40** A 76-year-old woman with atrial fibrillation on apixaban arrives at eight in the evening at a small district hospital with sixteen hours of vomiting and colicky central abdominal pain. She has not passed flatus since morning. Her abdomen is distended and tympanitic with high-pitched sounds. There is a tender 2 cm irreducible lump in the right groin lying below and lateral to the pubic tubercle. Her pulse is 104 and her lactate is 2.8 mmol/L. The nearest CT scanner is ninety minutes away by ambulance, there is no interventional radiology service, and the on-call anaesthetist is available. What is the most appropriate next step?

- A Resuscitate, reverse the apixaban as required and proceed to operation with an approach that allows bowel resection
- B Transfer her by ambulance for a CT of the abdomen and pelvis before any operative decision
- C Attempt gentle taxis of the groin lump after opioid analgesia and observe overnight
- D Insert a nasogastric tube, give water-soluble contrast and repeat an abdominal radiograph at eight hours
- E Perform a bedside ultrasound scan of the groin and, if a hernia is confirmed, list for elective repair on the next available list

**Q41** A 70-year-old man is operated on at two in the morning in a rural hospital for an incarcerated 8 cm umbilical hernia with obstruction. There is no CT out of hours, no interventional radiology and no intensive care bed; the nearest unit is three hours away and will not accept a transfer tonight. At operation a 25 cm segment of strangulated small bowel is found, resected and anastomosed, with faeculent fluid spilled into the wound. The fascial edges come together without undue tension after the resection. The hospital stocks lightweight polypropylene and a biosynthetic absorbable mesh, but no biological graft.

- A Place a lightweight polypropylene mesh in the sublay position and close over a drain
- B Place an intraperitoneal composite mesh to guarantee wide overlap of the defect
- C Leave the abdomen open with a negative pressure dressing and return in 48 hours for mesh placement
- D Close the fascia primarily with a slowly absorbable monofilament, wash out thoroughly, and plan definitive elective repair later if a hernia recurs
- E Place an onlay polypropylene mesh above the fascia, away from the contaminated peritoneal cavity



**Q42** A 54-year-old man with a body mass index of 33 has an incisional hernia after an emergency midline laparotomy for perforated diverticular disease three years ago. The defect measures 13 cm transversely on clinical examination and extends from just below the xiphisternum to below the umbilicus. He smokes fifteen cigarettes a day and his HbA1c is 58 mmol/mol. There is no loss of domain on clinical assessment and the skin is healthy. He is being planned for an open retromuscular repair. The team is discussing how to gain sufficient medial advancement of the posterior and anterior layers to close both without tension.

- A Bridging the defect with an intraperitoneal composite mesh without fascial closure
- B Anterior component separation with subcutaneous skin flaps raised to the anterior axillary line
- C Posterior component separation by transversus abdominis release with retromuscular sublay mesh
- D Primary suture closure of the midline with a running slowly absorbable suture and no mesh
- E Onlay polypropylene mesh over a primarily closed midline with wide subcutaneous dissection

**Q43** A 34-year-old woman with no comorbidity attends the day surgery unit for elective laparoscopic cholecystectomy after three episodes of biliary colic over eight months. Liver function tests and amylase have been normal throughout, and preoperative ultrasound showed multiple small stones in a thin-walled gallbladder with a common bile duct measuring 4 mm. At operation the tissues are soft and there is no inflammation. The registrar has cleared fat and fibrous tissue from the hepatocystic triangle and has separated the lower part of the gallbladder from the liver bed, and asks the consultant to confirm that the critical view of safety has been achieved before any clip is applied.

- A The cystic artery and cystic duct are both seen to cross anterior to the common hepatic duct
- B The common bile duct has been dissected circumferentially and encircled with a vessel loop
- C Two structures only are seen entering the gallbladder, and the lowest third of the gallbladder is separated from the cystic plate
- D A fluorescent cholangiogram demonstrates contrast passing freely into the duodenum
- E The cystic duct has been traced distally to its junction with the common bile duct

**Q44** A 68-year-old woman with type 2 diabetes presents with two days of right upper quadrant pain, jaundice and one episode of rigors. Temperature is 38.9 degrees Celsius, blood pressure 104/62 mmHg after two litres of crystalloid, heart rate 112 beats per minute, and she is oriented. Bilirubin is 96 micromol/L, alkaline phosphatase 420 units per litre, white cell count 19,200 per microlitre, creatinine 128 micromol/L, platelets 140,000 per microlitre, lactate 2.1 mmol/L. Ultrasound shows a dilated common bile duct of 12 mm with a distal echogenic focus and gallstones. She has received piperacillin-tazobactam. An endoscopy service is available in the hospital.

- A Continue antibiotics alone and reassess in 48 hours
- B Emergency open common bile duct exploration with T-tube drainage
- C Magnetic resonance cholangiopancreatography first to confirm the stone before any drainage
- D Laparoscopic cholecystectomy with intraoperative cholangiography tonight
- E Biliary drainage by endoscopic retrograde cholangiopancreatography within 24 hours

**Q45** A 65-year-old woman presents to a small hospital on a remote peninsula at 11 pm with two days of right upper quadrant pain, rigors and jaundice. There is no CT scanner out of hours, no interventional radiology, no endoscopy service and no intensive care bed; the referral centre is a four-hour road transfer or a helicopter transfer that cannot fly until dawn because of weather. Temperature 38.9 degrees, pulse 122, blood pressure 88/50 rising to 104/62 after two litres of crystalloid, bilirubin 96 micromol/L, alkaline phosphatase 480 U/L, white cells 19,000, lactate 3.2 mmol/L. Ultrasound shows a dilated 12 mm common bile duct with a stone and gallstones. What is the most appropriate management?

- A Emergency open common bile duct exploration and T-tube drainage in the local theatre tonight
- B Antibiotics alone with reassessment in the morning, deferring transfer unless she deteriorates further
- C Emergency laparoscopic cholecystectomy tonight to remove the source of sepsis
- D Broad-spectrum intravenous antibiotics, continued resuscitation and urgent arrangement of transfer for biliary drainage as soon as transport allows
- E Percutaneous transhepatic cholangiography performed by the on-call general surgeon under ultrasound guidance

**Q46** A 69-year-old man presents at 1 am to a district hospital with 20 hours of right upper quadrant pain, fever and confusion. He is jaundiced. Pulse is 118, blood pressure 86/48 after two litres of crystalloid, and he remains oliguric. Bilirubin is 128 micromol/L, alkaline phosphatase 420 U/L, white cell count 21,000 per microlitre and lactate 3.4 mmol/L. Ultrasound shows a dilated common bile duct of 13 mm with a stone at its lower end and gallstones in the gallbladder. The hospital has no on-site endoscopy service overnight and no interventional radiology. The regional unit accepts him for transfer with an expected arrival in two hours. What is the most appropriate immediate management while transfer is arranged?

- A Emergency open common bile duct exploration and T-tube placement locally
- B Antibiotics alone with reassessment in the morning if he fails to improve
- C Emergency laparoscopic cholecystectomy to remove the source of infection
- D Percutaneous cholecystostomy performed by the on-call surgeon under ultrasound guidance
- E Broad-spectrum intravenous antibiotics, vasopressor support and urgent transfer for biliary drainage

**Q47** A 38-year-old woman is undergoing laparoscopic cholecystectomy for a third episode of biliary colic. Preoperative magnetic resonance cholangiopancreatography showed a 2 cm stone impacted in Hartmann's pouch, extrinsic narrowing of the common hepatic duct, and a short segment where the gallbladder and duct appeared to share a wall over roughly one third of the duct circumference. Bilirubin was 62  $\mu$ mol/L. At operation the hepatocystic triangle is a dense fibrotic mass and no plane can be developed between the gallbladder infundibulum and the common hepatic duct. Blood loss is minimal and she is stable. Which is the most appropriate intraoperative decision?

- A Continue laparoscopic dissection of the hepatocystic triangle until the cystic duct is unequivocally identified
- B Clip and divide the structure entering the gallbladder that appears most likely to be the cystic duct, then complete the cholecystectomy
- C Abandon the operation, close, and refer for endoscopic stone extraction with no further surgery
- D Perform a top-down dissection from the fundus to define the anatomy from above
- E Convert to open, perform subtotal cholecystectomy leaving the posterior wall adherent, remove the stone, and repair or drain the duct defect with hepatobiliary input

**Q48** A 47-year-old man is on day 5 of severe acute pancreatitis of alcoholic aetiology. He required 40 per cent oxygen by mask for two days but is now on 2 litres by nasal cannula, creatinine has normalised and he is haemodynamically stable off vasopressors. Contrast-enhanced computed tomography shows approximately 40 per cent necrosis of the pancreatic body and a large heterogeneous acute necrotic collection. Temperature is 37.9 degrees Celsius, white cell count  $16 \times 10^9/L$  and C-reactive protein 280 mg/L falling from 340 mg/L. There is no gas within the collection and blood cultures are negative. He is tolerating nasogastric feed. What is the most appropriate management?

- A Image-guided fine-needle aspiration of the collection for culture
- B Continue supportive care and enteral nutrition, with no drainage at present
- C Percutaneous catheter drainage of the collection today
- D Start empirical meropenem for presumed infected necrosis
- E Open necrosectomy with closed lavage

**Q49** A 39-year-old woman with a six-year history of ileocolonic Crohn disease attends clinic with a two-month history of postprandial cramping, audible borborygmi and vomiting after solid meals. She has lost four kilograms. She is on azathioprine and no steroids. Inflammatory markers are normal and faecal calprotectin is 60 micrograms/g. MR enterography shows a 4 cm terminal ileal stricture with a thin wall, no mural oedema, no enhancement and no fistula or abscess, with prestenotic dilatation. Colonoscopy shows no other disease. She is nutritionally reasonable with an albumin of 38 g/L.

- A Escalate to an anti-tumour necrosis factor agent and reassess in three months
- B Ileocaecal resection or endoscopic balloon dilatation of the stricture
- C Start a tapering course of oral prednisolone
- D Extended right hemicolectomy with a wide mesenteric resection
- E Exclusive enteral nutrition for eight weeks and repeat imaging

**Q50** A 46-year-old woman attends the emergency department with two days of left iliac fossa pain and mild nausea. She has no relevant comorbidity and takes no immunosuppression. She is afebrile at 37.2 degrees Celsius, pulse 82, blood pressure 128/74. The abdomen is soft with localised left iliac fossa tenderness and no guarding. White cell count is 10,900 per microlitre, C-reactive protein 38 mg/L. Contrast-enhanced CT shows pericolic fat stranding around a thickened sigmoid segment with multiple diverticula, no abscess, no free air and no extraluminal contrast. She is tolerating oral fluids, lives with her husband and can return easily. What is the most appropriate management?

- A Admit for intravenous piperacillin-tazobactam and keep nil by mouth
- B Admit for observation and arrange flexible sigmoidoscopy during this admission
- C Discharge on a seven-day course of oral co-amoxiclav with review at completion
- D Book laparoscopic sigmoid colectomy on the next available elective list
- E Discharge with analgesia, oral intake as tolerated and early clinical review, without antibiotics

**Q51** A 63-year-old man has had an end colostomy for 14 months following a Hartmann procedure for perforated diverticulitis. He attends with a two-month history of a bulge around the stoma that appears when he stands and coughs. The appliance leaks two to three times a week and his skin is excoriated. Examination shows a large parastomal bulge with a wide fascial defect, easily reducible, with a well-perfused pink stoma and no obstructive symptoms. He is otherwise fit, works part-time and has a body mass index of 31. He has never had his stoma reversed and both he and his family are keen to be rid of the bag altogether.

- A Local repair of the fascial defect through a peristomal incision
- B Relocation of the colostomy to the opposite side of the abdomen
- C Fitting of a support belt and convex appliance as definitive treatment
- D Laparoscopic keyhole mesh repair leaving the stoma in situ
- E Assessment of the rectal stump and anal function with a view to Hartmann reversal

**Q52** A 33-year-old man with a seven-year history of ileocolonic Crohn disease attends with three months of colicky pain after eating, vomiting twice weekly and 6 kg weight loss. He has previously had a 40 cm ileal resection. Magnetic resonance enterography shows four short fibrotic strictures, each under 6 cm, distributed over 90 cm of remaining small bowel, with no abscess, no fistula and no active inflammatory phlegmon. C-reactive protein is 6 mg/L and albumin 38 g/L. He is on no corticosteroids. His total remaining small bowel length is estimated at 220 cm. What is the most appropriate surgical management?

- A Resection of the entire 90 cm segment containing all four strictures with primary anastomosis
- B Side-to-side isoperistaltic Michelassi strictureplasty over the whole 90 cm segment
- C Heineke-Mikulicz strictureplasty at each of the four sites
- D Proximal loop ileostomy to defunction the strictured segment
- E Escalation to an anti-tumour necrosis factor agent without surgery

**Q53** A 47-year-old man with well-controlled hypertension is taken to theatre at a hospital where the single CT scanner is out of service overnight and the nearest scanner is ninety minutes away. He has twelve hours of generalised abdominal pain with board-like rigidity, pulse 118, blood pressure 96/62, lactate 3.2 mmol/L. He is not immunosuppressed and is nutritionally normal. Erect chest radiograph shows free subdiaphragmatic gas. At laparotomy there is generalised purulent peritonitis with an inflamed sigmoid bearing a perforated diverticulum, and no faecal soiling. He responds to fluid and is off vasopressors by the end of the washout. What is the most appropriate operative decision?

- A Peritoneal lavage, drain placement and closure without resection
- B Sigmoid resection with primary anastomosis and defunctioning loop ileostomy
- C Oversew of the perforated diverticulum with omental patch and drainage
- D Damage control with a stapled-off sigmoid, laparostomy and planned relook at forty-eight hours
- E Total colectomy with end ileostomy

**Q54** A 70-year-old man is on day nine of intravenous antibiotics for an infected hip prosthesis in a small district hospital with no computed tomography scanner available out of hours, no interventional radiology and no intensive care bed. He has developed profuse watery diarrhoea, and stool testing is positive for *Clostridioides difficile* toxin. Despite 72 hours of oral vancomycin he has deteriorated: temperature 38.8 C, pulse 128 beats per minute, blood pressure 84/50 mmHg despite three litres of crystalloid, white cell count 32,000 per microlitre, lactate 4.6 mmol/L and creatinine doubled from baseline. The abdomen is distended and diffusely tender. What is the most appropriate management?

- A Add intravenous metronidazole and continue medical therapy with hourly review
- B Arrange faecal microbiota transplantation as an urgent inpatient procedure
- C Transfer to the regional centre for computed tomography before any operative decision
- D Insert a rectal tube and commence vancomycin retention enemas
- E Proceed to theatre for subtotal colectomy with end ileostomy, with vasopressor support in theatre and retrieval afterwards

**Q55** A 34-year-old woman with no comorbidity is admitted for an elective open repair of a symptomatic umbilical hernia scheduled as the second case on the afternoon list, expected to start at about 14:00. She telephoned the preassessment nurse the previous evening and was told nothing to eat or drink from midnight. On the ward round at 11:00 she is thirsty, has a dry mouth and a headache, and asks whether she may have a drink. She has no diabetes, no history of reflux, no gastric surgery and is on no medication that delays gastric emptying. The anaesthetist confirms a general anaesthetic with a laryngeal mask.

- A Continue strict nil by mouth until she goes to theatre and give 1 litre of intravenous crystalloid
- B Allow a light breakfast now because the case is not until the afternoon
- C Allow clear fluids, including a carbohydrate drink, up to two hours before the anticipated start of surgery
- D Allow sips of water only, no more than 30 mL per hour, until she goes to theatre
- E Move her to the start of the list to shorten the fasting period and keep her nil by mouth

**Q56** A 48-year-old woman with well-controlled hypothyroidism and no other comorbidity is booked for an elective laparoscopic Nissen fundoplication. She is a non-smoker with a body mass index of 26 kg/m<sup>2</sup> and climbs three flights of stairs to her flat daily without stopping. The operation is scheduled to start at 08:30. At the preoperative clinic the nursing staff ask what fasting instructions should be written on her admission card. She takes levothyroxine each morning and drinks two cups of tea before leaving home. She asks whether she must go without water from midnight as she did for a previous operation twenty years ago.

- A Nil by mouth from midnight for both solids and fluids
- B Solids until 06:00, then nil by mouth
- C Solids until midnight and clear fluids until two hours before induction
- D Solids until 02:30, clear fluids until 06:30, including a carbohydrate drink
- E Clear fluids permitted until arrival in the anaesthetic room

**Q57** A 71-year-old man is admitted at 21:40 to a small district hospital serving a farming district with four days of abdominal distension, absolute constipation and vomiting. The nearest CT scanner is ninety minutes away by road and does not operate overnight; there is no interventional radiology service and no intensive care bed in the building. Abdominal radiography shows grossly dilated large bowel with a coffee-bean configuration. He is tachycardic at 112 per minute, blood pressure 96/58 mmHg, lactate 2.1 mmol/L. He takes apixaban for atrial fibrillation and his last dose was at 08:00 this morning. Creatinine is 148 µmol/L. He needs an operation tonight.

- A Delay surgery for 72 hours to allow full apixaban washout, treating with nasogastric decompression and fluids meanwhile
- B Resuscitate, transfuse two units of fresh frozen plasma to reverse the apixaban, and operate once the transfusion is complete
- C Give intravenous vitamin K 10 mg and proceed once the international normalised ratio is below 1.5
- D Transfer him by road to the tertiary centre for CT before any operative decision is made
- E Resuscitate and proceed to laparotomy now, accepting increased bleeding risk, having discussed reversal agent availability and planning meticulous surgical haemostasis



**Q58** A 66-year-old woman attends the preassessment clinic six weeks before an elective open incisional hernia repair with component separation. She has chronic obstructive pulmonary disease, smokes fifteen cigarettes daily, and reports that she becomes breathless walking to her letterbox and cannot climb a flight of stairs without stopping. Her body mass index is 33 kg/m<sup>2</sup>. Her haemoglobin is 104 g/L with a ferritin of 12 microgram/L. She lives alone and does no regular exercise. The operation is not time-critical. What is the most appropriate plan?

- A** Proceed as listed and arrange a postoperative high-dependency bed
- B** Proceed as listed but transfuse two units of red cells on the morning of surgery
- C** Defer the operation and enter her into a structured prehabilitation programme with smoking cessation, exercise training, nutritional support and intravenous iron
- D** Refer for coronary angiography before making any further plan
- E** Cancel the repair permanently and manage the hernia with an abdominal binder

**Q59** A 60-year-old man with alcohol-related cirrhosis is referred for elective repair of a symptomatic, recurrently incarcerating umbilical hernia. He has controlled ascites on diuretics, no encephalopathy, serum bilirubin 34 micromol/L, albumin 31 g/L, INR 1.4 and platelets  $88 \times 10^9$ /L. Sodium is 132 mmol/L, creatinine 88 micromol/L. He has been abstinent for 14 months and attends a hepatology clinic. He asks what his risk of dying within 90 days of the operation would be, and whether anything can be done to reduce it. What is the most appropriate approach to quantifying and managing his perioperative risk?

- A** Use the American Society of Anesthesiologists grade alone, as cirrhosis-specific scores add nothing
- B** Apply a cirrhosis-specific perioperative risk score alongside optimisation of ascites and nutrition before elective repair
- C** Decline surgery outright, as any abdominal operation in cirrhosis carries prohibitive mortality
- D** Use the revised cardiac risk index, which captures hepatic risk through the creatinine criterion
- E** Proceed immediately without further scoring, since the hernia is symptomatic

**Q60** A 75-year-old man with a mechanical aortic valve replacement performed nine years ago and permanent atrial fibrillation takes warfarin with a target INR of 2.5 to 3.5. He has no prior thromboembolism. He is listed for an elective open umbilical hernia repair with mesh. His creatinine clearance is 62 mL/min. The preassessment nurse asks how his anticoagulation should be handled, having read that bridging is no longer recommended. His INR today is 2.9 and surgery is in ten days. What is the most appropriate plan?

- A Stop warfarin five days before surgery with no bridging, resuming the evening after surgery
- B Stop warfarin five days before surgery and bridge with therapeutic low molecular weight heparin
- C Switch him to apixaban four weeks before surgery, then stop it forty-eight hours preoperatively
- D Continue warfarin through surgery and reverse with vitamin K if bleeding occurs
- E Stop warfarin two days before surgery and give prothrombin complex concentrate at induction

**Q61** A 48-year-old woman with a body mass index of 27 kg/m<sup>2</sup> attends the surgical clinic with five years of burning retrosternal discomfort and sour regurgitation, worse when she bends forward to garden. She has taken omeprazole 20 mg daily intermittently, with good relief when she is compliant. She has never had dysphagia, weight loss, anaemia or vomiting. She is on no other medication and has no comorbidity. She asks to be considered for an operation because she dislikes taking tablets. She has never had an endoscopy or any oesophageal function testing. Examination is unremarkable.

- A Proceed to laparoscopic Nissen fundoplication on the strength of the typical symptom pattern and the response to acid suppression
- B Arrange a barium swallow alone and offer fundoplication if reflux of contrast is demonstrated
- C Double the omeprazole to twice daily indefinitely and decline any surgical assessment
- D Arrange magnetic sphincter augmentation without further investigation, as it is reversible
- E Arrange upper gastrointestinal endoscopy, high-resolution manometry and ambulatory pH monitoring off proton pump inhibitor before offering surgery

**Q62** A 61-year-old man had a laparoscopic Nissen fundoplication two days ago for reflux with a small sliding hiatal hernia. Overnight he becomes agitated, complains of left shoulder tip and epigastric pain, and develops a heart rate of 126 beats per minute with a respiratory rate of 26. Temperature is 38.2 degrees Celsius. He has surgical emphysema palpable at the left costal margin. The abdomen is tender in the epigastrium without generalised rigidity. White cell count is  $19.2 \times 10^9/L$  and C-reactive protein is 210 mg/L. He has passed only 20 mL of urine in the last two hours despite a fluid bolus. Which is the most appropriate next step?

- A Escalate analgesia, start intravenous antibiotics and repeat blood tests in the morning
- B Arrange a plain erect chest radiograph and manage conservatively if no free gas is seen
- C Perform bedside upper gastrointestinal endoscopy with maximal insufflation to inspect the wrap
- D Contrast-enhanced CT with oral water-soluble contrast, proceeding to reoperation if a leak is shown
- E Insert a left intercostal drain for presumed pneumothorax and observe

**Q63** A 58-year-old woman is reviewed twenty months after a laparoscopic Nissen fundoplication performed for regurgitation-dominant reflux. Her heartburn resolved for a year and has now returned, together with new dysphagia to solids and early satiety. She takes a full-dose proton pump inhibitor with only partial benefit. Endoscopy shows the wrap sitting 3 cm above the diaphragmatic pinch with a small pouch of stomach beside the oesophagus, and mild distal oesophagitis. Barium swallow confirms an intrathoracic wrap. Which is the most appropriate next step in her management?

