

FExNet 2026

Collated SAQs: General Surgery

ANSWER BOOKLET

Model answers for the 22 general surgery SAQs. References cited at the foot of each question.

Items marked [core] are required for full marks. Drug doses confirmed with current eTG Therapeutic Guidelines, WSES guidelines, Tokyo Guidelines TG18, BISAP and Glasgow scoring.

22 questions • 225 marks

ACEM-aligned format. Sub-questions labelled a) b) c). Mark allocations indicative; references cited in the Answer Booklet. Question and answer indexes are clickable.

Answer Index

Click any entry to jump to its answer. Marks shown right.

Q1. Acute Cholangitis — Tokyo Criteria	12	Q12. Strangulated Inguinal Hernia	9
Q2. Acute Cholecystitis	10	Q13. Anorectal Abscess	9
Q3. Acute Pancreatitis — Severity Assessment	12	Q14. Toxic Megacolon (Inflammatory Bowel Disease)	11
Q4. Small Bowel Obstruction — Strangulation Features	11	Q15. Post-Operative Complications	10
Q5. Sigmoid Volvulus	10	Q16. Acute Appendicitis in Pregnancy	11
Q6. Perforated Peptic Ulcer	11	Q17. Pneumoperitoneum — Causes and Investigation	9
Q7. Upper Gastrointestinal Haemorrhage	12	Q18. Severity Scoring in Acute Pancreatitis	9
Q8. Acute Lower Gastrointestinal Haemorrhage	10	Q19. Chronic Mesenteric Ischaemia (Intestinal Angina)	9
Q9. Ruptured Abdominal Aortic Aneurysm — Operative Pathway	11	Q20. Rectal Foreign Body	9
Q10. Acute Diverticulitis	11	Q21. Tokyo Severity Grading for Cholangitis	9
Q11. Acute Mesenteric Ischaemia — Aetiology and Treatment	11	Q22. Post-Cholecystectomy Complications	9

Question 1 | Acute Cholangitis — Tokyo Criteria (12 marks)

A 72-year-old woman with a history of gallstones presents to your emergency department with right upper quadrant pain, fever with rigors, and jaundice for 2 days. On arrival, her vital signs are: heart rate 125 beats per minute, blood pressure 95/70 millimetres of mercury, respiratory rate 24 breaths per minute, peripheral oxygen saturation 99 percent on room air, temperature 39.2 degrees Celsius, Glasgow Coma Score 14. She has a known penicillin allergy producing a rash. Her bloods: white cell count 22, C-reactive protein 320, sodium 125, potassium 4.4, chloride 89, bicarbonate 14, urea 23.7, creatinine 219, albumin 22, total bilirubin 255 (conjugated 198), alkaline phosphatase 867, gamma GT 412, ALT 178, AST 153, lactate 4.2.

a) List Charcot's triad AND Reynolds pentad for acute cholangitis AND state which features are present in this patient. (4 marks)

- **Charcot's triad:** (1) right upper quadrant pain; (2) fever with rigors; (3) jaundice — present in 50-70 percent of patients (specific but not sensitive) **[core]**
- **Reynolds pentad** = Charcot's triad PLUS (4) hypotension and (5) altered mental state — indicates suppurative cholangitis with sepsis (high mortality) **[core]**
- **This patient has Reynolds pentad:** all 5 features (RUQ pain, rigors and fever, jaundice, hypotension 95/70, altered consciousness GCS 14) **[core]**
- **Tokyo Guidelines (TG18)** diagnostic criteria: A. systemic inflammation (fever, raised inflammatory markers); B. cholestasis (jaundice or abnormal LFTs); C. imaging (biliary dilatation, stone, stricture, stent) — definite if all 3 categories met **[core]**

b) List 4 immediate management priorities (drug, dose, end-points). (4 marks)

- **Aggressive intravenous fluid resuscitation** (Surviving Sepsis bundle) — 30 mL/kg crystalloid (approximately 2 L for a 70 kg adult) over the first 3 hours; vasopressors (noradrenaline) if persistent hypotension; target MAP >65, urine output >0.5 mL/kg/h **[core]**
- **Empirical broad-spectrum intravenous antibiotics** (penicillin allergy in this patient) — **ciprofloxacin 400 mg IV every 12 hours + metronidazole 500 mg IV every 12 hours** (alternative: gentamicin 5 mg/kg + metronidazole if normal renal function); covers Enterobacteriaceae, Enterococcus, anaerobes **[core]**
- **Urgent biliary decompression** — ERCP with sphincterotomy and stone extraction is gold standard (performed within 24 hours for severe cholangitis); alternative: percutaneous transhepatic cholangiography (PTC); cholecystectomy after acute resolution **[core]**
- **Investigate the source** — bedside abdominal ultrasound first (gallstones, common bile duct dilatation >7 mm, stones); MRCP / endoscopic ultrasound if needed; blood cultures BEFORE antibiotics **[core]**
- Bloods including LFTs, lipase, U&E, FBC, coagulation, group and save
- Intensive care admission for severe cholangitis
- Reverse coagulopathy (vitamin K, fresh frozen plasma if INR significantly elevated)

c) State the normal common bile duct diameter AND list 4 causes of extrahepatic biliary obstruction. (4 marks)

- **Normal common bile duct diameter <6 mm** (or up to 7 mm if >60 years; up to 10 mm post-cholecystectomy) **[core]**
- **Choledocholithiasis** — gallstones in the common bile duct (most common cause; 80 percent of obstructive jaundice in benign disease) **[core]**
- **Pancreatic head cancer** (adenocarcinoma) — characteristic painless jaundice in elderly with weight loss **[core]**
- **Cholangiocarcinoma** — primary bile duct malignancy; often hilar (Klatskin tumour) **[core]**

- Pancreatitis (oedema of head of pancreas)
- Ampullary carcinoma
- Bile duct stricture (post-surgical, post-cholangitis, primary sclerosing cholangitis)
- Mirizzi syndrome (gallstone in cystic duct compressing common hepatic duct)
- Parasitic infection (Ascaris, Clonorchis)

References: *eTG Therapeutic Guidelines — Antibiotic* • *eTG (Therapeutic Guidelines, current)* • *Tokyo Guidelines TG18* • *Tintinalli's Emergency Medicine 9e Ch 79*

Question 2 | Acute Cholecystitis (10 marks)

A 27-year-old woman presents to your emergency department with constant right upper quadrant abdominal pain for 16 hours duration. She feels hot, generally unwell, and reports prior episodes of transient post-prandial RUQ pain. On arrival her vital signs: heart rate 112 beats per minute, blood pressure 135/86 millimetres of mercury, respiratory rate 21 breaths per minute, peripheral oxygen saturation 99 percent on room air, temperature 38.1 degrees Celsius. On examination she has significant right upper quadrant tenderness with positive Murphy's sign. White cell count 16, C-reactive protein 95, lipase 60 (normal), bilirubin 18 (normal), alkaline phosphatase 85 (normal).

a) List 4 features on abdominal ultrasound supporting acute cholecystitis. (4 marks)

- **Gallstones (echogenic foci with posterior acoustic shadowing) [core]**
- **Gallbladder wall thickening >3 mm [core]**
- **Pericholecystic fluid [core]**
- **Sonographic Murphy sign** — focal tenderness directly over the gallbladder with the ultrasound probe (positive when patient inspires) **[core]**
- Distended gallbladder (>4 cm transverse, >10 cm longitudinal)
- Gallstone impacted in neck / Hartmann's pouch
- Hyperaemia on colour Doppler

b) State 4 management priorities for confirmed acute cholecystitis. (4 marks)

- **Intravenous broad-spectrum antibiotics** — amoxicillin-clavulanate 1.2 g IV every 8 hours (per eTG; covers gram-negatives and anaerobes); ceftriaxone 1 g IV daily + metronidazole 500 mg IV every 12 hours as alternative; minimum duration 5-7 days **[core]**
- **Surgical referral for early laparoscopic cholecystectomy** within 7 days (preferably within 72 hours of symptom onset — TG18 / ANZGITA guidelines); reduces hospital stay and complications **[core]**
- **Supportive care** — IV fluids, analgesia (cautious opioid; non-steroidal anti-inflammatory drugs should be avoided due to cholestatic concerns), anti-emetics; nil by mouth while awaiting theatre **[core]**
- **Investigate for choledocholithiasis** if any concern (raised LFTs, raised bilirubin, ALP, dilated CBD on USS) — MRCP if suspected **[core]**
- Percutaneous cholecystostomy if patient unfit for surgery (acute decompensated comorbidities)
- ICU admission if signs of sepsis / haemodynamic instability

c) List 2 complications of untreated acute cholecystitis. (2 marks)