- A Proceed directly to revisional surgery on the endoscopic and barium findings alone
- B Complete the workup with high-resolution manometry and ambulatory pH-impedance monitoring before planning revision
- C Add a nocturnal H<sub>2</sub> receptor antagonist and review in twelve months
- D Arrange endoscopic pneumatic dilatation of the wrap to relieve the dysphagia
- E Convert to Roux-en-Y gastric bypass without further physiological testing

**Q64** A 32-year-old primary school teacher attends the outpatient clinic with a five-month history of bright red bleeding that coats the stool and drips into the pan after defaecation. She has no pain, no weight loss and no family history of bowel disease. Her stools are hard and she strains most mornings. Digital rectal examination is normal and proctoscopy shows prominent vascular cushions at the left lateral and right anterior positions that bleed on contact but do not descend when she is asked to strain on the couch. Flexible sigmoidoscopy performed the same day is otherwise normal. Her haemoglobin is 131 g/L.

- A Rubber band ligation of the two symptomatic cushions at this visit
- B Milligan-Morgan excisional haemorrhoidectomy on the next available list
- C Doppler-guided haemorrhoidal artery ligation with mucopexy
- D Topical glyceryl trinitrate 0.4% ointment twice daily for eight weeks
- E Dietary fibre to 25–30 g daily, increased fluid intake and defaecation retraining, with review in six to eight weeks

**Q65** A 19-year-old man with no significant medical history attends a small rural hospital in the late evening with twelve hours of agonising perianal pain that began suddenly while lifting a sack of grain. He describes a lump he can feel himself. On inspection there is a tense, tender, bluish 1.5 cm swelling at the anal verge covered by skin, with no surrounding cellulitis, no fluctuance and no fever. He is systemically well. The hospital has no CT scanner and no interventional radiology, but a minor operations room with local anaesthetic is available and the pain is at its peak.

- A Excision of the thrombosed haemorrhoid under local anaesthetic in the minor operations room
- B Incision and evacuation of the clot through a small stab incision
- C Rubber band ligation of the swelling in clinic
- D Oral analgesia, stool softeners and sitz baths with outpatient review
- E Urgent transfer for cross-sectional imaging to exclude a perianal abscess

**Q66** A 43-year-old man who has sex with men, HIV positive with a CD4 count of 520 on suppressive antiretroviral therapy and an undetectable viral load, is seen with perianal itching and several small warty lesions. High-resolution anoscopy with acetic acid and Lugol's iodine shows multifocal acetowhite lesions with coarse punctation in the anal canal and on the perianal skin. Biopsies from three sites report high-grade squamous intraepithelial lesion, p16 positive, with no invasion on any specimen. Digital examination reveals no mass and no induration. He is otherwise well, has no anal pain and no bleeding, and attends clinic reliably.

- A Wide local excision of all visible lesions with primary closure
- B Chemoradiotherapy to the anal canal as for invasive squamous carcinoma
- C Abdominoperineal excision given the multifocal high-grade disease
- D Targeted ablative treatment of the high-grade lesions with continued high-resolution anoscopic surveillance
- E Observation alone with annual digital examination and no ablative treatment

**Q67** A 37-year-old man is admitted with palpitations and heat intolerance. He has lost 8 kg over four months. Examination shows a fine tremor, a diffusely enlarged smooth goitre with a bruit, and bilateral proptosis with lid retraction. Pulse is 118 beats per minute and irregularly irregular. Thyroid-stimulating hormone is undetectable, free thyroxine is three times the upper limit and thyroid receptor antibodies are strongly positive. He has been started on carbimazole and propranolol by the medical team, and the endocrine surgeons are asked to see him with a view to definitive treatment.

- A Render him euthyroid on antithyroid drugs before considering any operation
- B Proceed to total thyroidectomy within the next two weeks while he remains thyrotoxic
- C Perform urgent subtotal thyroidectomy leaving a 4 g remnant to avoid hypothyroidism
- D Arrange fine-needle aspiration cytology of the gland before planning surgery
- E Refer immediately for radioiodine ablation without further antithyroid drug treatment

**Q68** A 46-year-old woman is 5 hours out from an uncomplicated total thyroidectomy for a large multinodular goitre. She has been comfortable on the ward, eating and drinking. She now presses the buzzer complaining of a tight sensation in her neck and difficulty swallowing her saliva. On examination she is anxious, sitting forward, with a respiratory rate of 26 and oxygen saturations of 93% on air. Her voice is unchanged. The wound is tense and bulging, the neck circumference visibly increased, and the drain has stopped swinging. Her pulse is 118 beats per minute. Which is the most appropriate immediate management?

- A Give high-flow oxygen, nebulised adrenaline and intravenous dexamethasone, then observe
- B Request an urgent ultrasound of the neck to confirm a haematoma before intervening
- C Check serum calcium and PTH urgently and give intravenous calcium gluconate
- D Open the wound at the bedside, releasing skin and strap muscle sutures to evacuate the clot
- E Arrange immediate transfer to theatre for exploration under general anaesthesia, leaving the wound intact

**Q69** A 52-year-old man on haemodialysis for eleven years has secondary hyperparathyroidism with a parathyroid hormone of 1,850 ng/L, persistent hyperphosphataemia, intractable pruritus and progressive bone pain despite maximal cinacalcet and phosphate binders. Corrected calcium is 2.62 mmol/L. He is listed for renal transplantation but is not expected to receive a graft for at least two years. Ultrasound and sestamibi show enlarged glands at three of the four expected sites. He is fit for anaesthesia. Which is the most appropriate operation?

- A Focused excision of the single largest gland identified on imaging
- B Removal of the three glands seen on imaging, leaving the fourth unexplored
- C Bilateral exploration with subtotal parathyroidectomy, or total parathyroidectomy with forearm autotransplantation
- D Total parathyroidectomy with no remnant and no autograft
- E Defer surgery and continue medical therapy until after transplantation

**Q70** A 28-year-old woman presents to a district hospital on day 12 after the birth of her second child. She has been breastfeeding and for three days has had a painful, red, hard area in the upper outer quadrant of the left breast, with fever to 38.4 degrees Celsius and rigors. Examination shows a tender wedge of erythema and induration measuring about 6 cm, warm to touch, with no fluctuance and no palpable collection. The overlying skin is intact. Ultrasound of the area shows oedematous tissue with increased vascularity and no drainable fluid collection. Her white cell count is  $14.2 \times 10^9/L$ . The baby is feeding well from the right breast.

- A** Stop breastfeeding from the affected side, suppress lactation with cabergoline and start oral flucloxacillin
- B** Admit for intravenous vancomycin because rigors indicate methicillin-resistant *Staphylococcus aureus*
- C** Take the patient to theatre for incision and drainage of the inflamed segment
- D** Withhold antibiotics, apply cold compresses and reassess in one week if symptoms persist
- E** Start oral flucloxacillin, encourage continued feeding or expressing from the affected breast, and review in 48 hours

**Q71** A 46-year-old woman who has smoked fifteen cigarettes daily for twenty years is seen for the third time in eighteen months with a tender, indurated area at the areolar margin of the left breast. On the two previous occasions she was treated with antibiotics and a small abscess was aspirated. She is not lactating and her last child was born fourteen years ago. Examination shows periareolar induration with a small punctum discharging seropurulent fluid at the areolar edge, and slight slit-like nipple retraction. Ultrasound shows a 12 mm subareolar collection. Aspirate culture previously grew mixed anaerobes and *Bacteroides* species.

- A** Immediate total duct excision with fistulectomy as a single definitive procedure at this attendance
- B** Incision and drainage through a radial incision over the point of maximum tenderness with packing
- C** A four-week course of oral flucloxacillin alone without further intervention
- D** Urgent mammography and core biopsy of the subareolar area for suspected inflammatory carcinoma
- E** Aspiration under ultrasound guidance with co-amoxiclav, and a clear conversation that recurrence is likely unless she stops smoking

**Q72** A 43-year-old woman undergoes wide local excision of a 26 mm grade 2 invasive carcinoma of no special type in the left breast with sentinel node biopsy. She was clinically and sonographically node-negative before surgery and had no neoadjuvant therapy. Whole-breast radiotherapy is planned and she has consented to it. The tumour is oestrogen receptor positive and HER2 negative, with no ink on tumour at any margin. Final histology reports three sentinel nodes retrieved, two of which contain macrometastases measuring 4 mm and 7 mm, with no extranodal extension. She is otherwise fit with no comorbidity and is 43 years old and premenopausal.

- A No further axillary surgery; proceed to whole-breast radiotherapy and systemic therapy
- B Return to theatre for completion level III axillary lymph node dissection
- C Completion mastectomy with axillary dissection because two nodes are involved
- D Re-excision of the sentinel node bed only, without a formal dissection
- E Axillary dissection deferred until after adjuvant chemotherapy is completed

**Q73** A 64-year-old man with type 2 diabetes and a fifteen pack-year smoking history attends the general surgical clinic complaining of cramping pain in the right calf after walking about three hundred metres on the flat. The pain resolves within three minutes of stopping and has been stable for two years. He has no rest pain and no ulceration. Femoral pulses are palpable, the right popliteal pulse is weak and both pedal pulses are absent on the right. Resting ankle brachial pressure index is 0.72 on the right and 0.95 on the left. He is on a statin and an antiplatelet agent.

- A Refer for computed tomography angiography with a view to femoropopliteal bypass
- B Refer for angioplasty of the superficial femoral artery
- C Arrange urgent vascular review for suspected chronic limb-threatening ischaemia
- D Enrol him in a supervised exercise programme and optimise medical therapy and glycaemic control
- E Prescribe bed rest and limb elevation with review in six months



**Q74** A 62-year-old woman with type 2 diabetes of twenty years and end-stage renal failure attends the diabetic foot clinic. She has a two-centimetre ulcer over the plantar aspect of the left first metatarsal head, present for seven weeks, with surrounding callus but no erythema, fluctuance or discharge. She is afebrile. Pedal pulses are palpable. Ankle-brachial pressure index measures 1.4 on the left and 1.5 on the right. Monofilament sensation is absent to the mid-foot. Plain radiographs show no bone destruction and inflammatory markers are normal.

- A Measure toe pressure or transcutaneous oxygen tension, as the ankle index is falsely elevated by medial calcification
- B Report the ankle-brachial index as normal and treat the ulcer as purely neuropathic with offloading alone
- C Start empirical broad-spectrum antibiotics and repeat radiographs in two weeks for suspected osteomyelitis
- D Refer directly for below-knee amputation given the duration of ulceration and dialysis dependence
- E Arrange CT angiography of the lower limbs as the first investigation of perfusion

**Q75** A 76-year-old man is brought at four in the morning to a district hospital with sudden severe epigastric pain radiating to the back and one episode of syncope. He is grey and sweating. Blood pressure is 74/45 mmHg, pulse 118 and regular. The abdomen is distended with a tender pulsatile mass. The CT scanner is unstaffed overnight and the nearest tertiary vascular unit with endovascular capability is a hundred minutes away by road. There is no interventional radiology service and the single emergency theatre is free. Two large-bore cannulae are in situ and six units are being crossmatched.

- A Give two litres of warmed crystalloid to restore a systolic pressure above 100 mmHg before any transfer decision
- B Transfer immediately by road to the tertiary unit for CT angiography and endovascular repair, resuscitating en route
- C Wait for the on-call radiographer to arrive and perform CT to define the aneurysm neck before committing to surgery
- D Restrict fluids to maintain a systolic pressure around 70 mmHg and consciousness, and take him straight to theatre for open repair
- E Admit for palliative care on the grounds that open repair of a ruptured aneurysm is futile outside a vascular centre

**Q76** A 3-year-old girl attends the paediatric assessment unit with eight hours of intermittent screaming episodes during which she draws her knees up and goes pale. Between episodes she plays normally. Her mother reports one loose stool streaked with mucus and dark blood. She had a coryzal illness the previous week. On examination she is afebrile, well perfused, and there is a vague sausage-shaped mass palpable in the right upper quadrant. The abdomen is soft with no guarding. Ultrasound shows a target lesion of concentric rings in the right upper quadrant with no free fluid.

- A Laparotomy and manual reduction without attempting radiological reduction
- B Fluid resuscitation, then air enema reduction with a surgeon informed and available
- C Nasogastric decompression, intravenous fluids and observation for twenty-four hours
- D Contrast-enhanced CT of the abdomen to define a lead point before any intervention
- E Broad-spectrum antibiotics and repeat ultrasound in six hours to look for spontaneous reduction

**Q77** A 13-year-old boy presents with twenty hours of central abdominal pain that has shifted to the right iliac fossa, one episode of vomiting and anorexia. He has a temperature of 37.9 °C, tenderness with percussion rebound at McBurney's point and voluntary guarding. His white cell count is  $15.2 \times 10^9/L$  with a CRP of 48 mg/L. Ultrasound shows a non-compressible blind-ending tubular structure of 9 mm with surrounding fat echogenicity and no free fluid or collection. He has no comorbidity, is well perfused and has been given intravenous fluid and a single dose of co-amoxiclav in the emergency department.

- A Laparoscopic appendicectomy on the emergency list within the next several hours
- B Non-operative management with a seven-day course of intravenous then oral antibiotics
- C Contrast-enhanced CT of the abdomen to confirm the diagnosis before any operation
- D Interval appendicectomy in six weeks after a course of antibiotics now
- E Diagnostic laparoscopy deferred to the next elective list to avoid an out-of-hours operation

**Q78** A 6-year-old girl is admitted with thirty-two hours of right iliac fossa pain, anorexia and vomiting. She has a temperature of 38.6 degrees, a heart rate of 140 and localised tenderness with guarding in the right iliac fossa but no generalised peritonism. White cell count is  $21 \times 10^9/L$  and C-reactive protein 180 mg/L. Ultrasound performed by an experienced sonographer shows a 4 cm heterogeneous collection with an appendicolith in the right iliac fossa and adjacent matted bowel. She improves markedly after fluid resuscitation and intravenous piperacillin-tazobactam, and by the following morning is afebrile and eating.

- A** Continue intravenous antibiotics with clinical and biochemical monitoring, and consider drainage only if she fails to progress
- B** Proceed to laparoscopic appendicectomy today while she is systemically improved
- C** Perform an immediate open appendicectomy through a gridiron incision to remove the appendicolith
- D** Discharge on oral antibiotics today with outpatient review in six weeks
- E** Arrange right hemicolectomy because of the matted bowel and inflammatory mass

**Q79** A 39-year-old woman is referred by her general practitioner for consideration of bariatric surgery. Her body mass index is 32 kg/m<sup>2</sup> and has been stable for four years. She has type 2 diabetes of six years' duration treated with metformin and a GLP-1 receptor agonist, with an HbA1c of 68 mmol/mol. She also has treated hypertension and biopsy-proven steatohepatitis. She has completed two structured dietetic programmes with a maximum loss of 5 kg, regained within a year. She has no eating disorder, no substance misuse and works as a school administrator. She asks whether she is eligible for surgery at her weight.

- A** She is ineligible for metabolic surgery because her body mass index is below 35 kg/m<sup>2</sup>
- B** She should be offered surgery only if she first achieves a body mass index above 35 kg/m<sup>2</sup>
- C** She meets current criteria for metabolic surgery on the basis of her body mass index and inadequately controlled type 2 diabetes
- D** She should be entered into an investigational protocol, as surgery below a body mass index of 35 kg/m<sup>2</sup> is not accepted practice
- E** Only an adjustable gastric band may be offered at this body mass index

**Q80** A 61-year-old man with type 2 diabetes of eight years' duration, previously requiring 78 units of insulin daily plus metformin, undergoes uncomplicated laparoscopic Roux-en-Y gastric bypass. His body mass index before surgery was 38 kg/m<sup>2</sup> and his HbA1c was 8.1 per cent. Insulin was withheld on the morning of surgery. By the third post-operative day, taking free fluids only, his capillary glucose readings sit between 5.1 and 7.4 mmol/L with no insulin and no oral hypoglycaemic agent, and his recorded weight has fallen by 2 kg. He asks why his diabetes has improved before he has lost any meaningful weight.

- A Resection of the ghrelin-producing gastric fundus has directly restored beta-cell function
- B The improvement is entirely explained by the 2 kg of weight already lost and the fall in visceral fat
- C Rapid delivery of undigested nutrients to the distal small bowel augments postprandial GLP-1 and peptide YY secretion, enhancing insulin release
- D Carbohydrate is malabsorbed within the biliopancreatic limb, so less glucose reaches the circulation
- E This reflects the peri-operative fast and will reverse once he resumes a solid diet

**Q81** A 52-year-old man with type 2 diabetes of six years' duration and a body mass index of 36 kg/m<sup>2</sup> is reviewed in the metabolic clinic. He is on metformin and a sodium-glucose cotransporter 2 inhibitor, with an HbA1c of 8.4 per cent. Fasting C-peptide is preserved and islet autoantibodies are negative. He asks why an operation on the stomach and bowel should improve his diabetes before he has lost any appreciable weight, having read that patients come off insulin within days of gastric bypass. He wants a mechanistic explanation before consenting.

- A Bypassing the proximal intestine and delivering nutrient rapidly to the distal gut increases glucagon-like peptide-1 and other incretin signalling, with reduced ghrelin, before substantial weight loss occurs
- B The early improvement is entirely explained by the calorie deficit of the post-operative liquid diet
- C Surgery regenerates pancreatic beta cells, which is why autoantibody-positive patients respond equally well
- D The stomach is the principal site of insulin degradation, and reducing its volume prolongs insulin half-life
- E Remission is due solely to resolution of hepatic steatosis, which takes several months and explains the early change

**Q82** A 31-year-old woman presents to the emergency department with a four-day history of a painful swelling in the left axilla. She is otherwise well, takes no regular medication and is a non-smoker. On examination there is a 4 cm tender, fluctuant, erythematous swelling with a small central punctum and surrounding induration extending about 1 cm beyond the swelling. She is afebrile, heart rate 88 beats per minute, blood pressure 118/72 mmHg. White cell count is  $11.2 \times 10^9/L$  and C-reactive protein 46 mg/L. There is no cellulitis of the arm, no lymphangitis and no crepitus. What is the most appropriate management?

- A Incision and drainage of the abscess, with derroofing and irrigation of the cavity
- B Oral flucloxacillin for seven days with review in the surgical outpatient clinic
- C Ultrasound-guided needle aspiration and oral co-amoxiclav
- D Urgent contrast-enhanced computed tomography of the chest wall and axilla
- E Wide local excision of the axillary skin with primary closure

**Q83** A 57-year-old man with type 2 diabetes on insulin presents to a rural hospital at 23:00 with a 30-hour history of pain and swelling of the left leg. There is no CT scanner available until the morning, no interventional radiology and no intensive care bed; the nearest tertiary unit is two hours by road. He is confused, temperature  $38.6^\circ C$ , heart rate 128 beats per minute, blood pressure 84/50 mmHg after two litres of crystalloid. The leg shows dusky discolouration with two haemorrhagic bullae, and pain far exceeds the visible changes. Lactate is 5.2 mmol/L, white cell count  $24 \times 10^9/L$ , C-reactive protein 310 mg/L, sodium 128 mmol/L.

- A Resuscitation, broad-spectrum antibiotics with clindamycin, and immediate radical debridement in the local theatre
- B Broad-spectrum antibiotics, vasopressor support and immediate transfer by road for debridement at the tertiary unit
- C Await the morning CT to define the extent of fascial gas before committing to operation
- D Bedside incisional biopsy of the fascia and await frozen section before deciding on debridement
- E Calculate the LRINEC score and proceed to theatre only if it is 8 or above

**Q84** A 57-year-old woman is 24 hours after her first radical debridement of a Type II necrotising infection of the left flank and abdominal wall, with *Streptococcus pyogenes* grown from intraoperative tissue. She remains on noradrenaline 0.12 micrograms per kilogram per minute, lactate has fallen from 6.2 to 2.1 mmol/L, and she is on meropenem plus clindamycin. The wound edges show a further 3 cm of dusky, non-contractile tissue on the superior margin. There is discussion on the ward round about adjuncts. What is the most appropriate next step?

- A Continue current therapy and add intravenous immunoglobulin instead of re-operating
- B Arrange hyperbaric oxygen therapy before any further surgery
- C Apply negative pressure wound therapy to the existing wound and reassess in 72 hours
- D Stop clindamycin now that the organism is known to be penicillin sensitive and narrow to benzylpenicillin alone
- E Return to theatre for planned second-look debridement and continue clindamycin

**Q85** You are asked to insert an intercostal drain in a 54-year-old woman with a moderate right pleural effusion complicating community-acquired pneumonia. She is sitting up, arm abducted, and has been given local anaesthetic. A first-year trainee assisting you asks where the drain should enter and why. She has a normal clotting screen and a platelet count of 240. The effusion has been marked on bedside ultrasound at the mid-axillary line. She has no previous thoracic surgery and no chest wall deformity. She weighs 68 kg and her body habitus is unremarkable.

- A Seventh intercostal space, posterior axillary line, passing the needle along the upper border of the eighth rib
- B Fifth intercostal space, mid-axillary line, passing the needle along the upper border of the sixth rib
- C Second intercostal space, midclavicular line, passing the needle along the lower border of the second rib
- D Fifth intercostal space, mid-axillary line, passing the needle along the lower border of the fifth rib
- E Fourth intercostal space, midclavicular line, directing the needle inferiorly towards the diaphragm

**Q86** A 49-year-old man with poorly controlled type 2 diabetes is admitted with ten days of fever, malaise and left-sided pleuritic pain following a dental abscess. Temperature is 38.6°C, white cell count  $19.8 \times 10^9/L$ , C-reactive protein 288 mg/L. Chest radiograph shows a large left effusion. Thoracic ultrasound shows a septated collection with multiple fibrinous strands. A 14 Fr Seldinger drain is inserted and 300 mL of turbid, foul-smelling fluid drains, then output falls to under 20 mL per day. Repeat ultrasound at 72 hours shows persistent loculated fluid despite intravenous co-amoxiclav. He remains febrile and the drain flushes freely.