- **Gallbladder gangrene and perforation** with peritonitis or pericholecystic abscess **[core]**
- **Empyema of the gallbladder** (suppurative cholecystitis with high mortality) **[core]**
- Cholangitis (ascending biliary infection)
- Cholecystoenteric fistula with gallstone ileus
- Mirizzi syndrome
- Hepatic abscess

References: eTG Therapeutic Guidelines — Antibiotic • eTG (Therapeutic Guidelines, current) • Tokyo Guidelines TG18 • Tintinalli's Emergency Medicine 9e Ch 79

Question 3 | Acute Pancreatitis — Severity Assessment (12 marks)

A 54-year-old man with a history of heavy alcohol use presents to your emergency department with severe constant epigastric abdominal pain radiating to his back for 24 hours. He has vomited multiple times. On arrival, his vital signs: heart rate 120 beats per minute, blood pressure 95/55 millimetres of mercury, respiratory rate 26 breaths per minute, peripheral oxygen saturation 92 percent on room air, temperature 37.8 degrees Celsius. Examination: marked epigastric tenderness, mildly distended abdomen, absent bowel sounds. Blood results: white cell count 22, C-reactive protein 320, lipase 4500, amylase 1200, glucose 13, urea 14, creatinine 150, calcium 1.85, lactate 5, ALT 60, ALP 110, albumin 28, LDH 480.

a) Apply the Glasgow (Imrie) prognostic criteria for acute pancreatitis severity (PANCREAS mnemonic — list 5 of the 8 components). (5 marks)

- **P** — PaO₂ <60 mmHg (or SpO₂ <90 percent on room air) [core]
- **A** — Age >55 years [core]
- **N** — Neutrophils / WCC >15 × 10⁹/L [core]
- **C** — Calcium <2 mmol/L [core]
- **R** — Renal function: urea >16 mmol/L; **E** — Enzymes: LDH >600 OR AST >200; **A** — Albumin <32; **S** — Sugar / glucose >10 (in non-diabetic) [core]
- **≥3 criteria within 48 hours = severe acute pancreatitis** (this patient has multiple features → severe)
- Alternative: revised Atlanta classification (mild — no organ failure or local complication; moderate — transient organ failure <48 hours OR local complication; severe — persistent organ failure >48 hours)

b) State 4 immediate management priorities. (4 marks)

- **Aggressive intravenous fluid resuscitation** — Hartmann's (balanced crystalloid preferred over saline — avoids hyperchloraemic acidosis); 5-10 mL/kg/h initial then guided by haemodynamics, urine output (target 0.5-1 mL/kg/h), and haematocrit; aim Hct 35-44 percent (over- or under-resuscitation both harmful) [core]
- **Adequate analgesia** — opioid (morphine 2.5-5 mg IV titrated, or fentanyl 25-50 µg IV); patient-controlled analgesia appropriate for ongoing severe pain; avoid pethidine (no advantage) [core]
- **Investigate cause and severity** — lipase confirms diagnosis; abdominal ultrasound for gallstones; CT abdomen with contrast at 72-96 hours for necrosis assessment (NOT routinely on presentation); investigate triglycerides, calcium, autoimmune markers if no obvious cause [core]
- **Identify and treat complications** — ICU admission for severe disease (organ failure, persistent shock); thiamine 300-500 mg IV before glucose (alcoholic patient) [core]
- Make nil by mouth initially; early enteral feeding (within 48-72 hours) preferred over parenteral once gut function returns
- AVOID prophylactic antibiotics (no evidence of benefit; may select for resistant organisms); antibiotics ONLY if infected pancreatic necrosis (carbapenem or piperacillin-tazobactam)
- Replace electrolytes — calcium, magnesium, potassium

c) List 3 local complications of severe acute pancreatitis. (3 marks)

- **Pancreatic / peripancreatic necrosis** (may become infected — needs intervention) [core]
- **Pancreatic pseudocyst** (usually develops 4 weeks post-onset) [core]
- **Acute peripancreatic fluid collection / walled-off necrosis** [core]
- Splenic vein thrombosis with gastric varices
- Pancreatic abscess
- Haemorrhage (pseudoaneurysm of splenic / gastroduodenal artery)

- Pleural effusion (commonly left)
- Bowel infarction

References: *eTG Therapeutic Guidelines — Gastrointestinal* • *eTG (Therapeutic Guidelines, current)* • *Australia / NZ Gastroenterological Society* • *Tintinalli's Emergency Medicine 9e Ch 79* • *Atlanta Classification 2012*