- A Replace the 14 Fr drain with a 28 Fr drain in the same tract
- B Administer intrapleural tissue plasminogen activator and DNase through the existing drain
- C Continue antibiotics alone and repeat imaging in a further 72 hours
- D Proceed directly to open thoracotomy and decortication
- E Administer intrapleural tissue plasminogen activator alone through the existing drain

**Q87** A 68-year-old man with severe emphysema, an FEV1 of 32% predicted and long-term home nebulisers is admitted with a right secondary spontaneous pneumothorax. A 14 Fr drain was inserted six days ago. The lung is 80% re-expanded but there is a continuous air leak on coughing and a persistent leak at rest. He is on nasal oxygen, mobilising slowly on the ward, and is not septic. Chest CT shows extensive bullous change bilaterally with no evidence of malignancy. He has had no previous pneumothorax. Cardiopulmonary assessment estimates a high perioperative risk. What is the most appropriate management?

- A Discuss with a thoracic surgeon for consideration of VATS bullectomy and pleurodesis, with chemical pleurodesis or a one-way valve as alternatives if he is judged unfit
- B Continue drainage for a further two weeks before any further decision
- C Remove the drain and manage conservatively, accepting the residual pneumothorax
- D Proceed directly to open thoracotomy, apical pleurectomy and bullectomy as the most durable option
- E Apply high-pressure wall suction at -40 cmH<sub>2</sub>O to accelerate closure of the air leak

**Q88** A 70-year-old man is seen in the emergency department with a tender, irreducible groin lump and vomiting. The registrar is uncertain whether this is an incarcerated inguinal or femoral hernia. She recalls a published paper in which one hundred consecutive patients presenting with an acute groin lump underwent bedside ultrasound by the on-call surgeon, and the ultrasound findings were compared against the operative findings at exploration the same day. The paper reports sensitivity, specificity and predictive values. Asked at the departmental teaching round to classify this study, she must name the design that most accurately describes it.

- A A cross-sectional diagnostic accuracy study against an operative reference standard
- B A retrospective case-control study of groin hernia
- C A prospective cohort study of hernia incidence
- D A randomised controlled trial of ultrasound-directed management
- E An uncontrolled case series describing bedside ultrasound

**Q89** A 59-year-old man is admitted with a tender, irreducible groin lump and vomiting to a rural hospital where the nearest CT scanner is ninety minutes away by road, there is no interventional radiology service and no intensive care bed. The consultant recalls a national registry analysis reporting that patients managed at hospitals performing more than fifty emergency hernia repairs per year had a mortality of 3 per cent, compared with 8 per cent at low-volume hospitals, adjusted for age and comorbidity. He wonders whether these data justify transferring the patient rather than operating now.

- A The registry establishes causation, so transfer is mandated by the evidence
- B Registry data risk residual confounding by case mix and referral patterns, and the transfer delay itself carries risk
- C Registry data are always superior to trial data because sample sizes are larger
- D Adjustment for age and comorbidity removes confounding, so the association can be treated as causal
- E The finding should be ignored entirely because registries contain administrative coding



**Q90** A 44-year-old man with a symptomatic pilonidal sinus is randomised in a non-inferiority trial comparing a novel minimally invasive endoscopic ablation against excision with flap closure. The pre-specified non-inferiority margin for one-year recurrence is 10 percentage points. In the intention-to-treat analysis the absolute difference in recurrence is 6.2 percentage points higher with ablation, with a 95 per cent confidence interval of minus 1.4 to 13.8 percentage points. The per-protocol analysis gives a difference of 4.1 points, interval minus 2.0 to 10.2. The authors declare non-inferiority. What is the correct interpretation?

- A Non-inferiority is demonstrated because the intention-to-treat interval includes zero
- B Non-inferiority is demonstrated because the per-protocol point estimate lies below the margin
- C Non-inferiority is not demonstrated, because the upper limit of the confidence interval crosses the pre-specified margin in both analyses
- D The trial should be reanalysed as a superiority trial, since the interval includes zero
- E Non-inferiority is demonstrated because intention-to-treat is conservative in a non-inferiority setting

**Q91** A 50-year-old woman has undergone breast-conserving surgery for a 15 mm grade 2 invasive ductal carcinoma of the right breast. Sentinel node biopsy retrieved three nodes, all negative. The definitive pathology report states that invasive carcinoma reaches the inked inferior margin over a 2 mm front; all other margins are clear by more than 5 mm. She is fit, has a good cosmetic result and is planned for whole-breast radiotherapy and endocrine therapy. She wishes to keep her breast if that is oncologically safe.

- A Re-excise the involved inferior margin as a targeted cavity shave
- B Proceed to whole-breast radiotherapy with a boost to the tumour bed and no further surgery
- C Convert to a mastectomy with immediate reconstruction
- D Complete an axillary lymph node dissection at the same sitting as any further breast surgery
- E Accept the margin and commence endocrine therapy alone, omitting radiotherapy

**Q92** A 60-year-old woman with well-controlled hypertension undergoes an elective laparoscopic sigmoid colectomy for a biopsy-proven adenocarcinoma of the sigmoid colon. She recovers uneventfully and is discharged on the fifth day. The pathology report describes a moderately differentiated adenocarcinoma invading the muscularis propria but not through it, with clear proximal, distal and radial margins. Seven lymph nodes were identified in the specimen, all free of tumour. The report is tabled at the multidisciplinary meeting. Her preoperative computed tomography of the chest, abdomen and pelvis showed no distant disease. What is the most appropriate next step in her management?

- A Ask the pathologist to re-examine the specimen for additional lymph nodes before deciding on adjuvant therapy
- B Accept the report as pT2 N0 and arrange routine surveillance alone
- C Return her to theatre for a completion left hemicolectomy with a more proximal vascular ligation
- D Start adjuvant capecitabine and oxaliplatin on the basis of the inadequate nodal yield
- E Arrange a positron emission tomography scan to exclude occult nodal disease

**Q93** A 39-year-old man with no comorbidity attends the surgical clinic with a pigmented lesion on the left calf that his partner noticed has changed over six months. It is 9 mm across, asymmetrical, with irregular borders and two shades of brown. There is no ulceration and no palpable inguinal or popliteal lymphadenopathy. He has fair skin, multiple naevi and a maternal uncle treated for melanoma. He works outdoors. Dermatoscopy suggests an atypical melanocytic lesion. He asks whether the lesion should be removed with a wide margin at the first operation.

- A Wide local excision with a 2 cm margin and simultaneous sentinel lymph node biopsy
- B Excisional biopsy with a 2 mm clinical margin down to subcutaneous fat, orientated along the limb
- C Incisional punch biopsy of the darkest area with the rest of the lesion left in situ
- D Shave biopsy of the surface to obtain tissue while preserving cosmesis
- E Photographic surveillance with review in three months before any biopsy

**Q94** A 75-year-old woman with well-controlled hypertension and mild chronic kidney disease is discussed at the colorectal multidisciplinary meeting. She has a biopsy-proven adenocarcinoma of the ascending colon, causing iron deficiency anaemia with a haemoglobin of 94 g/L, and no obstructive symptoms. Computed tomography of the chest, abdomen and pelvis shows a 5 cm caecal tumour, no enlarged regional nodes and no distant disease. Her performance status is 0 and she lives independently. The physiotherapist reports she climbs two flights of stairs without stopping. The meeting is asked for the most appropriate management.

- A** Laparoscopic right hemicolectomy with complete mesocolic excision and central vascular ligation
- B** Neoadjuvant chemotherapy for three months followed by reassessment and surgery
- C** Endoscopic mucosal resection of the caecal tumour
- D** Self-expanding metallic stent to the caecal tumour and surveillance
- E** Iron infusion and colonoscopic surveillance in six months given her age

**Q95** A 46-year-old man attends a general surgical clinic in a district hospital with a pigmented lesion on the upper back that his wife noticed had darkened and enlarged over six months. It measures 11 mm across, is asymmetrical with an irregular border and two shades of brown and black. There is no ulceration and no palpable axillary or cervical lymphadenopathy. He has no other skin lesions, no family history of melanoma and no comorbidity. Dermoscopy is not available locally, and the nearest specialist skin cancer service is a four-hour drive away.

- A** Punch biopsy of the darkest area to obtain a diagnosis before definitive surgery
- B** Excision biopsy with a 2 cm margin down to deep fascia at this visit
- C** Shave excision to confirm the diagnosis and preserve the cosmetic result
- D** Photograph the lesion and review in three months to document progression
- E** Excision biopsy with a narrow 2 mm margin including full thickness of skin and subcutaneous fat

**Q96** A 54-year-old woman is referred after an ultrasound performed for neck discomfort showed a 1.6 cm solid hypoechoic nodule in the right thyroid lobe with microcalcification and an irregular margin. Fine needle aspiration reports Bethesda category VI, papillary carcinoma. There is no cervical lymphadenopathy on ultrasound of both lateral compartments, no extrathyroidal extension, no hoarseness and no history of neck irradiation. Thyroid function is normal and the contralateral lobe is sonographically normal. She has two young children and asks whether she must lose the whole gland and take a tablet for life.

- A Right hemithyroidectomy with isthmusectomy
- B Total thyroidectomy with prophylactic bilateral central compartment dissection
- C Total thyroidectomy alone followed by routine radioiodine ablation
- D Active surveillance with six-monthly ultrasound
- E Right hemithyroidectomy with ipsilateral lateral neck dissection

**Q97** A 62-year-old woman with no comorbidity is found on CT performed for back pain to have a 2.8 cm cystic lesion in the body of the pancreas. MRCP shows a unilocular cyst that communicates with a main pancreatic duct measuring 6 mm. There are no mural nodules, no solid component and no jaundice. Serum CA 19-9 is normal, amylase is normal and she has never had pancreatitis. She has no weight loss and no diabetes. She is anxious and asks whether the cyst should be removed now.

- A Distal pancreatectomy with splenectomy now
- B Total pancreatectomy given main duct involvement
- C Percutaneous aspiration and alcohol ablation of the cyst
- D Discharge with no further imaging, as the cyst is benign
- E Endoscopic ultrasound with cyst fluid analysis and continued surveillance

**Q98** A 62-year-old woman on adjuvant chemotherapy for a node-positive breast cancer presents to the emergency department five days after her third cycle with fever of 38.7 degrees, rigors and vague right-sided abdominal pain. She is tachycardic at 116 beats per minute with a blood pressure of 98/56 mmHg. Her white cell count is  $0.8 \times 10^9/L$  with a neutrophil count of  $0.2 \times 10^9/L$ . Abdominal examination shows mild right iliac fossa tenderness without guarding or rebound. C-reactive protein is 180 mg/L and lactate is 2.4 mmol/L.

- A Await the CT report before starting antibiotics to avoid masking the diagnosis
- B Urgent laparotomy for suspected neutropenic enterocolitis
- C Granulocyte colony-stimulating factor and oral ciprofloxacin, with discharge and review in 48 hours
- D Blood cultures and broad-spectrum intravenous antibiotics within one hour, with fluid resuscitation
- E Diagnostic laparoscopy to exclude appendicitis before committing to antibiotics

**Q99** A 72-year-old man with ischaemic heart disease is reviewed with an incidentally detected 2.8 cm cystic lesion in the head of the pancreas, found during imaging for renal colic. He is asymptomatic, has never had pancreatitis and has no jaundice or weight loss. Magnetic resonance cholangiopancreatography shows a cyst communicating with a main pancreatic duct measuring 4 mm, with a 4 mm non-enhancing mural nodule and no thickened enhancing wall. Serum bilirubin is normal and CA 19-9 is 22 kU/L. He is anxious and asks whether he needs an operation.

- A Proceed to pancreaticoduodenectomy given the size of the lesion
- B Percutaneous aspiration of the cyst under computed tomography guidance
- C Discharge with no further imaging, as the cyst is benign
- D Enucleation of the cyst to obtain definitive histology while avoiding a Whipple
- E Endoscopic ultrasound assessment with consideration of fine needle aspiration, then surveillance if no high-risk feature emerges

**Q100** A 53-year-old woman is referred with a 9 cm painless mass in the left thigh, deep to the fascia lata, noticed six months ago and slowly enlarging. It is firm and fixed to deep structures. She has no constitutional symptoms and no comorbidity. The referring general practitioner has arranged an ultrasound showing a heterogeneous solid lesion with internal vascularity. She is seen in a general surgical clinic in a hospital with no sarcoma service; the nearest sarcoma unit is a four-hour drive away and accepts referrals within two weeks.

- A Referral to the sarcoma unit without prior biopsy, for cross-sectional imaging and image-guided core biopsy there
- B Excisional biopsy through a transverse incision to obtain a definitive histological diagnosis
- C Incisional biopsy through a longitudinal incision in the local hospital, then refer with the result
- D Fine-needle aspiration cytology to distinguish sarcoma from a benign lipomatous lesion
- E Interval ultrasound in three months to confirm continued growth before referral





SECTION III

# ANSWERS, WITH THE REASON- ING





Read the reasoning for the options you did **not** choose as well. Knowing why the other four are wrong is what separates a candidate who passes from one who recognises the right answer only when they see it.

**Q1 CORRECT ANSWER E**

This is the ilioinguinal nerve, which does not pass through the deep ring but pierces the internal oblique to enter the canal through its anterior wall.

Why: The ilioinguinal nerve lies on the anterosuperior surface of the cord and leaves through the superficial ring. It supplies the upper scrotum, root of the penis and a small strip of medial thigh. The genital branch of the genitofemoral nerve is the one that truly enters at the deep ring and runs within the cord to cremaster. Confusing the two is the classic examination trap.

Option A: The ilioinguinal nerve is correctly named but the route is wrong, as it never traverses the deep ring. Option E: Correct — it pierces internal oblique and joins the canal through the anterior wall, lying on the cord. Option B: The genital branch does enter at the deep ring, but it lies within the cord and supplies cremaster rather than running on the anterior surface. Option C: The iliohypogastric nerve runs above the canal and supplies the suprapubic skin, not the scrotum. Option D: The femoral branch passes beneath the inguinal ligament in the femoral sheath and supplies skin over the femoral triangle.

*The ilioinguinal nerve enters the inguinal canal through its anterior wall by piercing internal oblique, whereas the genital branch of the genitofemoral nerve is the only nerve that enters through the deep ring within the cord.*

*Standard descriptive anatomy of the inguinal canal*

**Q2 CORRECT ANSWER C**

The posterior wall of the inguinal canal is formed by the transversalis fascia throughout its length, reinforced medially by the conjoint tendon.

Why: The conjoint tendon is the fused aponeuroses of internal oblique and transversus abdominis, inserting on the pubic crest and pecten pubis. It buttresses the medial part of the posterior wall. A direct hernia pushes through this weakened medial area, within Hesselbach's triangle and medial to the inferior epigastric vessels. The described sac is lateral to those vessels, so it is indirect.

Option C: Correct — transversalis fascia forms the posterior wall, reinforced medially by the conjoint tendon. Option A: External oblique aponeurosis forms the anterior wall, not the posterior wall; the lacunar ligament is medial floor. Option B: The internal oblique contributes to the anterior wall laterally and to the roof, not the posterior wall. Option D: The iliopubic tract and femoral sheath lie inferiorly and are not the canal's posterior wall. Option E: Cremasteric fascia invests the cord and has no role in forming the canal wall.

*The posterior wall of the inguinal canal is transversalis fascia reinforced medially by the conjoint tendon; a sac lateral to the inferior epigastric vessels is indirect, medial is direct.*

*Applied anatomy of the inguinal canal and Hesselbach's triangle*

**Q3 CORRECT ANSWER C**

This is a hypochloraemic hypokalaemic metabolic alkalosis from gastric losses, and it is corrected with chloride-rich saline plus potassium.

Why: Vomiting and nasogastric aspiration lose hydrogen, chloride and potassium. The kidney cannot excrete bicarbonate while chloride and volume are depleted, so the alkalosis persists. Giving chloride and potassium allows bicarbonaturia and the pH self-corrects. The raised carbon dioxide here is appropriate respiratory compensation, not a primary problem.

Option C: Correct — it replaces the chloride, sodium, volume and potassium that were actually lost. Option A: Hartmann's contains lactate which is metabolised to bicarbonate and would worsen the alkalosis. Option B: Glucose 5 per cent provides negligible chloride or sodium and will not correct volume depletion. Option D: Bicarbonate would deepen an alkalosis that is already at pH 7.51. Option E: Albumin is a volume expander and supplies neither the chloride nor the potassium deficit.

*Hypochloraemic hypokalaemic metabolic alkalosis from gastric loss is saline-responsive and is treated with 0.9 per cent sodium chloride and potassium, not with bicarbonate.*

*Principles of fluid, electrolyte and acid-base management in the surgical patient*

**Q4 CORRECT ANSWER D**

This is hyperchloraemic metabolic acidosis from excessive 0.9 per cent saline, and the treatment is to change the fluid.

Why: The chloride is 116 with a normal lactate and a normal anion gap. That combination points to the fluid, not to sepsis or ischaemia. Saline contains 154 millimoles per litre of chloride, far more than plasma. High chloride also causes renal vasoconstriction and contributes to the oliguria. A balanced crystalloid corrects the physiology without masking anything.

Option A: Bicarbonate treats a number rather than a cause, and continuing saline perpetuates the chloride load. Option D: Correct, stopping the chloride load and reassessing volume treats the actual mechanism of the acidosis. Option B: A normal lactate, a soft abdomen and no fever make a leak unlikely, and a ninety-minute transfer carries real risk for a patient who does not need it. Option C: Furosemide produces urine without correcting perfusion or the acid-base disturbance and may worsen hypovolaemia. Option E: Fresh frozen plasma is a haemostatic product with no role in correcting a non-haemorrhagic acidosis.

*A normal anion gap acidosis with a high chloride and a normal lactate after days of 0.9 per cent saline is iatrogenic hyperchloraemic acidosis; change the fluid, do not chase a leak.*

*Principles of perioperative fluid and acid-base management*

**Q5 CORRECT ANSWER A**

An aberrant obturator artery arising from the inferior epigastric artery is the vessel that classically bleeds at the superomedial margin of the femoral ring.

Why: In a substantial minority of people the obturator artery arises from the inferior epigastric rather than the internal iliac. It then descends across the lacunar ligament to reach the

obturator canal. That course places it directly on the medial edge of the femoral ring. Blind division of the lacunar ligament to release a strangulated femoral hernia is how it is injured.

Option B: The superficial circumflex iliac artery runs in the subcutaneous plane laterally and is nowhere near the femoral ring. Option A: Correct — its aberrant course over the lacunar ligament places it exactly where the bleeding occurred. Option C: The deep circumflex iliac artery runs laterally along the iliac crest, well away from the medial ring. Option D: The superficial external pudendal artery is a small superficial vessel and would not bleed briskly at this depth. Option E: The lateral circumflex femoral artery arises from the profunda femoris below the inguinal ligament and lies laterally.

*The aberrant obturator artery crossing the lacunar ligament is the corona mortis, and the lacunar ligament should never be divided blindly when releasing a femoral hernia.*

*Applied anatomy of the femoral canal and femoral ring*

#### **Q6** CORRECT ANSWER **C**

This is capacitive coupling, produced by a hybrid metal port held in a non-conductive plastic sleeve.

Why: An activated monopolar instrument inside a metal cannula induces a current in that cannula. If the cannula is metal all the way through the abdominal wall, the induced charge dissipates safely over the large area of contact with tissue. A plastic anchoring sleeve insulates the metal from the abdominal wall, so the stored charge must discharge somewhere else. It does so into whatever viscus touches the cannula tip, producing a burn remote from the operative field.

Option A: Direct coupling requires the activated hook to touch the metal port, and here the hook was working at the liver bed. Option C: Correct — the hybrid metal-and-plastic port is the classic setup for capacitive coupling. Option B: A failing return plate burns the skin under the plate, not a distant intra-abdominal viscus. Option D: Ultrasonic thermal spread is confined to a few millimetres around the active blade and could not reach the left iliac fossa. Option E: Insulation failure produces a burn adjacent to the defect along the shaft, usually near the working field rather than at a port in a different quadrant.

*Never combine a metal laparoscopic cannula with a plastic anchoring sleeve; the hybrid arrangement traps capacitively coupled current and causes remote bowel burns.*

*Principles of electrosurgical safety, monopolar diathermy in laparoscopy*

#### **Q7** CORRECT ANSWER **A**

This is transfusion-related acute lung injury.

Why: It presents as acute hypoxaemia with non-cardiogenic pulmonary oedema within six hours of transfusion. The mechanism is donor anti-leucocyte antibody or bioactive lipid causing neutrophil-mediated capillary leak. The distinguishing feature here is a normal or low filling pressure with a normal blood pressure. Plasma is the highest-risk component.

Option B: Circulatory overload produces the same frothy oedema but with a raised central venous pressure, hypertension and a positive fluid balance, none of which is present. Option A: Correct — hypoxaemia with pulmonary oedema and normal filling pressures shortly after plasma transfusion is the defining picture. Option C: Acute haemolysis causes fever, haemoglobinuria, hypotension and coagulopathy rather than isolated pulmonary oedema. Option D: Anaphylaxis would be expected to produce urticaria, bronchospasm and profound hypotension, and none is described. Option E: Aspiration would have declared itself at induction rather than after the fourth unit some hours into a stable anaesthetic.

*Transfusion-related acute lung injury and circulatory overload both cause pulmonary oedema after transfusion; the discriminator is filling pressure, which is normal or low in lung injury and raised in overload.*

*Principles of transfusion medicine — classification of acute transfusion reactions*

#### **Q8 CORRECT ANSWER B**

This is refeeding syndrome, and the management is to reduce calorie delivery, aggressively replace phosphate, magnesium and potassium, and give thiamine.

Why: Prolonged starvation depletes total body phosphate, magnesium and potassium while serum levels remain deceptively normal. Reintroducing carbohydrate triggers insulin release, which drives these ions and glucose into cells. The resulting hypophosphataemia impairs adenosine triphosphate generation and 2,3-diphosphoglycerate synthesis, producing confusion, respiratory failure and arrhythmia. Thiamine is a cofactor for pyruvate dehydrogenase and is consumed rapidly once carbohydrate metabolism restarts.

Option A: Increasing calories accelerates the intracellular shift and is the direct cause of deterioration. Option B: Correct — it removes the driver, corrects the deficits and prevents Wernicke encephalopathy. Option C: Complete cessation for three days is unnecessary and prolongs malnutrition in a fresh anastomosis patient. Option D: Phosphate alone leaves the magnesium deficit, which itself perpetuates refractory hypokalaemia. Option E: Changing the route does not change the calorie load, which is the actual problem.

Starting at a quarter to half of requirement in high-risk patients, with daily electrolytes, prevents this entirely.

*Refeeding syndrome is driven by the calorie load, not the route; reduce feeding, replace phosphate, magnesium and potassium, and give thiamine before or with the first carbohydrate.*

*Principles of the metabolic response to starvation and refeeding*

#### **Q9 CORRECT ANSWER B**

Correct the ionised hypocalcaemia with intravenous calcium and rewarm, while continuing balanced product resuscitation.

Why: Citrate in stored blood chelates ionised calcium, and the liver cannot clear citrate quickly when it is cold and hypoperfused. Ionised calcium below about 0.9 mmol/L impairs both myocardial contractility and the coagulation cascade, since calcium is factor IV. Brady-

cardia with a prolonged QT after massive transfusion is citrate toxicity until proven otherwise. Hypothermia independently disables platelet function and enzyme kinetics, so rewarming is not optional.

Option B: Correct — it treats a reversible cause of both the cardiac depression and the ongoing coagulopathy. Option A: Red cells alone dilute clotting factors further and do nothing for the calcium or the temperature. Option C: Bicarbonate does not treat the primary problem, and it lowers ionised calcium further by increasing protein binding. Option D: Recombinant factor VII will not work in a cold, acidotic, calcium-depleted patient and carries thrombotic risk. Option E: Large-volume crystalloid worsens dilutional coagulopathy and is contrary to modern damage control resuscitation.

*Ionised calcium must be measured and replaced during massive transfusion — citrate chelation causes both myocardial depression and coagulopathy, and calcium is factor IV.*

*Principles of massive transfusion and damage control resuscitation*

#### **Q10** CORRECT ANSWER **D**

This is septic shock from an obstructed infected kidney; the immediate priorities are cultures, antibiotics and fluid resuscitation, with decompression arranged urgently in parallel.

Why: An obstructed infected system will not sterilise on antibiotics alone. Source control is therefore mandatory. But resuscitation and antimicrobials should not wait for the interventional suite. They run alongside the referral, not after it.

Option D: Correct — it delivers the sepsis bundle and secures source control without either step delaying the other. Option A: Withholding antibiotics to obtain a drainage specimen delays treatment in a patient who is already shocked. Option B: Vasopressors before any meaningful volume replacement treat the number rather than the hypovolaemia driving it. Option C: A six-hour observation period in obstructive pyonephrosis with shock risks irreversible deterioration. Option E: Ureteroscopy in an infected obstructed system raises intrarenal pressure and can precipitate overwhelming bacteraemia.

*In sepsis from an obstructed urinary tract, antibiotics and fluids do not substitute for decompression, and decompression does not justify delaying antibiotics — both happen at once.*

*Surviving Sepsis Campaign — International guidelines for sepsis and septic shock, 2026 (Intensive Care Med 2026;52:863-936)*

#### **Q11** CORRECT ANSWER **A**

The combination of tachycardia, a fallen systolic pressure, narrow pulse pressure, oliguria and agitation places him in class III haemorrhagic shock.

Why: Blood pressure only falls once roughly 30 to 40 per cent of blood volume is lost. Before that, the narrowing pulse pressure is the early warning sign. Urine output below 0.5 mL/kg/h and altered mental state confirm inadequate organ perfusion. A transient response to fluid means ongoing bleeding, most likely pelvic and femoral.

Option B: Class I involves under 15 per cent loss with a normal pulse, pressure and urine output. Option C: Class II gives tachycardia and a narrowed pulse pressure but preserves systolic pressure and mentation. Option A: Correct — hypotension with oliguria and agitation in a young man defines class III. Option D: Class IV is a moribund patient with negligible urine output and profound obtundation, which he is not yet. Option E: Neurogenic shock produces warm peripheries and relative bradycardia, not a cold clammy tachycardic patient.

*In a young patient, systolic blood pressure does not fall until roughly a third of the blood volume is lost — a narrowing pulse pressure and tachycardia are the earliest reliable signs of haemorrhagic shock.*

*ATLS classification of haemorrhagic shock*

### **Q12 CORRECT ANSWER C**

The narrowed pulse pressure with a preserved systolic blood pressure is the hallmark of class II haemorrhagic shock.

Why: Early blood loss raises systemic vascular resistance, so the diastolic pressure climbs and the pulse pressure narrows before the systolic falls. Tachycardia, anxiety and reduced urine output complete the picture. Systolic hypotension is a late and unreliable sign, particularly in the young. Haemoglobin measured early does not fall until dilution occurs.

Option A: Haemoglobin lags behind acute loss because whole blood is lost; a normal value is falsely reassuring. Option C: Correct — narrow pulse pressure with tachycardia and oliguria at roughly 15 to 30 per cent loss defines class II. Option B: She is not hypotensive by systolic criteria, so this does not describe her physiology. Option D: She is alert with some urine output, which excludes class IV. Option E: Her heart rate exceeds 100 and urine output is reduced, so class I is incorrect.

*A narrowing pulse pressure precedes systolic hypotension in haemorrhagic shock and is the earliest reliable haemodynamic warning.*

*ATLS classification of haemorrhagic shock*

### **Q13 CORRECT ANSWER D**

A rapid shallow breathing index of about 58 supports extubation, as values below 105 predict successful weaning.

Why: The index is respiratory rate divided by tidal volume in litres, so 22 divided by 0.38 gives roughly 58. It is the single best-validated bedside predictor of weaning outcome. It must be interpreted alongside the wider readiness criteria she already meets: resolving cause, adequate oxygenation, haemodynamic stability, adequate cough and neurological alertness.

Option D: Correct — well below the 105 threshold, indicating she is not breathing rapidly and shallowly. Option A: A negative inspiratory force of minus 10 is weak; values more negative than minus 20 to minus 30 are needed. Option B: A ratio of 180 indicates moderate hypoxaemia and argues against extubation, not for it. Option C: The cuff leak test is a pre-extubation assessment of laryngeal oedema and is useless after the event. Option E: A minute ventilation above about 10 litres reflects a high ventilatory burden and predicts failure.

*The rapid shallow breathing index is respiratory rate divided by tidal volume in litres; a value below 105 predicts successful extubation when the wider readiness criteria are also satisfied.*

*ATS/CHEST clinical practice guideline on liberation from mechanical ventilation*

**Q14 CORRECT ANSWER D**

Decompressive laparotomy with temporary abdominal closure is required for established abdominal compartment syndrome with organ failure.

Why: Intra-abdominal pressure above 20 mmHg with new organ dysfunction defines the syndrome, not merely hypertension. He has renal, respiratory and cardiovascular failure attributable to the pressure. Medical measures are for grade I to II hypertension or as a holding manoeuvre. In a hospital without CT or interventional radiology, delaying for imaging that will not change the decision costs organs.

Option A: A three-hour round trip with an unstable patient risks deterioration and the diagnosis is already made at the bedside. Option B: Paralysis and decompression of the gut are reasonable adjuncts at lower pressures but are insufficient once organ failure is established. Option D: Correct — decompression is definitive and the only intervention that reliably reverses the organ failure. Option C: Percutaneous drainage helps only when a large drainable fluid collection is the dominant cause, which is not the picture after resection and oedema. Option E: Raising perfusion pressure treats a number, not the mechanism, and twelve hours of anuria is unacceptable.

*Abdominal compartment syndrome is intra-abdominal pressure above 20 mmHg with new organ dysfunction, and once organ failure is established the treatment is decompressive laparotomy.*

*World Society of the Abdominal Compartment Syndrome consensus definitions and management*

**Q15 CORRECT ANSWER E**

The rapid shallow breathing index is respiratory rate divided by tidal volume in litres, giving 26 divided by 0.38, which is about 68 and favours extubation.

Why: An index below 105 predicts successful weaning with reasonable sensitivity. It is one component of readiness, alongside resolution of the precipitating illness, a cough strong enough to clear secretions, and adequate oxygenation on low settings. All of those are satisfied here. The index is a bedside calculation and needs no blood gas.

Option E: Correct — 26 divided by 0.38 gives about 68, comfortably below the threshold of 105. Option A: The interpretation is inverted; values above 105, not below, predict failure. Option B: A value of 15 would come from dividing by tidal volume in millilitres rather than litres. Option C: The index requires only respiratory rate and tidal volume, both available at the bedside. Option D: 105 is the accepted threshold, but the arithmetic here does not produce it.

*The rapid shallow breathing index is respiratory rate divided by tidal volume in litres, and a value below 105 during a spontaneous breathing trial predicts successful weaning.*

*Principles of weaning from mechanical ventilation — rapid shallow breathing index*



**Q16 CORRECT ANSWER A**

He has grade III intra-abdominal hypertension with new organ dysfunction, which is abdominal compartment syndrome, and decompressive laparotomy is the treatment.

Why: Abdominal compartment syndrome is a sustained intra-abdominal pressure above 20 mmHg with new organ failure. His oliguria and rising airway pressures are that organ failure. Every reversible medical measure has already been applied: he is sedated, paralysed, decompressed nasogastrically and not constipated. Delaying decompression once medical measures are exhausted converts a survivable problem into multi-organ failure.

Option B: Raising end-expiratory pressure treats the pressure reading, not the cause, and further impairs venous return. Option C: More crystalloid in a patient already eight litres positive raises intra-abdominal pressure and worsens the syndrome. Option D: Watchful waiting is only defensible while unused medical measures remain, and none remain here. Option A: Correct — surgical decompression with temporary closure is the definitive treatment for established compartment syndrome. Option E: Renal replacement supports the kidney but does not relieve the abdominal pressure driving the failure.

*Sustained intra-abdominal pressure above 20 mmHg with new organ dysfunction, after medical measures have been exhausted, mandates decompressive laparotomy with temporary abdominal closure.*

*World Society of the Abdominal Compartment Syndrome, definitions and management of intra-abdominal hypertension*

**Q17 CORRECT ANSWER A**

The Comprehensive Complication Index is the measure that captures the cumulative burden of all complications in one patient.

Why: Clavien-Dindo grades a single event by the treatment it required, so a patient with four complications is reduced to their worst one. The Comprehensive Complication Index weights every complication by its Clavien-Dindo grade and combines them on a scale from 0 to 100. That makes units with different complication counts comparable. It is more sensitive than the highest grade alone when comparing outcomes.

Option B: Grading only the worst event discards three of his four complications and understates his course. Option A: Correct — it aggregates all complications into one weighted, comparable figure. Option C: P-POSSUM predicts risk before or around surgery; it does not measure what actually happened. Option D: APACHE II is an intensive care admission severity score and is not a surgical morbidity measure. Option E: SOFA quantifies organ dysfunction over time in critical illness, not the burden of surgical complications.

*Clavien-Dindo grades a single complication by the treatment it needed; the Comprehensive Complication Index sums all complications into one 0 to 100 score and is the better measure of total morbidity burden.*

*Clavien-Dindo classification of surgical complications and the Comprehensive Complication Index*



**Q18 CORRECT ANSWER D**

He is at high risk of refeeding syndrome on unresolved shock, so the answer is electrolyte correction, thiamine and hypocaloric trophic feeding with slow escalation.

Why: Twelve per cent weight loss, four days of starvation and low phosphate and magnesium before any feed identify high refeeding risk. Delivering full calories precipitates a further intracellular shift of phosphate, potassium and magnesium with arrhythmia and cardiac failure. Separately, high-dose feeding during uncontrolled shock risks non-occlusive bowel ischaemia. Trophic feed maintains the mucosa without imposing that load.

Option A: Full-target feed in this patient is the textbook way to precipitate refeeding syndrome and bowel ischaemia. Option B: Early full parenteral nutrition adds infective and metabolic risk without outcome benefit when the gut is usable. Option C: Withholding nutrition entirely until vasopressors stop loses gut integrity and is not supported by current practice. Option D: Correct — it treats the refeeding risk first and introduces calories at a rate the patient can tolerate. Option E: Gastric feeding after oesophagectomy stresses the conduit and abandons the jejunostomy placed for exactly this purpose.

*Prolonged starvation with weight loss and low phosphate or magnesium mandates electrolyte correction, thiamine and hypocaloric trophic feeding before any approach to the caloric target.*

*ESPEN — Clinical nutrition in surgery*

**Q19 CORRECT ANSWER D**

Vaccination is only one part of the package: the asplenic patient also needs antibiotic prophylaxis, an emergency supply of antibiotics to start himself, an alert card or bracelet and annual influenza vaccination.

Why: Overwhelming post-splenectomy infection kills quickly and often begins away from hospital. He lives far from care and travels, so self-started antibiotics matter more, not less. The alert card tells any clinician he is asplenic when he cannot. Influenza vaccination reduces the secondary bacterial pneumonia that so often precedes it.

Option A: Vaccination alone leaves him without the antibiotic and alert components that address the acute febrile episode. Option B: Aciclovir targets viruses and has no role against the encapsulated bacteria that cause post-splenectomy sepsis. Option D: Correct — it is the complete package of prophylaxis, self-treatment, identification and annual influenza cover. Option C: Six-monthly repetition of the whole schedule is not the recommended interval and confers no additional protection. Option E: Weekly parenteral penicillin is impractical and is not the recommended route or interval for prophylaxis.

*Post-splenectomy care is vaccination plus antibiotic prophylaxis plus a standby emergency antibiotic supply plus a patient alert card plus annual influenza vaccination — vaccination alone is incomplete.*

*BSH — Prevention and treatment of infection in asplenic patients, 2024 (Br J Haematol 2024;204:1672-86)*

**Q20 CORRECT ANSWER C**

A haemodynamically stable child with an isolated grade III splenic injury and no contrast blush is managed non-operatively with inpatient observation.

Why: Non-operative management succeeds in the great majority of blunt splenic injuries in children. Haemodynamic stability, not the CT grade, is what selects the pathway. Children in particular have a higher rate of successful non-operative management than adults at any given grade. Observation must be inpatient, because failure declares itself in the first days through tachycardia, pain and a falling haemoglobin.

Option A: Splenectomy in a stable child sacrifices splenic function and lifelong immunity for no benefit. Option B: Embolisation is reserved for a contrast blush, a pseudoaneurysm or a high-grade injury, none of which is present. Option C: Correct — stability with no blush makes structured observation the appropriate management. Option D: Same-day discharge removes the serial examination that detects delayed failure. Option E: Laparoscopy is not required when there is no peritonism and CT shows no bowel or mesenteric injury.

*In blunt splenic injury it is haemodynamic status, not the AAST grade, that decides between operative and non-operative management.*

APSA — Blunt liver and spleen injury in children, 2023

**Q21 CORRECT ANSWER A**

Burn resuscitation is calculated from weight and burn area, front-loaded into the first eight hours from the moment of injury, and then titrated to urine output.

Why: The clock starts at injury, not at arrival, so time already elapsed is subtracted from the first eight-hour allocation. The formula gives only a starting estimate. Urine output is the practical endpoint that tells you whether to increase or reduce the rate. Over-resuscitation causes abdominal and limb compartment syndrome and is now as feared as under-resuscitation.

Option B: A fixed bolus followed by maintenance ignores the ongoing plasma loss across a 27 per cent burn. Option A: Correct — it uses the formula as a starting point, respects the injury-time clock and titrates to a physiological endpoint. Option C: Colloid from the outset is not standard practice in the first phase of burn resuscitation. Option D: Delaying fluid in a major burn produces avoidable acute kidney injury and shock. Option E: Spreading the volume evenly and starting the clock at admission under-resuscitates the critical early hours.

*In burn resuscitation the clock starts at the time of injury, half the calculated first 24-hour volume is given in the first 8 hours, and the formula is only a starting point titrated against urine output.*

ACS Committee on Trauma — Advanced Trauma Life Support, 11th edition (2025)

**Q22 CORRECT ANSWER C**

The patient has the full lethal triad and the operation should be abbreviated now.

Why: Hypothermia, acidosis and diffuse non-surgical bleeding define physiological exhaustion. Further operating time worsens all three. Temporary abdominal closure allows rewarm-

ing, product-based correction of coagulopathy and reassessment. Restoring continuity is deferred to a planned relaparotomy once physiology has recovered, usually within 24 to 48 hours.

Option A: Anastomoses performed in a hypothermic acidotic patient leak at high rates, and fascial closure risks abdominal compartment syndrome. Option B: Definitive repair in this physiology is the classic error damage control surgery exists to prevent. Option C: Correct — abbreviating the operation addresses the physiology that is actually killing him. Option D: Viscoelastic testing guides product choice but must not delay abbreviation of the operation. Option E: Skin-only closure risks compartment syndrome and a seven-day delay abandons the bowel for far too long.

*Hypothermia, acidosis and coagulopathy together mandate abbreviating the operation, not completing it.*

ACS Committee on Trauma — Advanced Trauma Life Support, 11th edition (2025)

### **Q23 CORRECT ANSWER E**

This combination of a seat-belt sign, free fluid without solid organ injury, mesenteric stranding and bowel wall thickening is a blunt hollow viscus or mesenteric injury until proven otherwise, and it needs operative inspection.

Why: Free intraperitoneal gas is present in only a minority of blunt bowel perforations, so its absence proves nothing. Unexplained free fluid with no solid organ injured is the single most useful CT sign. Delayed diagnosis of these injuries markedly increases sepsis and mortality, so the threshold for looking is low.

Option A: Serial observation and repeat imaging delay a diagnosis whose outcome worsens sharply with every hour of peritoneal soiling. Option E: Correct — the CT constellation is a recognised indication for operative or laparoscopic assessment of the bowel and mesentery. Option B: Embolisation addresses arterial bleeding, not devascularised or perforated bowel, and would leave the injury untreated. Option C: Discharge is unsafe because the absence of free gas does not exclude perforation and the seat-belt sign carries high risk. Option D: This is management for a duodenal haematoma, not for suspected jejunal perforation with mesenteric injury.

*Unexplained free fluid on CT with no solid organ injury after blunt trauma is a bowel or mesenteric injury until surgically excluded; absent free gas does not reassure.*

ACS Committee on Trauma — Advanced Trauma Life Support, 11th edition (2025)

### **Q24 CORRECT ANSWER E**

A persistently hypotensive patient with an unstable pelvis and a negative abdominal ultrasound is bleeding into the pelvis and needs preperitoneal packing with skeletal stabilisation.

Why: Most pelvic fracture bleeding is venous and from bone surfaces, which packing addresses directly. Angioembolisation treats arterial bleeding but is two hours away and she is not stable enough to travel. The negative ultrasound makes an intraperitoneal source unlikely,

so opening the peritoneum first would release the tamponade for no gain. External fixation reduces the pelvic volume and complements the packing.

Option A: Removing a binder in a bleeding patient with an unstable pelvis disrupts any clot that has formed and serves no clinical purpose. Option B: A laparotomy in the face of a negative abdominal ultrasound opens the peritoneum unnecessarily and can decompress the retroperitoneal tamponade. Option E: Correct — it is the intervention that can be delivered now, in this hospital, and addresses the likely venous source. Option C: A two-hour transfer at 84/50 mmHg with ongoing transfusion requirement is very likely to end in cardiac arrest en route. Option D: A patient who does not respond to blood products should not be sent to the scanner.

*In pelvic fracture haemorrhage with persistent hypotension and no angiography available, preperitoneal packing with external fixation is the definitive option — and the binder stays on.*

ACS Committee on Trauma — Advanced Trauma Life Support, 11th edition (2025)

#### **Q25 CORRECT ANSWER A**

Hard signs of vascular injury with a combined fracture mean theatre now, with a temporary shunt placed before the bone is fixed.

Why: Absent pulses with a cool pale limb are hard signs and require exploration, not imaging. In a combined vascular and skeletal injury the shunt restores perfusion within minutes and keeps the ischaemic clock from running while the orthopaedic team works. Fixing the bone first means an hour or more of continued ischaemia. Definitive repair is performed after fixation, when limb length is settled and the graft will not be torn or kinked.

Option B: Imaging delays revascularisation in a limb with hard signs where the diagnosis is already made. Option A: Correct — shunt first restores flow, then fixation, then definitive repair at settled limb length. Option C: A definitive graft placed before fixation risks disruption or inappropriate length once the femur is reduced. Option D: Fixing the femur first adds substantial ischaemic time to a limb that is already threatened. Option E: Anticoagulation and observation do not reperfuse an occluded artery and will cost the limb.

*In combined vascular and skeletal limb injury, insert a temporary vascular shunt first, then fix the skeleton, then perform definitive vascular repair — perfusion should never wait for orthopaedic fixation.*

ACS Committee on Trauma — Advanced Trauma Life Support, 11th edition (2025)

#### **Q26 CORRECT ANSWER C**

A main duct transection to the left of the mesenteric vessels is treated by distal pancreatectomy with proximal stump closure and drainage.

Why: Duct disruption is what determines management, and a neck transection leaves a short proximal remnant that closes safely. Resection removes the source of pancreatic leak in a single controlled step. Splenic preservation is reasonable when the physiology allows, but the

spleen is sacrificed without hesitation if it costs time. A complex reconstruction has no place in a patient who is already cold and acidotic.

Option A: Pancreaticoduodenectomy is indicated for combined duodenopancreatic and ampullary destruction, none of which is present here. Option C: Correct — it removes the disrupted segment and is the shortest definitive operation available. Option B: Drainage alone in a proven main duct transection produces a persistent high-output fistula. Option D: A pancreaticojejunostomy adds a fresh anastomosis and considerable time to a physiologically depleted patient. Option E: Duct-to-duct repair of a traumatised pancreatic duct does not hold and is not a recognised option.

*Main pancreatic duct disruption to the left of the superior mesenteric vessels is managed by distal pancreatectomy; drainage alone is reserved for injuries without duct involvement.*

WSES-AAST — Duodeno-pancreatic and extrahepatic biliary tree trauma, 2019 (Coccolini, World J Emerg Surg 2019;14:56)

#### **Q27 CORRECT ANSWER A**

Children with blunt splenic injury and stable physiology are managed non-operatively, and their monitoring is driven by physiology rather than by the CT grade.

Why: Non-operative management succeeds in the great majority of paediatric splenic injuries, including high-grade ones. Contemporary paediatric practice has moved away from grade-based bed rest protocols towards observation guided by haemodynamics and haemoglobin trend. She has been stable for three hours with no contrast blush. Preserving the spleen avoids lifelong susceptibility to encapsulated organisms.

Option B: Splenectomy in a stable child removes a functioning spleen unnecessarily and imposes lifelong infection risk. Option C: Embolisation has a smaller role in children and is not indicated without a blush or ongoing bleeding. Option A: Correct — physiology-guided non-operative management preserves the spleen and is the paediatric standard. Option D: Splenorrhaphy requires a laparotomy she does not need and offers no advantage over successful observation. Option E: Same-day discharge after a high-grade injury with haemoperitoneum forgoes the observation that makes non-operative management safe.