Question 4 | Small Bowel Obstruction — Strangulation Features (11 marks)

A 65-year-old woman presents to your emergency department with 3 days of intermittent colicky abdominal pain, distension, vomiting, and absolute constipation. She has had previous appendicectomy and a hysterectomy 10 years ago. Her vital signs: heart rate 105 beats per minute, blood pressure 115/75 millimetres of mercury, respiratory rate 22, peripheral oxygen saturation 98 percent, temperature 37.6 degrees Celsius. Examination: abdomen distended with tinkling bowel sounds, diffuse tenderness without peritonism. Plain abdominal radiograph shows multiple dilated loops of small bowel with air-fluid levels.

a) List 4 likely causes of small bowel obstruction. (4 marks)

- **Adhesions** (most common in patients with prior abdominal surgery — 60-75 percent of cases; this patient has appendicectomy and hysterectomy) **[core]**
- **Hernia** — incarcerated (reducible) or strangulated (incarcerated + ischaemic): inguinal, femoral, umbilical, incisional, internal **[core]**
- **Malignancy** (carcinoma — primary or metastatic; lymphoma) **[core]**
- **Crohn's disease** — chronic stricture **[core]**
- Volvulus (small bowel — rare; sigmoid more common)
- Intussusception (rare in adults — usually has a lead point — tumour, polyp)
- Foreign body, gallstone ileus, bezoar
- Radiation enteritis

b) List 4 features (clinical or imaging) that suggest strangulated / ischaemic bowel. (4 marks)

- **Severe constant abdominal pain** (rather than intermittent / colicky) — indicates ischaemia / peritonism **[core]**
- **Peritonism / signs of peritonitis** — tenderness with guarding, rebound, rigidity **[core]**
- **Systemic features** — fever, tachycardia, raised inflammatory markers, leucocytosis, raised lactate (>2) **[core]**
- **CT features:** bowel-wall thickening (target sign), abnormal enhancement, pneumatosis intestinalis, portal venous gas, mesenteric stranding, free fluid, closed-loop appearance, whirl sign (volvulus) **[core]**
- Mesenteric oedema
- Hyperamylasaemia, raised LDH

c) State 3 immediate management priorities. (3 marks)

- **Nasogastric tube on free drainage;** make nil by mouth; anti-emetics (ondansetron or metoclopramide) **[core]**
- **Intravenous fluid resuscitation** and electrolyte correction (anticipate AKI and hypokalaemia, hyponatraemia from NG losses); replace ongoing NG losses with normal saline **[core]**
- **Surgical referral** — early operative management if strangulation features (per 'b' above); conservative trial up to 3-5 days for adhesional obstruction without strangulation; broad-spectrum IV antibiotics if perforation / strangulation suspected **[core]**
- Analgesia (opioid titrated)
- CT abdomen with intravenous contrast — definitive characterisation, confirms or excludes strangulation
- Bloods: FBC, U&E, lactate, group and save, coagulation

References: World Society of Emergency Surgery (current) • eTG (Therapeutic Guidelines, current) • Tintinalli's Emergency Medicine 9e Ch 80

Question 5 | Sigmoid Volvulus (10 marks)

A 78-year-old woman from a nursing home presents to your emergency department with generalised abdominal pain, distension, and vomiting for the past 24 hours. She has not passed flatus or stool for 48 hours. She has a history of chronic constipation. Her vital signs: heart rate 90 beats per minute, blood pressure 165/82 millimetres of mercury, respiratory rate 20, peripheral oxygen saturation 96 percent on room air, temperature 36.2 degrees Celsius, Glasgow Coma Score 14 (her baseline). Examination: marked abdominal distension with tympanic percussion. Abdominal radiograph shows a 'coffee bean' appearance of grossly dilated sigmoid colon ascending to the upper abdomen.

a) List 3 risk factors for sigmoid volvulus. (3 marks)

- **Chronic constipation** with elongation and redundant sigmoid colon (typical pattern in nursing home residents) **[core]**
- **Older age, institutionalised patients**; immobility; sedentary lifestyle **[core]**
- **Neurological / psychiatric conditions** — Parkinson's disease, dementia, schizophrenia (laxative use) **[core]**
- Chagas disease (megacolon — endemic in South America)
- Hirschsprung's disease, megarectum
- High-fibre diet

b) State 4 immediate management priorities. (4 marks)