*Paediatric blunt splenic injury is managed non-operatively according to haemodynamic status and haemoglobin trend, not according to the CT grade.*

APSA — Blunt liver and spleen injury in children, 2023

#### **Q28 CORRECT ANSWER C**

This is uncomplicated adhesive small bowel obstruction without any feature of strangulation, so non-operative management with a water-soluble contrast challenge is the correct first step.

Why: He has a previous laparotomy, colicky pain, a soft abdomen and normal lactate. Nothing suggests ischaemia. Most adhesive obstructions of this type settle without an operation. The contrast study is both diagnostic and therapeutic. Passage of contrast into the colon within about 24 hours predicts resolution and lets you avoid a laparotomy that would itself create new adhesions.

Option A: Immediate laparotomy is for suspected strangulation or failed conservative care, neither of which is present. Option C: Correct — decompression plus contrast challenge is the standard opening move in uncomplicated adhesive obstruction. Option B: Neostigmine treats colonic pseudo-obstruction, not mechanical small bowel obstruction. Option D: Laparoscopy has a role in selected obstructions but not before an attempt at non-operative resolution in a stable patient. Option E: Laxatives and enemas do nothing for a mechanical small bowel obstruction and delay proper treatment.

*In adhesive small bowel obstruction without signs of strangulation, decompress, resuscitate and give a water-soluble contrast challenge before considering operation.*

WSES — Bologna guidelines for adhesive small bowel obstruction (ASBO), 2017 update (World J Emerg Surg 2018;13:24, PMID 29946347)

### Q29 CORRECT ANSWER E

A young woman with a high Alvarado score, a negative pregnancy test and classical localised signs can go straight to laparoscopic appendicectomy.

Why: A score of 9 puts the probability of appendicitis high enough that imaging will rarely change the plan. Computed tomography in a woman of this age adds ionising radiation to the pelvis for very little diagnostic yield. Laparoscopy is itself diagnostic and treats the gynaecological differentials it might reveal. Imaging earns its place in the equivocal band, not at the top of the score.

Option E: Correct, because the clinical probability is high and laparoscopy answers the diagnostic question and treats it in one step. Option A: Computed tomography is reasonable for an equivocal score but here it delays theatre and irradiates the pelvis for no change in management. Option B: Observation is for the equivocal patient, and it prolongs an inflamed appendix towards perforation in a patient already committed by her score. Option C: Antibiotic-first management is a shared decision for uncomplicated disease, not a discharge with unsupervised outpatient follow-up. Option D: Waiting a further 12 hours in a patient with localised peritonism risks perforation with no diagnostic gain.

*A high Alvarado score with a negative pregnancy test in a young woman justifies proceeding to laparoscopy without imaging; computed tomography belongs to the equivocal score.*

WSES Diagnosis and treatment of acute appendicitis — Jerusalem guidelines, 2025 edition

### Q30 CORRECT ANSWER B

An irreducible, tender inguinal hernia after failed taxis is an incarcerated hernia and requires emergency exploration.

Why: Vomiting with an irreducible tender hernia means bowel is in the sac and obstructed. Normal lactate does not exclude early ischaemia, since lactate rises late. Time spent on further reduction attempts is time the bowel spends without perfusion. Repeated forceful taxis also risks reducing a strangulated loop en masse into the abdomen, where the ischaemia continues unseen.

Option A: Deep sedation on a ward for forceful taxis risks reduction of dead bowel and unmonitored respiratory depression. Option B: Correct — exploration both relieves the obstruction and allows the bowel to be inspected. Option C: The diagnosis is clinical, and computed tomography only delays an operation that is already indicated. Option D: Overnight observation of an incarcerated hernia with vomiting risks a resection that early surgery would have avoided. Option E: Ice and an elective plan are for a reducible hernia; this one will not reduce.

A mesh may be used if there is no bowel resection and no contamination.

*An irreducible, tender hernia with obstructive symptoms goes to theatre; a normal lactate never justifies waiting.*

*European Hernia Society guidelines on groin hernia management*

### Q31 CORRECT ANSWER **E**

This is uncomplicated appendicitis on CT, and current guidance treats antibiotic-first management and appendicectomy as two defensible options to be chosen with the patient.

Why: The CT shows no perforation, no gas and no abscess, so this is uncomplicated disease. Antibiotics alone succeed in a substantial proportion of such patients, but a meaningful minority recur and come to appendicectomy later. Appendicectomy is definitive but carries operative and anaesthetic risk. The choice therefore turns on the patient's own priorities, and the conversation must be documented.

Option A: Appendicectomy is a reasonable choice, but presenting it as the only option ignores an established alternative for uncomplicated disease. Option E: Correct — it offers both evidence-based pathways and makes the decision jointly, which is what guidance requires. Option B: Interval appendicectomy is a strategy for complicated disease managed non-operatively, not a routine follow-on after antibiotics for uncomplicated appendicitis. Option C: Discharging without arranged review abandons a patient who has a real risk of failure or recurrence. Option D: MRI adds nothing when a diagnostic CT has already been obtained in a non-pregnant adult, and delays treatment.

*In CT-confirmed uncomplicated appendicitis, antibiotic-first management and appendicectomy are both acceptable, and the choice belongs to a documented shared decision with the patient.*

*WSES — Diagnosis and treatment of acute appendicitis — Jerusalem guidelines, 2025 edition (JAMA Surg 2026;161:283-295, PMID 41604201)*

### Q32 CORRECT ANSWER **C**

A small anterior duodenal perforation is treated by omental patch repair and lavage; nothing here justifies a larger resection or an acid-reducing operation.

Why: The operation has two jobs — close the hole and clean the abdomen. A 7 mm anterior defect is ideal for a patch. Definitive ulcer surgery has largely disappeared because proton pump inhibitors and *Helicobacter* eradication control acid far better than a vagotomy does. He must also stop the ibuprofen and be tested and treated for *Helicobacter* afterwards.



Option C: Correct — it closes a small defect reliably and removes the contamination driving his sepsis. Option A: Gastrectomy is a major resection with no advantage for a small perforation and high mortality in a septic, hypotensive patient. Option B: Vagotomy and pyloroplasty add operative time and morbidity to treat acid secretion that medical therapy now handles. Option D: Leaving purulent contamination unwashed accepts ongoing peritoneal sepsis for a theoretical concern. Option E: Pyloric exclusion is a damage control option for massive duodenal injury, not for a 7 mm ulcer perforation.

*Perforated peptic ulcer is treated by omental patch and lavage, followed by NSAID withdrawal, proton pump inhibitor and Helicobacter eradication — definitive acid-reducing surgery is obsolete.*

*WSES guidelines for the management of perforated peptic ulcer*

### **Q33 CORRECT ANSWER B**

In an obstructing left-sided colonic lesion without perforation or ischaemia in a fit patient, a stent decompresses the colon and allows a planned single-stage resection.

Why: Bridging avoids an emergency operation on an unprepared, dilated colon in an unoptimised patient. It converts a stoma-bearing emergency procedure into an elective resection with a much higher chance of primary anastomosis. The caecum at 9 cm is dilated but not at the diameter that mandates immediate decompression, and there is no free gas.

Option A: Hartmann's tonight commits a fit, independent woman to a stoma that stenting may allow her to avoid. Option C: Subtotal colectomy removes healthy colon and is reserved for caecal perforation or synchronous right-sided disease. Option B: Correct — decompression now, definitive resection after staging and optimisation. Option D: A permanent transverse colostomy leaves the obstructing lesion untreated in a patient fit for resection. Option E: Enemas and a nasogastric tube will not relieve a tight mechanical stricture and risk perforation while waiting.

*In obstructing left-sided colonic lesions without perforation or ischaemia, endoscopic stenting as a bridge converts an emergency operation into an elective, often stoma-free, resection.*

*WSES guidelines on the management of obstructing colon cancer, and ESGE guideline on colonic stenting*

### **Q34 CORRECT ANSWER B**

This is acute-on-chronic thrombotic occlusion of the superior mesenteric artery, and the priority is restoring flow before deciding what bowel to remove.

Why: Weight loss and postprandial pain give away the chronic atherosclerotic substrate; the ostial occlusion with calcification confirms thrombosis rather than embolus. Pain out of proportion to a soft abdomen is the classic early picture. Resecting bowel without revascularising leaves the remaining gut on the same failed axis. Bowel assessment follows reperfusion, not the other way round.

Option A: Heparin alone does not reopen a calcified ostial occlusion and wastes the window before infarction. Option C: Resection before revascularisation removes bowel that might recover and leaves the rest ischaemic. Option B: Correct — it restores perfusion first and



then allows an accurate viability assessment. Option D: Vasodilator infusion is the treatment for non-occlusive mesenteric ischaemia, not for a thrombosed origin. Option E: Medical management of chronic mesenteric ischaemia ignores an acute occlusion with a rising lactate. *In acute mesenteric ischaemia, revascularise before resecting; the pattern of occlusion distinguishes embolic, thrombotic and non-occlusive disease and dictates the intervention.*

*WSES guidelines on the diagnosis and management of acute mesenteric ischaemia*

### **Q35 CORRECT ANSWER C**

This is acute mesenteric venous thrombosis without established transmural infarction, and prompt systemic anticoagulation is the treatment.

Why: The presentation is subacute and non-specific, which is typical of venous rather than arterial ischaemia. The bowel wall still enhances and the lactate is normal, so the bowel is congested but not dead. Anticoagulation halts propagation and allows recanalisation in most patients. Surgery is for peritonitis or failure to improve, and resection removes bowel without treating the thrombus.

Option A: Resecting congested but viable bowel loses length that would have recovered with anticoagulation. Option C: Correct — anticoagulation is the primary treatment when there is no evidence of infarction or peritonitis. Option B: Antibiotics without anticoagulation allows the thrombus to propagate over the following week. Option D: Open venous thrombectomy is rarely feasible and is not first-line for this presentation. Option E: A portosystemic shunt addresses portal hypertension and its bleeding complications, not acute mesenteric venous occlusion.

*Mesenteric venous thrombosis with a viable, enhancing bowel wall is treated with prompt therapeutic anticoagulation; surgery is reserved for peritonitis or clinical deterioration.*

*WSES guidelines on acute mesenteric ischaemia*

### **Q36 CORRECT ANSWER C**

Non-operative treatment is a legitimate option for uncomplicated appendicitis, but it is the wrong option for a man who will be unreachable if it fails.

Why: Antibiotic treatment carries a real rate of recurrence and of treatment failure needing later appendicectomy. That risk is acceptable when a hospital is nearby and unacceptable when the patient will be at sea for months. Shared decision-making means telling him what happens if the antibiotics do not work and where he will be when that happens. Appendicectomy removes the future risk entirely and is a low-morbidity operation in a fit young man.

Option A: It applies the evidence without applying the context — access to rescue is part of the decision. Option C: Correct — it respects the shared decision but weights his complete lack of access to care if treatment fails. Option B: Planned interval appendicectomy is not the standard follow-up after antibiotics for uncomplicated disease. Option D: Discharging him to a ship with an inflamed appendix and oral antibiotics is the most dangerous option listed.

Option E: Doing nothing at all for radiologically confirmed appendicitis is not a recognised strategy.

*Non-operative treatment of uncomplicated appendicitis depends on the patient being able to return quickly if it fails — geography and access are part of the shared decision.*

*WSES — Diagnosis and treatment of acute appendicitis — Jerusalem guidelines, 2025 edition (JAMA Surg 2026;161:283-295, PMID 41604201)*

### **Q37 CORRECT ANSWER B**

Deliberate identification and preservation of the inguinal nerves is the standard that reduces chronic post-herniorrhaphy pain.

Why: Nerves that are never identified are the ones that get caught in a suture or trapped under a mesh edge. Awareness of all three nerves at open repair is associated with less chronic pain than routine division. Prophylactic neurectomy of a healthy nerve trades one problem for numbness and does not reliably prevent pain. Division is reserved for a nerve that is already injured or unavoidably in the way of the mesh.

Option A: Routine division of healthy nerves causes sensory loss without a proven reduction in chronic pain. Option B: Correct — identification with preservation and careful mesh placement is the evidence-based standard. Option C: Selective routine ilioinguinal neurectomy is still division of a healthy nerve and is not recommended as a default. Option D: Not looking for the nerves is exactly how they end up under a fixation suture. Option E: Chemical neurolysis has no role in elective inguinal hernia repair and risks a dense neuropathic deficit.

*At open inguinal repair, identify all three inguinal nerves and preserve them; divide only a nerve that is already damaged or genuinely obstructing correct mesh placement.*

*HerniaSurge — International guidelines for groin hernia management, 2018 (Hernia 2018;22:1-165, PMID 29330835)*

### **Q38 CORRECT ANSWER D**

An elective open repair reinforced with a preperitoneal mesh is the standard offer, because mesh roughly halves the recurrence rate even for small umbilical defects.

Why: Suture repair of umbilical hernia carries a recurrence rate of the order of one in five, and mesh reduces this substantially. A small flat mesh in the preperitoneal plane through the same short infraumbilical incision adds little morbidity. Recurrence risk relates to the defect and the tissue, not only to the size. She is symptomatic enough to want the lump dealt with and has no reason to defer.

Option A: Adult umbilical hernias do not close spontaneously — that is the paediatric natural history, not the adult one. Option D: Correct — mesh reinforcement in the preperitoneal position gives the lowest recurrence for the least added morbidity here. Option B: Suture repair alone is the historical operation and has a clearly higher recurrence rate than mesh. Option C: Intraperitoneal mesh with tacks is disproportionate for a 1.5 cm primary defect and exposes her to visceral adhesion risk. Option E: A support garment treats neither the defect nor her symptoms and simply defers the decision.

*Adult umbilical hernias do not close spontaneously, and mesh reinforcement lowers recurrence even in small defects, so a flat preperitoneal mesh is the default elective repair.*

*European Hernia Society guideline on the management of umbilical and epigastric hernia*

**Q39 CORRECT ANSWER E**

Even a small primary ventral defect has a lower recurrence rate when repaired with mesh, and a flat mesh in the preperitoneal or retromuscular plane is the standard.

Why: Suture repair of primary ventral and umbilical hernias carries a recurrence rate several times higher than mesh repair, and this holds down to defects of around 1 cm. The mesh needs only to be small, with a few centimetres of overlap in every direction. Placing it deep to the fascia distributes intra-abdominal pressure across the mesh rather than across the suture line. The operation remains a day case under local or general anaesthesia.

Option A: Suture repair alone is the option with the highest recurrence rate and is reserved for very small defects when mesh must be avoided. Option E: Correct — a small flat mesh in the preperitoneal or retromuscular plane gives the lowest recurrence for a defect of this size. Option B: Onlay placement works but involves wider subcutaneous dissection and more seroma and wound morbidity for no gain here. Option C: A laparoscopic intraperitoneal approach is disproportionate for a 15 mm epigastric defect and adds visceral and adhesion risk. Option D: Component separation is a technique for large or complex defects with loss of domain, not for a fingertip defect.

*Primary ventral and umbilical hernias should be repaired with mesh rather than suture alone even at defect sizes around 1 to 2 cm, because suture repair recurs several times more often.*

*European Hernia Society guideline on the treatment of umbilical and epigastric hernias*

**Q40 CORRECT ANSWER A**

This is an obstructed femoral hernia and she needs resuscitation and an operation tonight, not a scan ninety minutes away.

Why: A tender irreducible lump below and lateral to the pubic tubercle with small bowel obstruction is a femoral hernia until proven otherwise. The femoral ring is narrow and rigid, so strangulation risk is the highest of any groin hernia. CT would confirm what examination has already established and would cost hours of ischaemic time. Her tachycardia and raised lactate argue for theatre, not observation.

Option B: Transfer for imaging delays a decision that clinical examination has already made and risks infarcted bowel. Option C: Taxis of a tender femoral hernia risks reducing ischaemic bowel en masse into the abdomen where it cannot be inspected. Option A: Correct — timely operation through an approach giving access for resection is the only management that protects the bowel. Option D: Water-soluble contrast is a tool for adhesional obstruction, not for a mechanically obstructing hernia at a rigid ring. Option E: Confirming the diagnosis then deferring to an elective list ignores the obstruction in front of you.

*A tender irreducible groin lump below and lateral to the pubic tubercle with obstruction is a strangulating femoral hernia and warrants immediate operation, with no place for taxis or for imaging that delays theatre.*

*HerniaSurge — International guidelines for groin hernia management, 2018 (Hernia 2018;22:1-165, PMID 29330835)*

#### **Q41 CORRECT ANSWER D**

In a contaminated field with fascia that meets without tension, primary suture closure with washout is the right operation tonight.

Why: Faeculent spillage after a bowel resection makes this a contaminated case. Permanent synthetic mesh placed into that field risks infection, a chronic sinus and eventual explantation, and this hospital has no intensive care bed or radiology to rescue him if it goes wrong. The defect closes without tension, so mesh is not needed to bridge anything. A later hernia is a manageable elective problem; infected mesh in a rural hospital is not.

Option A: A permanent synthetic sublay mesh in gross faeculent contamination is the classic route to mesh sepsis.

Option B: An intraperitoneal composite mesh sits in the contaminated cavity itself and adds erosion into the fresh anastomosis to the list of risks.

Option D: Correct — tension-free primary closure avoids implanting foreign material into a contaminated field with no salvage capacity available.

Option C: Leaving the abdomen open is for physiological derangement or a hostile abdomen, not for a stable patient whose fascia closes.

Option E: An onlay mesh still lies in a wound contaminated by spillage and is prone to superficial infection and chronic sinus.

*In a contaminated emergency field where the fascia closes without tension, suture closure and washout beat implanting permanent synthetic mesh.*

*CDC surgical wound classification and principles of mesh selection in the contaminated field*

#### **Q42 CORRECT ANSWER C**

Transversus abdominis release with a retromuscular mesh is the appropriate technique for a W3 midline defect of this width.

Why: TAR extends the retromuscular plane laterally beyond the linea semilunaris, giving wide advancement of both the posterior and anterior layers. It achieves this without raising subcutaneous flaps, so the skin perforators are preserved and wound morbidity is lower than after anterior component separation. The retromuscular position also places a large mesh in a well-vascularised bed away from bowel. His smoking and glycaemic control should be optimised before surgery, but they do not change the technique.

Option A: A bridged intraperitoneal mesh without midline closure leaves the linea alba unrestored and has higher recurrence and eventration.

Option B: Anterior component separation works but devascularises the skin flaps and carries more wound complications than TAR.

Option C: Correct — it delivers the advancement needed for a 13 cm defect while keeping the skin envelope intact.

Option D: Suture repair alone of a defect above 4 cm recurs in more than a third of patients.

Option E: An onlay over a wide subcutaneous dissection combines a high seroma and infection rate with an inferior mesh plane.

*For EHS W3 midline incisional hernias, posterior component separation by transversus abdominis release with retromuscular mesh gives the advancement needed with less wound morbidity than anterior component separation.*

*European Hernia Society classification of primary and incisional abdominal wall hernias*

#### **Q43 CORRECT ANSWER C**

The third element of the critical view of safety is that only two structures — the cystic duct and cystic artery — are seen entering the gallbladder, with the lowest third separated from the cystic plate.

Why: The critical view has exactly three components. The hepatocystic triangle is cleared of fat and fibrous tissue. The lowest third of the gallbladder is dissected off the liver bed. Only two structures enter the gallbladder. It is a view to be attained, not a dissection to the common bile duct.

Option C: Correct — this is the third Strasberg criterion, and with the two steps already done it completes the view. Option A: The relationship of these structures to the common hepatic duct is not part of the definition and varies with anatomy. Option B: Circumferential dissection of the common bile duct is exactly what the critical view is designed to avoid, and devascularises the duct. Option D: Cholangiography is an adjunct when anatomy is uncertain, not a component of the critical view, and a normal cholangiogram does not exclude misidentification. Option E: Dissecting distally towards the common bile duct is the infundibular manoeuvre in reverse and is the classical route to a Strasberg E injury.

*The critical view of safety has three components: a cleared hepatocystic triangle, the lowest third of the gallbladder separated from the cystic plate, and only two structures entering the gallbladder.*

*SAGES multi-society guideline on safe cholecystectomy and prevention of bile duct injury, 2020 (Surg Endosc 2020;34:2827-2855)*

#### **Q44 CORRECT ANSWER E**

She has acute cholangitis with an obstructing ductal stone, and the definitive treatment is timely biliary drainage.

Why: Antibiotics treat the bacteraemia but do not relieve the obstruction that keeps producing it. Endoscopic drainage with sphincterotomy and stone extraction is the least invasive effective route and is available here. Her physiology is borderline rather than collapsed, so drainage within 24 hours is appropriate rather than immediately at the bedside. Cholecystectomy follows once the sepsis has resolved.

Option A: Cholangitis with an obstructed duct does not resolve on antibiotics alone and will progress to septic shock. Option E: Correct — drainage is the treatment; antibiotics are adjunctive. Option B: Open exploration is far more invasive than endoscopy in a septic patient when endoscopy is available. Option C: The duct is already dilated with a visible stone and clinical cholangitis; further imaging only delays drainage. Option D: Removing the gallbladder does not decompress the bile duct and adds an unnecessary anaesthetic during sepsis.

*In acute cholangitis, antibiotics buy time but biliary drainage is the treatment, and it should not be deferred for confirmatory imaging when the diagnosis is already clear.*

*Tokyo Guidelines TG18 (2018)*

#### **Q45 CORRECT ANSWER D**

This is severe acute cholangitis with organ dysfunction, and the priority is antibiotics plus resuscitation while biliary drainage is arranged at a centre that can deliver it.

Why: Cholangitis kills through undrained sepsis, so drainage is definitive, but it must be effective drainage. Nothing available locally tonight can decompress the duct safely. Antibiotics and resuscitation buy the hours needed for transfer, and she responded to initial fluids. Transfer must be requested immediately, not once she deteriorates.

Option D: Correct — resuscitate, cover with antibiotics and get her to drainage without delay. Option A: Open duct exploration in a septic, hypotensive patient in a hospital with no intensive care carries a very high mortality. Option B: Waiting for further deterioration in severe cholangitis wastes the only window she has. Option C: Cholecystectomy does not decompress the obstructed common bile duct and is the wrong operation. Option E: Percutaneous transhepatic drainage requires interventional radiology expertise that is not available here.

*In severe acute cholangitis, biliary drainage is definitive treatment — when it cannot be delivered locally, antibiotics and resuscitation are a bridge to immediate transfer, never a substitute for drainage.*

*Tokyo Guidelines TG18 (2018)*

#### **Q46 CORRECT ANSWER E**

This is Tokyo Grade III acute cholangitis, and the priorities are resuscitation, antibiotics and urgent biliary drainage at the receiving unit.