- **Sigmoid decompression with flexible sigmoidoscopy** (or rigid sigmoidoscopy and rectal tube placement) — first-line if no peritonism; success rate 70-90 percent; rectal tube left in situ for 24-48 hours to maintain decompression **[core]**
- **Intravenous fluid resuscitation**; nasogastric tube on free drainage; electrolyte correction **[core]**
- **Surgical consultation** — operative management (sigmoid resection with primary anastomosis OR Hartmann's procedure with end colostomy) for patients with peritonism, perforation, ischaemic bowel, OR failed endoscopic decompression **[core]**
- **Definitive management** — elective sigmoid colectomy after acute episode settles (recurrence rate 40-90 percent without surgery); discuss with patient and family given comorbidities **[core]**
- Antibiotics (metronidazole + amoxicillin) if sepsis / perforation / strangulation suspected

c) List 3 features on plain abdominal radiograph supporting sigmoid volvulus. (3 marks)

- **'Coffee bean' or 'omega' sign** — grossly dilated sigmoid colon with two limbs converging at the pelvis (pathognomonic) **[core]**
- **Massive sigmoid distension** extending from the pelvis to above the umbilicus; loss of haustra **[core]**
- **Inverted 'U' shape** with apex pointing toward the right hemidiaphragm (left-sided volvulus typically); 'beak' or 'bird's beak' sign at the twist point on contrast study **[core]**
- Closed-loop bowel obstruction features
- Caecum distended (pre-obstructive)

References: World Society of Emergency Surgery (current) • eTG (Therapeutic Guidelines, current) • Tintinalli's Emergency Medicine 9e Ch 80

Question 6 | Perforated Peptic Ulcer (11 marks)

A 55-year-old man presents to your emergency department with sudden-onset severe epigastric abdominal pain that started 4 hours ago while at work. The pain has progressively become generalised. He has a history of chronic epigastric pain and uses ibuprofen frequently. On arrival, his vital signs: heart rate 130 beats per minute, blood pressure 90/55 millimetres of mercury, respiratory rate 28 breaths per minute, peripheral oxygen saturation 96 percent on room air, temperature 38.0 degrees Celsius. Examination: he is lying still, with a 'board-like' rigid abdomen, generalised tenderness, absent bowel sounds, and percussion over the right upper quadrant reveals loss of liver dullness.

a) List 4 imaging features of pneumoperitoneum. (4 marks)

- **Erect chest radiograph (or left lateral decubitus): free gas under the diaphragm** on erect chest X-ray (sensitivity ~80 percent); Cupola sign **[core]**
- **Plain abdominal radiograph: Rigler's sign (double-wall sign)** — gas on both sides of the bowel wall (intramural and extramural) **[core]**
- **Football sign** (large amount of intraperitoneal free gas in supine film); **falciform ligament sign** **[core]**
- **Computed tomography of abdomen** — most sensitive (>95 percent); identifies free intraperitoneal air, free fluid, site of perforation, underlying pathology **[core]**
- Triangle sign (gas tracking around mesentery)
- Loss of liver dullness on percussion (clinical)

b) State 4 immediate management priorities. (4 marks)

- **Aggressive intravenous fluid resuscitation** — 30 mL/kg crystalloid (approximately 2 L) over the first hour; targeted to MAP >65, urine output; vasopressor support if hypotensive after resuscitation **[core]**
- **Empirical broad-spectrum intravenous antibiotics** — **piperacillin-tazobactam 4.5 g IV every 8 hours** (per eTG) OR ceftriaxone 2 g + metronidazole; covers gram-positive, gram-negative, anaerobes **[core]**
- **Urgent surgical consultation** for operative management — laparotomy (open or laparoscopic) for perforation closure (Graham omental patch repair); definitive treatment needed to source-control **[core]**
- **Nasogastric tube on free drainage**, make nil by mouth; **proton-pump inhibitor** (pantoprazole 40 mg IV twice daily); analgesia (opioid IV titrated); urinary catheter; pre-operative bloods (FBC, group and crossmatch 4 units, coagulation, lactate) **[core]**
- Investigate *Helicobacter pylori* — test and treat if positive (urea breath test, stool antigen, or biopsy)
- Tetanus update if any concern

c) List 3 risk factors for perforated peptic ulcer disease. (3 marks)