Why: Hypotension unresponsive to fluid and renal impairment define organ dysfunction, which is Grade III. The obstructed, infected duct will not be controlled by antibiotics alone, so drainage is not optional. What is negotiable is where it happens. Two hours of organ support and transfer is safer than a laparotomy at night in a hospital without critical care.

Option E: Correct — it stabilises him and delivers him to the service that can decompress the duct. Option A: An emergency duct exploration in a septic, hypotensive patient without an intensive care bed carries a very high mortality. Option B: Antibiotics without drainage in Grade III cholangitis is the classical route to a preventable death. Option C: Cholecystectomy

does not decompress an obstructed common bile duct and addresses the wrong problem tonight. Option D: A cholecystostomy drains the gallbladder, not the obstructed duct above a distal stone, and would not relieve his sepsis.

*In Grade III cholangitis the source of sepsis is the obstructed duct, so antibiotics and organ support are only a bridge to drainage — never a substitute for it.*

*Tokyo Guidelines TG18 (2018)*

#### **Q47 CORRECT ANSWER E**

This is Mirizzi syndrome with a cholecystocholedochal fistula, and safety lies in converting and performing a subtotal cholecystectomy rather than pursuing a plane that does not exist.

Why: The gallbladder wall has eroded into the duct, so the two structures share a wall by definition. Persisting with dissection in this plane is how the duct is transected. Subtotal cholecystectomy removes the stone and the diseased anterior wall while leaving the posterior wall on the duct. The residual defect needs formal repair or controlled drainage, and this is a decision to take with hepatobiliary help, not alone.

Option A: Continued dissection in a frozen triangle with a fistula is precisely the manoeuvre that produces a Strasberg E injury. Option B: Clipping the structure that looks most likely to be the cystic duct is the classical mechanism of major bile duct injury. Option E: Correct — convert, go subtotal, and manage the duct defect with specialist input. Option C: Endoscopic extraction cannot remove a 2 cm stone impacted in Hartmann's pouch with a fistula. Option D: A top-down approach still ends at the fused infundibulum and duct, and offers no protection here.

*In Mirizzi syndrome with a cholecystocholedochal fistula there is no safe plane between gallbladder and duct: convert, perform subtotal cholecystectomy and manage the duct defect deliberately.*

*SAGES multi-society safe cholecystectomy guideline, 2020 (Surg Endosc 2020;34:2827-2855); Strasberg classification of bile duct injury*

#### **Q48 CORRECT ANSWER B**

The collection is sterile necrosis in a patient who is improving, so nothing should be drained or given antibiotics.

Why: Fever, leucocytosis and a raised C-reactive protein are expected in the inflammatory phase and do not by themselves mean infection. His organ dysfunction is resolving and the C-reactive protein is falling, which argues against a developing infection. Intervening in sterile necrosis converts a sterile collection into an infected one. Enteral nutrition is the intervention that actually matters at this point.

Option B: Correct, because sterile necrosis in a clinically improving patient is managed conservatively. Option A: Routine aspiration adds a contamination risk and rarely changes management when the trajectory is improving. Option C: Drainage is indicated for infected necrosis or for confirmed complications, and ideally is postponed to allow the collection to wall off. Option D: Antibiotics without proven infection do not improve outcome and drive



fungal and resistant infection. Option E: Open necrosectomy at day 5 in unwallled necrosis carries the highest mortality of any option here.

*Fever and a raised C-reactive protein in the first week of necrotising pancreatitis usually reflect the inflammatory response, not infection; sterile necrosis in an improving patient is managed without drainage or antibiotics.*

*IAP/APA/EPC/IPC/JPS revised guidelines on acute pancreatitis (2025); Revised Atlanta classification of acute pancreatitis (2012)*

#### **Q49 CORRECT ANSWER B**

This is a fibrostenotic stricture without active inflammation, so mechanical treatment rather than medical escalation is required.

Why: Her calprotectin, inflammatory markers and MR appearances all point to fibrosis, not active disease. Fibrous tissue does not respond to immunosuppression or steroids. A short, accessible stricture can be treated by endoscopic balloon dilatation, and limited ileocaecal resection is the surgical equivalent. Either option addresses the obstruction that is actually causing her symptoms.

Option A: Biologics act on inflammation and will not open an established fibrotic stricture. Option C: Steroids carry harm and offer nothing when there is no inflammatory component. Option D: Extended resection with wide mesenteric clearance is oncological surgery and inappropriate in benign Crohn disease. Option B: Correct — resection or dilatation is the treatment for a symptomatic fibrostenotic stricture. Option E: Exclusive enteral nutrition improves nutrition and inflammation but does not relieve fibrotic narrowing.

*A Crohn stricture with normal calprotectin and no mural enhancement is fibrotic, and fibrosis is treated mechanically, not medically.*

*ECCO — Guidelines on therapeutics in Crohn disease — surgical treatment, 2024 (J Crohns Colitis 2024;18:1556-1582)*

#### **Q50 CORRECT ANSWER E**

Outpatient management without antibiotics is appropriate: this is CT-confirmed uncomplicated diverticulitis in an immunocompetent, systemically well patient who meets every outpatient criterion.

Why: Antibiotics in uncomplicated diverticulitis treat an inflammatory process, not an abscess. Randomised evidence has removed the obligation to give them to every patient. Her CRP is well below the threshold that predicts complicated disease, she is afebrile and she tolerates oral intake. Safety here comes from arranged review, not from an antibiotic.

Option A: Admission and intravenous antibiotics commit a well patient to hospital risk with no demonstrated benefit in uncomplicated disease. Option E: Correct — she satisfies the accepted outpatient criteria and has reliable follow-up if she deteriorates. Option B: Endoscopy during the acute episode risks perforation and should wait six to eight weeks. Option C: A reflex antibiotic course is the older paradigm and adds adverse effects without shortening recovery in this group. Option D: Elective resection is decided after recovery on symptom burden and fitness, never during a first uncomplicated attack.



*Uncomplicated CT-confirmed diverticulitis in an immunocompetent patient with a low CRP, no fever and adequate home support can be managed as an outpatient without antibiotics.*

WSES — Management of acute colonic diverticulitis in the emergency setting, 2020 update

#### **Q51 CORRECT ANSWER E**

The definitive solution for a symptomatic parastomal hernia in a fit patient who wants to be rid of the stoma is restoration of intestinal continuity.

Why: Reversal removes the stoma and its hernia in a single operation. It also removes the source of the leaks and skin damage. Assessment of the rectal stump and continence comes first, since a poor sphincter or an unusable stump would change the plan. Mesh or local repair only makes sense if the stoma has to stay.

Option A: Suture repair alone has the highest recurrence rate of the available options. Option B: Relocation exchanges one stoma site for another and leaves him with a bag he does not want. Option E: Correct — reversal treats the hernia and the stoma together in a patient fit for it. Option C: Appliance measures are reasonable for the unfit, but they are palliation, not treatment, in a working man. Option D: Keyhole mesh repair is a reasonable option only when a permanent stoma is unavoidable.

*When a parastomal hernia complicates a potentially reversible stoma in a fit patient, reversal is the definitive repair — assess the rectal stump and sphincter first.*

European Hernia Society guidelines on the prevention and treatment of parastomal hernias

#### **Q52 CORRECT ANSWER C**

Four short fibrotic strictures in a man who has already lost 40 cm of ileum are best treated by Heineke-Mikulicz strictureplasty at each site, which relieves obstruction while preserving bowel length.

Why: Strictureplasty is the bowel-sparing operation of Crohn surgery and is well suited to short fibrotic strictures under about 10 cm. Preserving length matters in a patient with prior resection and a lifetime of possible further surgery. The absence of sepsis, fistula and active inflammation makes the technique safe here. Malignancy at the site should still be excluded by biopsy if the appearance is atypical.

Option A: Resecting 90 cm to treat four short strictures squanders bowel he cannot afford to lose. Option C: Correct — it relieves each stricture individually and conserves the maximum length. Option B: The Michelassi technique is for long or closely clustered strictured segments, not four discrete short ones. Option D: A defunctioning stoma does not treat distal small bowel strictures and leaves the obstruction in circuit. Option E: Biologics do not reverse established fibrostenotic disease, and he is already obstructing with a normal C-reactive protein.

*Short fibrotic Crohn strictures under about 10 cm are treated by Heineke-Mikulicz strictureplasty to preserve bowel length, with resection reserved for phlegmon, fistula or a suspicious lesion.*

ECCO — Guidelines on therapeutics in Crohn disease — surgical treatment, 2024 (*J Crohns Colitis* 2024;18:1556-1582, PMID 38878002)

### Q53 CORRECT ANSWER **B**

In a stable, immunocompetent, well-nourished patient with purulent peritonitis from perforated diverticulitis, resection with primary anastomosis and a protecting loop ileostomy is the preferred operation.

Why: The diseased segment must come out, so a non-resectional option is not on the table. Between the two resectional strategies, primary anastomosis with a loop ileostomy leaves a far easier stoma to reverse than a Hartmann. Reversal of an end colostomy after a Hartmann is a laparotomy many patients never have. He has none of the features that would push you to a Hartmann: instability, immunosuppression or malnutrition.

Option A: Lavage alone leaves the perforation in situ and has been compared unfavourably with resection in randomised trials. Option B: Correct — it achieves source control and gives him the best chance of a temporary rather than permanent stoma. Option C: An inflamed diverticular perforation does not hold sutures, and patching it leaves the diseased segment behind. Option D: Damage control is for the physiologically deranged patient, and he corrected with fluid alone. Option E: Total colectomy removes healthy colon and is indicated for pancolonic disease, not a single perforated sigmoid.

*For Hinchey III perforated diverticulitis in a stable, immunocompetent patient, primary anastomosis with a loop ileostomy is preferred over Hartmann because the stoma is far more likely to be reversed.*

WSES — Management of acute colonic diverticulitis in the emergency setting, 2020 update

### Q54 CORRECT ANSWER **E**

Fulminant *Clostridioides difficile* colitis with vasopressor-dependent shock, a rising lactate and organ failure needs emergency colectomy, and delay to obtain imaging costs lives.

Why: The diagnosis is already established by toxin testing and the clinical picture. Imaging would not change the decision when there is shock, a lactate of 4.6 mmol/L and acute kidney injury after failed maximal medical therapy. Mortality in fulminant disease rises steeply with each hour of delay. Operating locally and retrieving afterwards is safer than a transfer that postpones source control.

Option A: Adding metronidazole to a regimen that has already failed does not address established organ failure. Option B: Faecal transplantation has a role in recurrent disease, not in fulminant colitis with shock. Option E: Correct — source control by colectomy is the only intervention that alters mortality at this stage. Option C: Transferring for a scan delays the operation and would not change the management. Option D: Vancomycin enemas are an adjunct when the colon is defunctioned, not a substitute for colectomy in shock.

*Fulminant *Clostridioides difficile* colitis with shock, rising lactate or organ failure requires emergency subtotal colectomy with end ileostomy; the decision is clinical and must not be delayed for imaging.*

WSES guidelines for the management of *Clostridioides difficile* infection in surgical patients

**Q55 CORRECT ANSWER C**

She should be offered clear fluids, including a preoperative carbohydrate drink, until two hours before the expected start of surgery.

Why: The evidence-based fasting rule is six hours for solids and two hours for clear fluids. Midnight fasting for an afternoon list produces fourteen hours without oral fluid and no safety benefit. Prolonged fasting worsens thirst, headache, insulin resistance and patient experience. Carbohydrate loading is a core preoperative ERAS element in a patient with no diabetes and no gastric emptying disorder.

Option A: Intravenous fluid treats the dehydration but perpetuates an unnecessary fasting rule and adds a cannula and cost for no gain. Option C: Correct — it matches the two-hour clear fluid rule and delivers the ERAS carbohydrate element safely. Option B: Solids require six hours, so a light breakfast at 11:00 would not clear before a 14:00 start. Option D: Rationing water to sips has no physiological basis and leaves her dehydrated and symptomatic. Option E: Reordering the list to accommodate an outdated fasting instruction fixes the symptom and not the error.

*Clear fluids are permitted until two hours before anaesthesia and solids until six hours; midnight fasting for an afternoon list is an avoidable harm, not a safety measure.*

*ERAS Society, enhanced recovery guideline for elective colonic surgery — preoperative fasting and carbohydrate loading*

**Q56 CORRECT ANSWER C**

The standard rule is six hours for solids and two hours for clear fluids, so solids at midnight and clear fluids until 06:30 are both acceptable for an 08:30 start.

Why: Prolonged fasting does not empty the stomach any further after six hours. It does cause thirst, headache, insulin resistance and hypoglycaemia in the elderly. Clear fluids leave the stomach within two hours, so restricting them overnight has no safety benefit. A preoperative carbohydrate drink two hours beforehand is an ERAS element in non-diabetic patients without delayed gastric emptying, but it must be given, not merely permitted.

Option A: Midnight fasting for fluids is the historical practice that ERAS pathways were designed to abolish and it confers no aspiration protection. Option B: A 06:00 solid meal is only two and a half hours before induction and breaches the six-hour solid rule. Option D: Setting solids at 02:30 needlessly wakes the patient and confuses the six-hour rule with the two-hour rule. Option E: Fluids up to arrival in the anaesthetic room leaves no defined two-hour interval and is unsafe. Option C: Correct, because it applies six hours for solids and two hours for clear fluids to an 08:30 list start.

*Preoperative fasting is six hours for solids and two hours for clear fluids; nil by mouth from midnight is obsolete and harmful.*

*ERAS Society guideline, colorectal surgery*

**Q57 CORRECT ANSWER E**

A shocked patient with a closed-loop large bowel obstruction needs resuscitation and a laparotomy tonight, with the anticoagulation managed around the operation rather than dictating it.

Why: The clinical and radiographic picture is a sigmoid volvulus with impending or established compromise. Delay to achieve a pharmacologically ideal coagulation profile costs bowel and costs lives. Renal impairment prolongs apixaban clearance, so waiting is even less attractive. Bleeding risk is real and is managed by surgical technique, warmth, calcium and a plan for reversal if catastrophic haemorrhage occurs.

Option A: Seventy-two hours of nasogastric decompression in a patient who is already tachycardic and hypotensive will end in perforation. Option B: Fresh frozen plasma does not reverse a factor Xa inhibitor and would simply delay theatre. Option E: Correct — timely source control with informed acceptance of bleeding risk is the decision that saves him. Option C: Vitamin K reverses warfarin, not apixaban, and the international normalised ratio does not track apixaban effect reliably. Option D: A ninety-minute transfer for imaging that will not change the need for laparotomy risks perforation en route.

*In emergency surgery for a compromised obstructed bowel, the timing of operation is set by the physiology, not by the anticoagulant washout interval.*

NELA — National Emergency Laparotomy Audit standards

**Q58 CORRECT ANSWER C**

Every one of her risk factors is modifiable and the operation is elective, so the correct answer is to optimise before operating rather than to accept the risk.

Why: Functional capacity below four metabolic equivalents predicts postoperative pulmonary and cardiac complications. Smoking cessation needs four to eight weeks to reduce respiratory complications, which the six-week window allows. Iron deficiency anaemia before major surgery is treated with iron, not with blood. Prehabilitation combining exercise, nutrition and psychological support is recommended for high-risk patients facing major resection.

Option A: Booking a high-dependency bed manages the consequences of risk without reducing any of it. Option C: Correct — deferral converts four modifiable risks into a lower-risk operation with no oncological penalty. Option B: Preoperative transfusion for treatable iron deficiency exposes her to transfusion risk and does not correct the deficiency. Option D: Angiography is not indicated in the absence of angina, an acute coronary syndrome or a positive functional test. Option E: Permanent cancellation abandons a repairable symptomatic hernia in a woman whose risk is reducible.

*Poor functional capacity, smoking and iron deficiency anaemia before elective major surgery are reasons to defer and optimise, not reasons to proceed with more monitoring.*

ERAS Society, prehabilitation recommendations within procedure-specific enhanced recovery guidelines

**Q59 CORRECT ANSWER B**

Cirrhosis-specific scoring gives a far better estimate of postoperative mortality than generic tools, and several of his risk factors are modifiable.

Why: Generic perioperative scores were not derived in cirrhotic populations and consistently underestimate risk. Dedicated scores incorporating hepatic synthetic function, the nature of the surgery and age give calibrated 30 and 90-day mortality estimates that support genuine informed consent. Ascites control is the single most important modifiable factor, since uncontrolled ascites drives wound dehiscence and recurrence. Nutritional depletion and sarcopenia compound the risk and are treatable.

Option A: The anaesthetic grade is a blunt instrument that does not discriminate between compensated and decompensated liver disease. Option B: Correct — it pairs a calibrated risk estimate with the modifiable factors that actually change outcome. Option C: Refusing repair leaves a recurrently incarcerating hernia that will eventually present as an emergency with far higher mortality. Option D: The cardiac index quantifies cardiac events and does not capture hepatic synthetic failure or portal hypertension. Option E: Symptoms justify repair but do not remove the obligation to quantify risk and optimise ascites first.

*Perioperative mortality in cirrhosis should be quantified with a cirrhosis-specific score rather than generic tools, and ascites control before elective repair is the most important modifiable factor.*

ACG — Perioperative risk assessment in cirrhosis, 2025 (Am J Gastroenterol 2025;120:1968-84, PMID 40899690)

**Q60 CORRECT ANSWER B**

A mechanical aortic valve prosthesis is a bridging indication; warfarin is stopped five days before and therapeutic low molecular weight heparin covers the gap.

Why: The evidence against bridging came from trials in non-valvular atrial fibrillation, and it does not transfer to mechanical valves. Valve thrombosis and prosthetic embolism are catastrophic and the thrombotic risk during an unprotected interval is real. The heparin is stopped around twenty-four hours before incision and restarted when haemostasis is secure. Reading the no-bridging message as universal is the trap here.

Option B: Correct — mechanical valve prostheses remain a bridging indication despite the change in practice for atrial fibrillation. Option A: Omitting bridging applies non-valvular atrial fibrillation evidence to a mechanical valve, where it does not hold. Option C: Direct oral anticoagulants are contraindicated in mechanical valve prostheses because of increased thromboembolism and bleeding. Option D: Operating at a therapeutic INR causes avoidable haemorrhage in an entirely elective case. Option E: Acute reversal at induction exposes him to a rebound prothrombotic state and is reserved for emergencies.

*The no-bridging evidence applies to non-valvular atrial fibrillation — mechanical valve prostheses still require therapeutic heparin bridging, and DOACs are contraindicated in them.*

ACCP antithrombotic therapy guidance, perioperative management of antithrombotic therapy

**Q61 CORRECT ANSWER E**

She needs objective confirmation of reflux plus a motility study before any antireflux operation is offered.

Why: Typical symptoms and a proton pump inhibitor response are suggestive but not diagnostic of pathological reflux. Roughly a third of patients referred for surgery on symptoms alone have no abnormal acid exposure. Manometry is needed to exclude achalasia masquerading as reflux and to choose between a total and a partial wrap. Endoscopy documents oesophagitis, hernia anatomy and any Barrett segment.

Option A: Operating without objective testing risks wrapping an oesophagus that is not refluxing or one that is achalasic. Option E: Correct — endoscopy, manometry and pH testing together confirm the diagnosis, define the anatomy and guide the choice of wrap. Option B: A barium swallow demonstrates anatomy but reflux of contrast is neither sensitive nor specific for pathological acid exposure. Option C: Refusing surgical assessment ignores a legitimate patient preference in a young woman facing decades of medication. Option D: Magnetic sphincter augmentation still requires proof of reflux and normal motility; reversibility is not a substitute for workup.

*No antireflux operation should be offered without endoscopy, high-resolution manometry and objective reflux monitoring, because symptoms alone misclassify a substantial minority of candidates.*

*SAGES — Guidelines for the surgical treatment of gastro-oesophageal reflux, 2021 (Surg Endosc 2021;35:4903-4917, PMID 34279710)*

**Q62 CORRECT ANSWER D**

Sepsis with surgical emphysema after fundoplication means an oesophageal or gastric perforation until proven otherwise, and CT with water-soluble oral contrast is the investigation that both confirms it and plans the operation.

Why: Perforation after antireflux surgery may be missed at operation or occur from a retraction injury or a suture line. Tachycardia, fever, oliguria and emphysema on day two is not normal postoperative pain. CT localises the leak, shows any collection and identifies wrap position. Delay converts a repairable defect into mediastinal sepsis.

Option D: Correct — it confirms and localises the leak and dictates whether reoperation or drainage is required. Option A: Observation in an oliguric septic patient with emphysema allows established mediastinitis to develop overnight. Option B: A normal chest radiograph does not exclude a contained leak and would falsely reassure. Option C: Endoscopy with forceful insufflation risks enlarging a fresh perforation and disrupting the wrap. Option E: The emphysema reflects a visceral leak, and a chest drain treats a consequence while ignoring the cause.

*Tachycardia, fever and surgical emphysema in the early days after fundoplication indicate perforation until excluded by contrast CT; postoperative pain is a diagnosis of exclusion.*

*SAGES Guidelines for the surgical treatment of gastro-oesophageal reflux, 2021*

**Q63 CORRECT ANSWER B**

Manometry and pH-impedance should be completed before revisional antireflux surgery is planned, even when the anatomical failure is already visible.

Why: Anatomy explains where the wrap is, not what her oesophagus can now do. Motility may have deteriorated since the index operation, and that determines whether the revision should be a complete or a partial wrap. pH-impedance also confirms that her recurrent symptoms are genuinely reflux rather than a functional or non-acid problem. Revisional surgery has a higher complication rate than a primary procedure, so the indication must be documented rather than assumed.

Option A: Operating on imaging alone risks reconstructing a wrap the oesophagus cannot empty against and revising symptoms that are not reflux. Option B: Correct — physiology completes the picture and determines the type of revision. Option C: Watchful waiting concedes a herniated wrap with dysphagia and oesophagitis that will not resolve medically. Option D: Dilating a herniated wrap does not correct the anatomy and risks perforating a reoperated hiatus. Option E: Bypass is a legitimate salvage option in selected patients, but not chosen before the workup that defines the problem.

*Recurrent symptoms after fundoplication require both anatomical and physiological assessment — endoscopy, contrast study, manometry and pH-impedance — before revisional surgery is planned.*

*SAGES — Guidelines for the surgical treatment of gastro-oesophageal reflux, 2021 (Surg Endosc 2021;35:4903-4917, PMID 34279710)*

**Q64 CORRECT ANSWER E**

These are Goligher grade I internal haemorrhoids, and conservative management with fibre and bowel retraining is the correct first step.

Why: Grade I means they bleed but do not prolapse, which is exactly what proctoscopy showed. Straining on hard stool is the driver here and it is modifiable. Fibre supplementation reduces bleeding episodes in grade I and II disease and costs the patient nothing in risk. Procedures remain available if she still bleeds at review.

Option A: Banding is the best office procedure for grade II and selected grade III disease, but it carries a real risk of secondary haemorrhage and vasovagal episodes that is not justified before conservative measures have been tried.

Option E: Correct — grade I disease with an obvious constipation driver is treated medically first.

Option B: Excisional haemorrhoidectomy is reserved for grade III and IV disease or failure of office treatment, and would be grossly disproportionate here.

Option C: Dearterialisation is an operative intervention under anaesthesia and has no place before first-line measures in non-prolapsing haemorrhoids.

Option D: Glyceryl trinitrate treats fissure-related sphincter spasm, and she has neither pain nor a fissure.

*Goligher grade I haemorrhoids bleed but do not prolapse, and are managed with fibre, fluid and defaecation retraining before any procedure is offered.*



ASCRS clinical practice guideline for the management of haemorrhoids

**Q65 CORRECT ANSWER A**

A thrombosed external haemorrhoid presenting within seventy-two hours of onset, at the peak of pain, is best treated by excision under local anaesthetic.

Why: Excision of the whole thrombosed cushion gives immediate relief and a lower rate of residual tag and recurrence than simply incising it. The window matters: after about three days the pain is already settling and conservative care is reasonable. He is twelve hours in and in severe pain, so this is the moment to operate. The procedure needs nothing the hospital lacks.

Option A: Correct — early excision removes the clot and its overlying skin and relieves pain immediately. Option B: A stab incision evacuates clot incompletely, leaving loculated thrombus and a high rate of re-thrombosis. Option C: Band ligation is for internal cushions above the dentate line and would be intolerable on somatically innervated anoderm. Option D: Conservative treatment is appropriate late in the natural history, but it means days of severe pain when he presents this early. Option E: There is no fluctuance, fever or induration to suggest abscess, and transfer would waste the operative window.

*Excise a thrombosed external haemorrhoid if the patient presents within about seventy-two hours and pain is severe; beyond that window, treat conservatively.*

ASCRS clinical practice guideline for the management of haemorrhoids

**Q66 CORRECT ANSWER D**

Multifocal high-grade anal intraepithelial neoplasia is treated by targeted ablation with ongoing high-resolution anoscopic follow-up.

Why: This is a precursor lesion, not an invasive cancer, so treatment aims to destroy dysplastic epithelium without sacrificing the anal canal. Ablation directed by high-resolution anoscopy achieves that lesion by lesion. Recurrence and new lesions are frequent in this group, which is why structured surveillance is part of the treatment rather than an optional extra. Any new pain, bleeding or induration must trigger biopsy for invasion.

Option A: Wide excision of multifocal circumferential disease risks anal stenosis and does not prevent new lesions. Option D: Correct — it clears the dysplasia while preserving anal function and keeps him under surveillance. Option B: Chemoradiotherapy is treatment for invasive carcinoma, and no biopsy here shows invasion. Option C: Radical excision with a permanent stoma is grossly disproportionate for intraepithelial disease. Option E: Pure observation in a man with multifocal high-grade lesions forgoes a treatment shown to reduce progression.

*High-grade anal intraepithelial neoplasia is managed by targeted ablation with high-resolution anoscopic surveillance, not by radical surgery or chemoradiotherapy, which are reserved for invasive disease.*

ASCRS clinical practice guideline on anal squamous neoplasms



**Q67 CORRECT ANSWER A**

A thyrotoxic patient must be rendered euthyroid before thyroidectomy, because operating on an uncontrolled gland risks thyroid storm.

Why: Surgical stress, anaesthesia and manipulation of the gland can precipitate a crisis with a mortality that is far from trivial. Antithyroid drugs plus a beta blocker restore biochemical control over several weeks. Only then is elective surgery safe. His atrial fibrillation is a manifestation of the thyrotoxicosis, not a separate reason to hurry to theatre.

Option B: Operating while frankly thyrotoxic is the classic avoidable cause of perioperative thyroid storm. Option A: Correct — biochemical control before operation is the single most important preoperative measure in Graves disease. Option C: Leaving a remnant in Graves disease carries a real recurrence rate and does not remove the need for preoperative control. Option D: Cytology has no role in a diffuse antibody-positive Graves goitre with no discrete nodule. Option E: Radioiodine is a legitimate definitive option but is not given to an uncontrolled patient with severe active eye disease.

*Never take a thyrotoxic patient to elective thyroidectomy before restoring euthyroidism, whatever the pressure on the list.*

*American Thyroid Association guidelines, hyperthyroidism and other causes of thyrotoxicosis*

**Q68 CORRECT ANSWER D**

This is a post-thyroidectomy haematoma with airway compromise, and the wound must be opened at the bedside without delay.

Why: The clot is under the strap muscles, so releasing skin sutures alone is not enough. Decompression relieves venous and lymphatic obstruction of the larynx, which is what actually closes the airway. Every minute spent moving the patient or confirming the diagnosis makes intubation harder. Formal exploration in theatre follows once the airway is safe.

Option D: Correct — immediate bedside decompression through skin and strap layers is the only intervention that acts fast enough. Option A: Steroids and nebulised adrenaline treat mucosal oedema but do nothing about an expanding clot compressing the neck. Option B: Ultrasound delays treatment for a diagnosis already made on clinical grounds at the bedside. Option C: Hypocalcaemia causes paraesthesia and tetany, not a tense bulging wound with rising neck circumference. Option E: Transferring an obstructing patient to theatre with the wound closed risks losing the airway in the corridor or on induction.

*A tense, expanding neck after thyroidectomy with respiratory distress is decompressed at the bedside through skin and strap muscles first; theatre comes second.*

*British Association of Endocrine and Thyroid Surgeons, guidance on the management of post-thyroidectomy haematoma*

**Q69 CORRECT ANSWER C**

Secondary hyperparathyroidism is four-gland hyperplasia, so the operation is bilateral exploration with either a subtotal resection or total parathyroidectomy plus autotransplantation.

Why: The driver is chronic hypocalcaemic stimulation of all four glands, not a single adenoma. Imaging that shows three glands reflects the limits of the test, not the disease. Both accepted operations leave viable parathyroid tissue, either as a vascularised remnant or as a forearm graft, so residual function can be modulated later. Waiting two years for a graft means two more years of bone disease and pruritus.

Option A: Focused excision treats one gland in a disease that involves all four and guarantees persistence. Option C: Correct — bilateral exploration with a preserved remnant or autograft addresses hyperplasia while retaining function. Option B: Trusting imaging to have found every gland leaves hyperplastic tissue behind and recurrence is the norm. Option D: Leaving no tissue at all produces adynamic bone disease and lifelong difficult calcium dependence. Option E: His disease is refractory to maximal medical therapy and the transplant is years away.

*Secondary hyperparathyroidism is four-gland hyperplasia and requires bilateral exploration with subtotal parathyroidectomy or total parathyroidectomy with autotransplantation, never a focused excision guided by imaging.*

AAES — Definitive management of primary hyperparathyroidism, 2016

#### **Q70 CORRECT ANSWER E**

This is uncomplicated lactational mastitis without abscess, and it is treated with an anti-staphylococcal antibiotic plus continued milk drainage.

Why: Staphylococcus aureus is the usual organism, so flucloxacillin is first line. Milk stasis drives the process, so effective emptying of the breast is as important as the antibiotic. Breast milk from an infected breast is safe for a healthy term infant. Early review matters because failure to settle within 48 hours suggests an abscess that ultrasound may have missed or that has since formed.

Option A: Stopping feeding worsens stasis and converts a treatable mastitis into an abscess. Option E: Correct — it treats the organism and removes the stasis that caused it, with planned reassessment. Option B: Rigors are expected in cellutic mastitis and do not by themselves indicate resistant organisms; empirical vancomycin is not first line here. Option C: There is no collection to drain, so surgery would achieve nothing and risk a milk fistula. Option D: Withholding antibiotics in a febrile woman with a rising white cell count invites abscess formation.

*Lactational mastitis is treated with flucloxacillin and continued drainage of the breast; failure to improve within 48 hours means re-imaging for an abscess.*

Association of Breast Surgery, guidance on the management of breast infection

#### **Q71 CORRECT ANSWER E**

The correct immediate step is ultrasound-guided aspiration with an antibiotic covering anaerobes, together with explicit smoking cessation advice.

Why: This is periductal mastitis, a smoking-associated disease of the subareolar ducts, not duct ectasia and not a lactational infection. The organisms are typically anaerobic and mixed, so co-amoxiclav is the appropriate cover. Aspiration preserves the skin and avoids the scarring that repeated formal drainage produces. Definitive duct surgery has a high recurrence rate while she continues to smoke, so cessation is the intervention that changes her outcome.

Option E: Correct — it drains the collection, covers the likely organisms and addresses the actual driver of recurrence. Option A: Duct excision in an actively infected field has poor healing and high recurrence in a continuing smoker. Option B: Formal incision through areolar skin risks a mammary duct fistula and a poor cosmetic result. Option C: Flucloxacillin does not cover the anaerobes that characterise periductal mastitis. Option D: Recurrent periareolar sepsis in a smoker with a punctum is a recognised benign pattern; inflammatory carcinoma presents with diffuse peau d'orange, not a discharging areolar punctum.

*Recurrent periareolar sepsis in a smoker is periductal mastitis: aspirate, cover anaerobes, and treat the smoking, because duct surgery in a continuing smoker recurs.*

*Association of Breast Surgery, guidance on the management of breast infection*

#### **Q72 CORRECT ANSWER A**

She meets the criteria under which completion axillary dissection can be safely omitted, so no further axillary surgery is required.

Why: The relevant criteria are a T1 or T2 tumour, one or two positive sentinel nodes, breast-conserving surgery, planned whole-breast radiotherapy and no neoadjuvant chemotherapy. She satisfies every one of them. Omitting dissection in this group does not compromise overall survival or locoregional control. It avoids lymphoedema, shoulder morbidity and sensory loss.

Option B: Completion dissection adds substantial arm morbidity without a survival or regional control benefit in exactly this patient group. Option A: Correct — every eligibility criterion for omitting completion dissection is satisfied here. Option C: The margins are clear and there is no indication to convert a successful conservation to mastectomy. Option D: Re-excising the sentinel node bed is neither a recognised operation nor an adequate axillary clearance. Option E: Deferring dissection until after chemotherapy does not remove its morbidity and is not a recognised strategy in this setting.

*Completion axillary dissection may be omitted for one or two positive sentinel nodes only when the tumour is T1 to T2, the patient had breast-conserving surgery with planned whole-breast radiotherapy, and no neoadjuvant chemotherapy was given.*

*ESMO Clinical Practice Guidelines, early breast cancer*

#### **Q73 CORRECT ANSWER D**

Stable intermittent claudication with an ankle brachial pressure index of 0.72 is treated first with supervised exercise and best medical therapy.

Why: Most claudicants never progress to limb-threatening ischaemia. Supervised exercise improves walking distance by promoting collateral flow and metabolic adaptation, without

procedural risk. Revascularisation is reserved for those whose lifestyle remains limited after a proper trial of exercise, or for those with rest pain or tissue loss. His cardiovascular risk is the real threat to his life, so statin, antiplatelet, glycaemic control and smoking cessation matter more than his leg.

Option A: Bypass exposes a stable claudicant to significant morbidity for a symptom that exercise usually improves. Option B: Angioplasty is a reasonable second-line option but should follow, not precede, a supervised exercise trial. Option D: Correct — supervised exercise with best medical therapy is the first-line treatment for stable claudication. Option C: There is no rest pain, tissue loss or critically low ankle pressure, so this is not limb-threatening ischaemia. Option E: Rest and elevation worsen perfusion and deconditioning, and are precisely the wrong advice.

*Stable claudication is managed with supervised exercise and cardiovascular risk reduction first; revascularisation is for failure of that or for limb-threatening disease.*

*ESVS guidelines, peripheral arterial disease*

#### **Q74 CORRECT ANSWER A**

An ankle-brachial index above 1.3 in a diabetic dialysis patient is uninterpretable, so perfusion must be assessed with toe pressure or transcutaneous oximetry.

Why: Medial arterial calcification makes the tibial vessels non-compressible. The cuff then records an artefactually high pressure that can conceal severe occlusive disease. Digital arteries are usually spared, so a toe pressure remains valid. A toe pressure below 30 mmHg defines chronic limb-threatening ischaemia and mandates urgent vascular referral for revascularisation planning.

Option B: Calling a value of 1.4 normal is the classic trap; it is a marker of calcification, not of good flow. Option A: Correct — toe pressure or transcutaneous oxygen tension bypasses the non-compressible tibial vessels. Option C: There is no erythema, fever or raised inflammatory markers, so blind antibiotics treat a diagnosis she does not yet have. Option D: Amputation before perfusion has even been measured forfeits a foot that revascularisation may well save. Option E: Angiography is a roadmap for intervention, not the first-line physiological test, and carries contrast risk.

*In diabetes or renal failure an ankle-brachial index above 1.3 means non-compressible calcified vessels and must never be read as normal; use toe pressure or transcutaneous oximetry instead.*

*ESVS guidelines, chronic limb-threatening ischaemia and diabetic foot*

#### **Q75 CORRECT ANSWER D**

A haemodynamically unstable ruptured aneurysm in a hospital with no CT and no endovascular service is a theatre decision, taken with permissive hypotension and no imaging.

Why: The clinical triad plus shock is sufficient to make the diagnosis. Any strategy that delays proximal aortic control — transfer, imaging, or aggressive fluid loading — costs contained retroperitoneal tamponade. Permissive hypotension, targeting a systolic pressure of roughly

50 to 70 mmHg with preserved consciousness, avoids dislodging the clot at the rupture site. Open repair with supraceliac control, then re-clamping infrarenally, is the operation available to a general surgeon here.

Option A: Filling him to a normal pressure disrupts the retroperitoneal clot and converts contained rupture into free haemorrhage. Option B: A hundred-minute transfer of an unstable patient wastes the only asset he has, which is time to clamp. Option D: Correct — controlled hypotension plus immediate laparotomy is the only strategy that offers survival in this setting. Option C: Imaging changes nothing when the patient is too unstable to survive the wait, and CT is for stable ruptures. Option E: In-hospital mortality after open repair of rupture is around thirty to forty per cent, which is not futility.

*In suspected ruptured aortic aneurysm with refractory hypotension, go straight to theatre with permissive hypotension; CT and transfer belong only to the haemodynamically stable patient.*

*ESVS guidelines, abdominal aortic aneurysm*

#### **Q76 CORRECT ANSWER B**

This is ileocolic intussusception in a stable child with no peritonitis, so non-operative reduction by air enema is the correct first treatment.

Why: Pneumatic reduction succeeds in the large majority of idiopathic ileocolic cases and avoids a laparotomy altogether. The only absolute contraindications are peritonitis, perforation and shock, none of which are present here. Perforation during the enema is uncommon but real, so a surgeon and theatre must be alerted before it starts. Adequate intravenous access and fluid loading come first, because reduction can precipitate a vagal response.

Option A: Operating first denies a stable child a reduction that usually succeeds without an incision. Option C: Intussusception does not reliably reduce with observation, and delay increases ischaemia and perforation risk. Option B: Correct — resuscitate, then reduce pneumatically with surgical cover immediately available. Option D: CT adds radiation and delay when ultrasound has already made the diagnosis in a typical age group. Option E: Antibiotics alone treat nothing here, and waiting for spontaneous resolution is not a management plan.

*In a stable child without peritonitis, ileocolic intussusception is reduced by air enema after resuscitation, with a surgeon and theatre on standby.*

*APSA clinical practice guideline, management of intussusception in children*

#### **Q77 CORRECT ANSWER A**

Ultrasound has confirmed uncomplicated acute appendicitis in a well child, and laparoscopic appendicectomy on the emergency list is the standard treatment.

Why: The diagnosis is secure on clinical findings plus a positive ultrasound, so further imaging adds radiation and delay without changing the plan. Appendicectomy remains the definitive treatment with the lowest treatment-failure rate. Operating within a few hours rather than immediately is safe in an uncomplicated case, which is why this belongs on the emergency list rather than in the middle of the night.

Option B: Antibiotics alone are an accepted option in selected children, but recurrence rates approach a quarter and this boy has no contraindication to surgery. Option A: Correct — confirmed uncomplicated appendicitis in a fit child is treated by prompt laparoscopic appendectomy. Option C: CT adds ionising radiation to a child in whom ultrasound has already been diagnostic. Option D: Interval appendectomy is a strategy for a contained appendix mass or abscess, not for simple appendicitis. Option E: Elective deferral risks progression to perforation, which changes both the operation and the complication rate.

*In a child with clinically convincing appendicitis and a diagnostic ultrasound, proceed to appendectomy — CT adds radiation without changing management.*

*WSES Jerusalem guidelines for diagnosis and management of acute appendicitis*

#### **Q78 CORRECT ANSWER A**

A walled-off appendiceal phlegmon or abscess in a child who is responding to antibiotics is managed non-operatively in the first instance.

Why: Operating in the middle of a dense inflammatory mass risks enterotomy, ileocaecal resection and a stoma in a child who would otherwise settle. Antibiotics alone resolve the majority of these collections. Percutaneous or transrectal drainage is reserved for a large or non-resolving abscess. An appendicolith raises the recurrence rate and is the usual reason to plan an interval appendectomy, but it does not force an operation now.

Option B: Laparoscopy into a phlegmon converts a settling illness into a difficult dissection with a real risk of bowel injury. Option A: Correct — antibiotics with close monitoring and selective drainage is the standard approach and preserves the ileocaecal region. Option C: An open gridiron approach to a matted mass carries the same risks as laparoscopy without the visualisation. Option D: She has only been improving for a matter of hours and needs a defined course with inpatient observation first. Option E: Right hemicolectomy for inflammatory matting in a child is a gross overtreatment of a benign process.

*A well-walled-off appendiceal mass in a child who is improving on antibiotics is treated medically, with drainage reserved for failure to settle and appendectomy deferred rather than forced.*

*APSA clinical practice guideline, appendicitis in children*

#### **Q79 CORRECT ANSWER C**

She is eligible. Current criteria support metabolic surgery at a body mass index of 30 to 34.9 kg/m<sup>2</sup> when there is an obesity-related comorbidity such as inadequately controlled type 2 diabetes.

Why: The indication is now driven by metabolic disease burden, not by a single weight threshold. Her diabetes remains poorly controlled on two agents after several years. She has additional comorbidity in the form of steatohepatitis and hypertension. Repeated supervised medical weight management has failed to give durable loss.

Option A: A rigid cut-off at 35 kg/m<sup>2</sup> is outdated and would deny a proven treatment to the group with the most to gain metabolically. Option C: Correct — it applies the comorbidity-

based indication to a patient with refractory diabetes at a body mass index above 30 kg/m<sup>2</sup>. Option B: Asking a patient to gain weight to qualify for an operation is clinically and ethically indefensible. Option D: Surgery in this range with comorbidity is accepted practice, not investigational; the investigational label applies to lower body mass index thresholds. Option E: Band placement has declining use because of erosion, slippage and inferior durable weight loss, and there is no reason to restrict her to it.

*Metabolic surgery is indicated at a body mass index of 30 to 34.9 kg/m<sup>2</sup> when an obesity-related comorbidity such as type 2 diabetes is inadequately controlled by medical therapy.*

*ASMBS/IFSO indications for metabolic and bariatric surgery*

#### **Q80 CORRECT ANSWER C**

The early glycaemic improvement after gastric bypass is an incretin effect, not a weight-loss effect.

Why: Nutrients reach the distal small bowel undiluted and undigested, driving L-cell secretion of GLP-1 and peptide YY. This amplifies glucose-stimulated insulin secretion within days of surgery. Acute energy restriction contributes by reducing hepatic fat and hepatic glucose output, but it does not explain the magnitude or the durability of the change. Sustained remission later depends on weight loss and improved peripheral insulin sensitivity.

Option A: The fundus is excluded rather than resected in a bypass, and ghrelin changes modulate appetite rather than restore beta-cell function. Option B: Two kilograms, largely fluid, cannot account for withdrawal of 78 units of insulin. Option C: Correct because the hindgut incretin response operates immediately and is the mechanism that distinguishes bypass from equivalent dieting. Option D: The biliopancreatic limb carries no food, and a standard bypass causes little true carbohydrate malabsorption. Option E: Fasting alone would not maintain euglycaemia off all agents, and in practice the improvement persists as he progresses to solids.

*Glycaemic control improves within days of Roux-en-Y gastric bypass through enhanced GLP-1 and peptide YY secretion from the distal gut, before any weight-dependent mechanism can operate.*

*ADA Standards of Care, metabolic surgery for type 2 diabetes*

#### **Q81 CORRECT ANSWER A**

The early glycaemic improvement is a hormonal effect of altered nutrient handling, not simply a consequence of weight loss.

Why: Rapid delivery of undigested nutrient to the distal small bowel augments glucagon-like peptide-1 and peptide YY secretion, which enhances insulin release and satiety. Excluding the proximal intestine removes signals that promote insulin resistance. Resection or exclusion of the fundus lowers ghrelin. Sustained remission then depends on the later effects of weight loss and improved insulin sensitivity, and it is more likely when diabetes is short in duration with preserved C-peptide.

Option B: Caloric restriction contributes but does not account for the magnitude or speed of the change after bypass. Option A: Correct — it describes the incretin and ghrelin mecha-



nisms that operate before meaningful weight is lost. Option C: Beta cell regeneration is not the mechanism, and autoantibody-positive type 1 diabetes does not remit after bariatric surgery. Option D: Insulin is cleared principally by the liver and kidney, not degraded in the stomach. Option E: Hepatic steatosis does improve, but on a timescale that cannot explain glycaemic change within days.

*Diabetes improvement after gastric bypass begins within days through incretin and ghrelin mechanisms driven by altered nutrient transit, and is sustained later by weight loss and improved insulin sensitivity.*

*ADA Standards of Medical Care in Diabetes, metabolic surgery section*

#### **Q82 CORRECT ANSWER A**

A fluctuant, well-localised cutaneous abscess is drained. Antibiotics do not resolve a collection of pus.

Why: Fluctuance plus a punctum means an established cavity. Antibiotics penetrate pus poorly, so drainage is the definitive treatment. In a systemically well patient with only a narrow rim of surrounding erythema, adjunctive antibiotics add little and are not routinely required. Send a pus swab so that a recurrence can be treated on culture data rather than guesswork.

Option A: Correct — drainage removes the pus, and deroofing prevents premature closure over a residual cavity. Option B: Antibiotics alone leave the collection undrained and the patient returns worse in forty-eight hours. Option C: Needle aspiration of a loculated cutaneous abscess has a high recurrence rate compared with formal drainage. Option D: Cross-sectional imaging adds nothing when the diagnosis is clinically obvious and superficial. Option E: Excisional surgery is an operation for recurrent hidradenitis, not for a first acute abscess.

*A fluctuant cutaneous abscess is treated by drainage; antibiotics are an adjunct for surrounding cellulitis or systemic features, never a substitute.*

*WSES guidance on skin and soft tissue infections*

#### **Q83 CORRECT ANSWER A**

The diagnosis of necrotising soft tissue infection is clinical and unequivocal here, so he needs resuscitation, antibiotics and radical debridement in the hospital he is standing in.

Why: Pain out of proportion, haemorrhagic bullae, dusky skin and septic shock are diagnostic enough. Time from presentation to first debridement is the strongest determinant of survival. Clindamycin is added for its antitoxin effect through suppression of exotoxin synthesis. Source control cannot wait for a scanner, a score or another hospital.

Option B: A two-hour transfer before any source control adds hours of untreated necrosis to a patient already in shock. Option A: Correct — resuscitation and radical debridement happen simultaneously, locally and now. Option C: Imaging is an adjunct when the diagnosis is uncertain, and here it is not; waiting until morning is indefensible. Option D: Frozen section adds delay in a patient whose clinical picture already mandates exploration. Option E: LRINEC is a screening adjunct, and a score below 8 never excludes necrotising infection.



*Necrotising soft tissue infection is a clinical diagnosis; when it is unequivocal, debride immediately in the hospital you are in rather than delaying for imaging, scores or transfer.*

*Surviving Sepsis Campaign — International guidelines for sepsis and septic shock, 2026 (Intensive Care Med 2026;52:863-936)*

**Q84 CORRECT ANSWER E**

Mandatory second-look debridement at 24 to 48 hours is the intervention here, and the dusky non-contractile margin confirms residual disease.

Why: Necrotising infection spreads along fascial planes beyond what looks abnormal at the first operation, and most patients need more than one debridement. Tissue that does not bleed or contract on stimulation is dead and must be excised. Clindamycin is continued for toxin suppression while the patient remains toxaemic, independent of penicillin sensitivity. Adjuncts are supplements to surgery, never alternatives to it.

Option E: Correct — re-exploration is planned practice after the index debridement and the margin findings make it mandatory. Option A: Immunoglobulin remains an adjunct of uncertain benefit and cannot substitute for excising necrotic tissue. Option B: Hyperbaric oxygen is not available urgently in most settings and must never delay a needed debridement. Option C: Negative pressure dressings are for the reconstructive phase once all necrotic tissue has been removed. Option D: Clindamycin is retained for its antitoxin effect against streptococcal superantigen while toxaemia persists, regardless of sensitivity.

*Second-look debridement at 24 to 48 hours is mandatory in necrotising soft tissue infection, and clindamycin is continued for toxin suppression while the patient remains toxaemic.*

*Surviving Sepsis Campaign — International guidelines for sepsis and septic shock, 2026 (Intensive Care Med 2026;52:863-936)*

**Q85 CORRECT ANSWER B**

The drain should enter through the triangle of safety at the fifth intercostal space in the mid-axillary line, with the needle passed along the upper border of the rib below.

Why: The intercostal neurovascular bundle runs in the costal groove on the inferior surface of each rib. Hugging the upper border of the lower rib keeps the needle away from it. The triangle of safety is bounded by the lateral border of pectoralis major, the anterior border of latissimus dorsi and the fifth intercostal space. Going below that level risks the diaphragm, liver and spleen.

Option A: The seventh space is below the triangle of safety and risks transdiaphragmatic placement into liver or spleen. Option C: The second space midclavicular line is the needle decompression site for tension pneumothorax, not a drain site, and hugging the lower border of a rib is exactly wrong. Option B: Correct — the triangle of safety with the needle on the upper border of the rib below avoids both the bundle and the diaphragm. Option D: The site is right but the trajectory is wrong and risks intercostal artery injury and haemothorax. Option E: A midclavicular fourth space entry crosses breast tissue and internal mammary territory, and aiming at the diaphragm is unsafe.

*Chest drains go in the triangle of safety at the fifth intercostal space, and the needle always rides the upper border of the lower rib because the neurovascular bundle sits under the rib above.*

*BTS — Guideline for pleural disease, 2023 (Thorax 2023;78:s1-s42, PMID 37433578)*

**Q86 CORRECT ANSWER B**

Combined intrapleural tissue plasminogen activator and DNase is the correct next step for a septated empyema that has stopped draining despite a patent tube.

Why: The drain is patent and flushing, so the problem is loculation, not tube position or calibre. Fibrinolysis alone breaks the septations but leaves viscous, DNA-rich pus that will not flow. DNase reduces that viscosity. The combination improves radiographic clearance and reduces surgical referral; neither agent alone does so.

Option A: Upsizing the tube does not help when the tube is patent and the fluid is trapped in separate locules. Option C: He is still septic at 72 hours, and antibiotics do not penetrate an undrained loculated collection adequately. Option B: Correct — septations plus viscous pus in a patent drain is precisely the setting where the combination works. Option D: Surgery is the answer if intrapleural therapy fails, not before it has been tried in a patient who is stable. Option E: Fibrinolytic monotherapy has not been shown to improve outcome and leaves the viscosity problem untreated.

*In a septated empyema with a patent but non-draining tube, give tissue plasminogen activator with DNase — neither agent alone is effective.*

*BTS — Guideline for pleural disease, 2023 (Thorax 2023;78:s1-s42, PMID 37433578)*

**Q87 CORRECT ANSWER A**

A persistent air leak at five to seven days is an indication for thoracic surgical referral, and the discussion must include less invasive alternatives given his physiology.

Why: The leak has failed to settle within the accepted window, so ongoing observation alone is no longer neutral. Referral does not commit him to a thoracotomy; it opens the options. In a patient with an FEV1 of 32% predicted, VATS with talc, chemical pleurodesis through the existing drain, or an endobronchial valve may all be preferable to a major resection. The decision is made jointly, not by default.

Option B: Two more weeks of drainage exposes him to infection, deconditioning and empyema with no evidence it will close. Option C: Removing the drain with a continuous leak in a patient with severe underlying lung disease risks rapid re-collapse. Option A: Correct — persistent air leak beyond five days mandates surgical discussion, with the least invasive effective option chosen for his physiology. Option D: Open thoracotomy is the most invasive choice and is poorly tolerated at this level of respiratory reserve. Option E: High-pressure suction does not reliably close leaks and may perpetuate flow through the fistula.

*A persistent air leak beyond five days after drainage of a secondary pneumothorax triggers thoracic surgical referral, and in poor-reserve patients the aim of that referral is to choose the least invasive effective option, not automatically to operate.*

BTS — Guideline for pleural disease, 2023 (Thorax 2023;78:s1-s42, PMID 37433578)

### Q88 CORRECT ANSWER **A**

This is a cross-sectional diagnostic accuracy study, because index test and reference standard are applied to the same patients at the same point in time.

Why: A diagnostic accuracy study asks how well a test classifies disease that is present now. Both ultrasound and operative findings were obtained on the same admission, so there is no follow-up period. That temporal structure is what makes it cross-sectional rather than a cohort. The reference standard here is the operation, which is the correct comparator for an anatomical diagnosis.

Option B: A case-control design would sample by known outcome and work backwards, which is not what happened here. Option A: Correct — index test and reference standard applied concurrently to a consecutive series is the defining structure of diagnostic accuracy work. Option C: A cohort study follows patients forward to an outcome that has not yet occurred, which this study does not do. Option D: Nothing was randomised and no management strategy was compared, so this cannot be a trial. Option E: A case series has no reference standard and cannot generate sensitivity or specificity at all.

*A study that applies an index test and a reference standard to the same patients at the same time is a cross-sectional diagnostic accuracy study, whatever the clinical setting.*

STROBE — Reporting observational studies, 2007

### Q89 CORRECT ANSWER **B**

Volume-outcome associations from registries are vulnerable to residual confounding, and the delay involved in transferring an obstructed hernia carries its own real risk.

Why: High-volume units differ from low-volume units in more ways than can be coded. They have different referral thresholds, anaesthetic support and critical care access. Adjusting for age and comorbidity leaves those differences untouched. In this patient, a delay of hours risks strangulation and resection.

Option A: Observational designs cannot establish causation regardless of sample size or statistical adjustment. Option B: Correct — it recognises residual confounding and weighs the concrete harm of delay. Option C: Size reduces random error but does nothing about systematic bias, which is the dominant problem here. Option D: Adjustment handles only measured confounders, and unmeasured case mix is the main threat in volume studies. Option E: Registries are valuable for rare outcomes and real-world practice, and dismissing them wholesale is not critical appraisal.

*Registry-derived volume-outcome relationships are hypothesis-generating; residual confounding by unmeasured case mix persists after statistical adjustment, and the risk of acting on them must be weighed against the risk of delay.*

STROBE — Reporting observational studies, 2007

**Q90 CORRECT ANSWER C**

Non-inferiority requires the entire confidence interval to lie on the acceptable side of the margin, and here the upper limits of 13.8 and 10.2 points both exceed 10.

Why: In a non-inferiority trial the decision rests on the confidence limit nearest the margin, not on the point estimate. Including zero shows only that superiority of the comparator was not proven. Convention requires both intention-to-treat and per-protocol analyses to support non-inferiority, because in this design intention-to-treat is biased towards the null and therefore towards a false claim of non-inferiority. Neither analysis excludes an unacceptable excess of recurrence.

Option A: Containing zero addresses superiority, not the non-inferiority question the trial was designed to answer. Option C: Correct — the margin is not excluded in either analysis, so the claim is unsupported. Option B: A point estimate below the margin is irrelevant when the interval crosses it. Option D: Post hoc conversion to a superiority framework abandons the pre-specified hypothesis and is not legitimate. Option E: Intention-to-treat is conservative in superiority trials but anti-conservative in non-inferiority trials.

*Non-inferiority is established only when the confidence limit closest to the margin excludes it, and both intention-to-treat and per-protocol analyses must agree.*

CONSORT — Reporting randomised trials, 2010

**Q91 CORRECT ANSWER A**

Tumour at the inked margin after breast-conserving surgery mandates re-excision, and a targeted shave of the involved inferior margin is the right operation.

Why: The accepted standard for invasive disease is no ink on tumour. Anything wider confers no additional local control benefit and costs cosmesis. Here the ink is involved, so this is a true positive margin. Radiotherapy does not compensate for residual macroscopic-front disease at the margin.

Option B: A radiotherapy boost does not substitute for clearing tumour that reaches the ink. Option C: Mastectomy is disproportionate when a single focal margin can be re-excised with a good cosmetic result. Option A: Correct — re-excising only the involved margin restores no ink on tumour while preserving the breast. Option D: The sentinel nodes were negative, so axillary dissection would add lymphoedema risk for no oncological gain. Option E: Omitting radiotherapy after conservation in a woman of this age, with a positive margin, substantially raises local recurrence.

*After breast-conserving surgery for invasive cancer, the margin standard is no ink on tumour; ink on tumour means re-excise, wider clearance adds nothing.*

SSO/ASTRO consensus guideline on margins in breast-conserving surgery with whole-breast irradiation

**Q92 CORRECT ANSWER A**

The specimen has been inadequately assessed, and the first move is to ask the pathologist to look again for further nodes.

Why: Twelve nodes is the accepted minimum for adequate nodal staging in colon cancer. A yield of seven means the patient may be understaged, not that she is node-negative. Re-examination of the fat, sometimes with fat clearance techniques, frequently retrieves further nodes. Only once the yield is adequate can node-negative status and the need for adjuvant therapy be decided.

Option B: Calling this a confident N0 ignores the fact that fewer than twelve nodes carries a real risk of understaging. Option A: Correct — re-examination is cheap, non-invasive and may convert an unreliable stage into a reliable one. Option C: Reoperation for nodal yield alone is not supported and exposes her to morbidity without demonstrated benefit. Option D: Chemotherapy is not automatic for a low nodal count in a pT2 tumour; the yield should first be corrected. Option E: Positron emission tomography does not reliably detect microscopic nodal disease and will not resolve a pathological staging problem.

*A nodal yield below twelve in colon cancer is a pathology problem to be corrected before it becomes a staging conclusion.*

*NCCN Guidelines, colon cancer*

#### **Q93 CORRECT ANSWER B**

A suspicious pigmented lesion is diagnosed by narrow-margin excisional biopsy; definitive margins are chosen afterwards, once Breslow thickness is known.

Why: You cannot select the correct wide excision margin until the pathologist gives you a thickness. A 2 mm margin removes the whole lesion without disturbing the lymphatics, so a later sentinel node biopsy remains accurate. Orientation along the limb allows a subsequent wide excision to be closed without a graft.

Option B: Correct — it gives full-thickness pathology, preserves staging accuracy and keeps reconstructive options open. Option A: Committing to a 2 cm margin before the thickness is known over-treats a thin lesion and may under-treat a thick one. Option C: Punch biopsy risks sampling error and can underestimate Breslow thickness, which drives every subsequent decision. Option D: Shave biopsy transects the base and destroys the single most important prognostic measurement. Option E: Delaying biopsy of a changing, clinically atypical lesion allows a thin curable melanoma to become a thick one.

*Suspected melanoma is biopsied by complete excision with a narrow 2 mm margin; Breslow thickness from that specimen then determines both the definitive excision margin and whether sentinel node biopsy is offered.*

*ESMO Clinical Practice Guidelines, cutaneous melanoma*

#### **Q94 CORRECT ANSWER A**

This is an operable, non-obstructed, non-metastatic colon cancer in a fit woman, and oncological resection is the standard of care.

Why: Age alone does not modify the treatment of colon cancer; performance status and physiological reserve do. A right hemicolectomy with high vascular ligation gives the specimen the

nodal yield needed for accurate staging. Twelve or more nodes is the accepted minimum for adequate pathological staging. Adjuvant chemotherapy is decided after histology, not before. Option A: Correct — oncological right hemicolectomy is the standard curative treatment for a resectable caecal cancer. Option B: Neoadjuvant chemotherapy is not standard for colon cancer outside a trial or locally advanced disease. Option C: Endoscopic mucosal resection cannot achieve an oncological clearance of a 5 cm invasive carcinoma or stage the nodes. Option D: Stenting is a treatment for obstruction, and a right-sided stent has no role in a patient with no obstructive symptoms. Option E: Surveillance abandons curative treatment in a fit, independent woman with a resectable cancer.

*Fitness and performance status, not chronological age, determine whether a patient with resectable colon cancer is offered curative resection.*

*NCCN Guidelines, colon cancer*

#### **Q95 CORRECT ANSWER E**

A suspicious pigmented lesion should undergo full-thickness excision biopsy with a narrow clinical margin, because Breslow thickness on the whole lesion determines the definitive margin and the need for sentinel node biopsy.

Why: Partial sampling can miss the thickest part of the tumour and give a falsely reassuring Breslow depth. A narrow margin is deliberate: it removes the lesion intact without disturbing lymphatic drainage, which would compromise later sentinel node mapping. Definitive wide excision is a second, planned procedure once the pathology is known.

Option A: A punch biopsy samples one area and may underestimate the true Breslow thickness. Option B: A 2 cm margin at the outset is over-treatment for a lesion of unknown thickness and disrupts lymphatic mapping. Option E: Correct — it gives intact pathology for Breslow staging while preserving the option of sentinel node biopsy. Option C: Shave excision transects the deep aspect of the lesion and makes Breslow thickness unmeasurable. Option D: Watching a lesion with clear clinical features of melanoma allows the tumour to thicken and worsens prognosis.

*Any lesion suspicious for melanoma is removed by full-thickness excision biopsy with a narrow margin, because Breslow thickness measured on the whole lesion drives every subsequent decision.*

*ESMO Clinical Practice Guidelines, cutaneous melanoma*

#### **Q96 CORRECT ANSWER A**

A lobectomy with isthmusectomy is appropriate for a unifocal papillary carcinoma between 1 and 4 cm with no extrathyroidal extension, no nodal disease and no irradiation history.

Why: Oncological outcomes for this low-risk group are equivalent to total thyroidectomy. Lobectomy avoids bilateral recurrent laryngeal nerve risk and permanent hypoparathyroidism. Most patients remain euthyroid afterwards and need no replacement. Completion thyroidectomy remains available if the final histology shows adverse features.

Option B: Prophylactic central dissection in a clinically node-negative neck adds parathyroid and nerve morbidity without proven survival benefit. Option C: Total thyroidectomy with routine ablation over-treats low-risk disease and commits her to lifelong replacement. Option A: Correct — it matches the risk category, preserves thyroid function and keeps completion surgery in reserve. Option D: Surveillance is considered for subcentimetre papillary microcarcinoma, not a 1.6 cm cytologically malignant nodule. Option E: Lateral neck dissection is a therapeutic operation for proven nodal disease, absent on imaging here.

*Unifocal papillary thyroid carcinoma of 1 to 4 cm with no extrathyroidal extension and a node-negative neck can be treated by lobectomy, with completion thyroidectomy held in reserve for adverse histology.*

*American Thyroid Association guidelines, differentiated thyroid cancer*

#### **Q97 CORRECT ANSWER E**

Endoscopic ultrasound with fluid analysis followed by surveillance is correct because this cyst has a worrisome feature but no high-risk stigma demanding immediate resection.

Why: A duct of 5 to 9 mm and a cyst of 3 cm are worrisome features under the Fukuoka framework, not absolute indications to operate. High-risk stigmata are obstructive jaundice, an enhancing mural nodule of 5 mm or more, and a main duct of 10 mm or more. Worrisome features mandate endoscopic ultrasound to look for nodules and mural irregularity. Resection follows only if that examination is positive.

Option A: Distal pancreatectomy commits a fit woman to pancreatic insufficiency and splenectomy before the assessment is complete. Option E: Correct — it completes the evaluation of a worrisome feature before any irreversible decision. Option B: Total pancreatectomy is a decision of last resort and is grossly disproportionate here. Option C: Ablation is not standard care and destroys the tissue needed for diagnosis in a potentially premalignant lesion. Option D: Discharging a main-duct-communicating mucinous cyst ignores its malignant potential.

*Worrisome features in a pancreatic cystic neoplasm trigger endoscopic ultrasound, whereas high-risk stigmata such as jaundice, an enhancing nodule of 5 mm or more, or a main duct of 10 mm or more trigger resection.*

*IAP — Fukuoka consensus on IPMN, 2017*

#### **Q98 CORRECT ANSWER D**

Neutropenic sepsis is a medical emergency and empirical broad-spectrum antibiotics must be given within one hour of presentation.

Why: Mortality rises with every hour of delay in this group. The physical signs of intra-abdominal sepsis are blunted because there are no neutrophils to generate peritonism, so a soft abdomen never excludes serious pathology. Imaging and cultures should proceed in parallel with treatment, never before it. Neutropenic enterocolitis is usually managed medically unless there is perforation, uncontrolled haemorrhage or clinical deterioration despite maximal support.



Option D: Correct — antibiotics within the first hour after cultures is the intervention that changes mortality here. Option A: Delaying antibiotics for imaging in a hypotensive neutropenic patient is the commonest avoidable cause of death in this situation. Option B: Laparotomy without evidence of perforation carries very high mortality in a profoundly neutropenic patient. Option C: Oral antibiotics and discharge are unsafe in a patient who is hypotensive with a lactate above 2 mmol/L. Option E: Laparoscopy before resuscitation and antibiotics inverts the priorities and risks a septic induction of anaesthesia.

*Neutropenic sepsis requires blood cultures and broad-spectrum intravenous antibiotics within one hour; absent peritonism does not exclude intra-abdominal pathology because the inflammatory response is abolished.*

*ESMO Clinical Practice Guidelines, management of febrile neutropenia*

#### **Q99 CORRECT ANSWER E**

This branch-duct intraductal papillary mucinous neoplasm carries worrisome features but no high-risk stigmata, so endoscopic ultrasound assessment followed by surveillance is correct.

Why: High-risk stigmata that mandate resection are obstructive jaundice with a head cyst, an enhancing mural nodule of 5 mm or more, and a main duct of 10 mm or more. This lesion has none of them. Size of 3 cm and a small non-enhancing nodule are worrisome features, and these prompt endoscopic ultrasound rather than immediate surgery. In a 72-year-old with cardiac disease the balance clearly favours assessment before resection.

Option A: Pancreaticoduodenectomy carries substantial morbidity and is not justified by worrisome features alone. Option E: Correct — endoscopic ultrasound refines the risk before any decision to operate. Option B: Percutaneous aspiration risks tract seeding and gives poor diagnostic yield in a mucinous lesion. Option C: Discharging a branch-duct lesion with worrisome features abandons surveillance in a patient with a real malignant risk. Option D: Enucleation does not achieve an oncological resection and carries a high pancreatic fistula rate.

*In branch-duct IPMN, high-risk stigmata mandate resection while worrisome features mandate endoscopic ultrasound assessment — the two are not interchangeable.*

*IAP — Fukuoka consensus on IPMN, 2017*

#### **Q100 CORRECT ANSWER A**

A deep soft tissue mass larger than 5 cm should be referred untouched to a sarcoma unit for imaging and image-guided core biopsy.

Why: Size over 5 cm, a deep location and progressive growth are the classic triad demanding sarcoma referral. Any biopsy contaminates a tract that must later be excised en bloc, so the tract should be planned by the team that will resect. Magnetic resonance imaging is required before biopsy to characterise the lesion and plan the approach. An unplanned excision converts a straightforward resection into a re-excision with worse margins and higher recurrence.



Option B: Excisional biopsy of a large deep mass is the classic unplanned excision and seeds the whole field. Option C: Even a correctly oriented incisional biopsy places a tract the resecting surgeon did not plan. Option D: Cytology cannot grade or subtype a sarcoma and a negative result would be falsely reassuring. Option A: Correct — imaging first, then a core biopsy through a tract chosen by the unit that will operate. Option E: Watching a 9 cm deep enlarging mass delays diagnosis of a probable sarcoma with no benefit.

*Any soft tissue mass that is deep to fascia, larger than 5 cm or enlarging must be referred to a sarcoma unit before biopsy, because an unplanned biopsy or excision compromises the definitive resection.*

*ESMO Clinical Practice Guidelines, soft tissue sarcoma*