- **Non-steroidal anti-inflammatory drugs** (especially with concurrent antiplatelet / anticoagulant; this patient — frequent ibuprofen use) **[core]**
- ***Helicobacter pylori* infection** **[core]**
- **Smoking, alcohol**, chronic stress **[core]**
- Glucocorticoid use (especially with NSAIDs)
- Chronic kidney disease, cirrhosis
- Zollinger-Ellison syndrome (gastrinoma — rare; consider if recurrent / refractory ulcers)

References: eTG Therapeutic Guidelines — Antibiotic • eTG (Therapeutic Guidelines, current) • ACEM clinical policies and statements • Tintinalli's Emergency Medicine 9e Ch 79 • World Society of Emergency Surgery (current)

Question 7 | Upper Gastrointestinal Haemorrhage (12 marks)

A 62-year-old man with a history of chronic alcohol use and known cirrhosis (Child-Pugh B) presents to your emergency department after vomiting approximately 1 litre of fresh red blood 30 minutes ago. He has had two further episodes of haematemesis since arrival. His vital signs: heart rate 130 beats per minute, blood pressure 85/45 millimetres of mercury, respiratory rate 26, peripheral oxygen saturation 95 percent on room air, Glasgow Coma Score 14. He has stigmata of chronic liver disease (palmar erythema, spider naevi, splenomegaly). His haemoglobin is 75, INR 1.8, platelets 78, urea 18, creatinine 95.

a) List 4 immediate management priorities (drug, dose). (4 marks)

- **Resuscitation** — two large-bore intravenous access; activate massive transfusion protocol; group O blood until crossmatched; balanced 1:1:1 transfusion (packed cells, fresh frozen plasma, platelets); target haemoglobin 70-80 (avoid over-transfusion in variceal bleed — may trigger re-bleed) **[core]**
- **Terlipressin 2 mg IV every 4-6 hours** (or somatostatin/octreotide 100 µg IV bolus then 50 µg/h infusion) — splanchnic vasoconstrictor for suspected variceal bleeding; commence empirically before endoscopy **[core]**
- **Empirical intravenous antibiotics** — **ceftriaxone 1 g IV daily** for 5-7 days (reduces mortality and re-bleeding in cirrhotic GI bleed; preferred over fluoroquinolones for rising resistance) **[core]**
- **Urgent endoscopy within 12-24 hours** (within 6 hours for variceal bleed — band ligation; sclerotherapy if cannot band; balloon tamponade as bridge to definitive treatment if uncontrolled) **[core]**
- Reverse coagulopathy carefully — vitamin K 10 mg IV; FFP 10-15 mL/kg; consider prothrombin complex concentrate
- Tranexamic acid is generally NOT recommended (HALT-IT trial showed no benefit and increased venous thrombosis)
- Proton pump inhibitor — pantoprazole 80 mg IV bolus then 8 mg/h infusion (evidence stronger for non-variceal; reduces re-bleeding risk)

b) Calculate the Glasgow-Blatchford score components for this patient. (4 marks)

- **Urea** 18 mmol/L → 4 points (thresholds 6.5-8, 8-10, 10-25, >25) **[core]**
- **Haemoglobin** 75 g/L (men: <100 = 6 points; <110 = 3 points; <120 = 1 point) → 6 points **[core]**
- **Systolic BP** 85 → <90 = 3 points **[core]**
- **Other:** pulse >100 (1); melaena (1); syncope (2); hepatic disease (2); cardiac failure (2); this patient: pulse 130 (1) + syncope/recent collapse possible (2 if yes) + cirrhosis (2) → at least 16+ (**HIGH RISK**; admit and urgent endoscopy) **[core]**

c) List 4 features distinguishing variceal from non-variceal upper GI bleeding. (4 marks)

- **Variceal:** cirrhosis or portal hypertension (clinical signs); history of varices; alcohol use; viral hepatitis B/C **[core]**
- **Non-variceal:** typically peptic ulcer disease (history of chronic epigastric pain, NSAID / aspirin use, *Helicobacter pylori*); Mallory-Weiss tear (post-vomiting onset) **[core]**
- **Variceal:** massive sudden haematemesis (often without preceding epigastric pain); shock often more severe; classically projectile **[core]**
- **Endoscopic appearance:** variceal — linear cords / nodules; non-variceal — ulcer with adherent clot, vessel, or active bleeding (Forrest classification) **[core]**
- Variceal mortality higher (10-20 percent), particularly in Child-Pugh C; risk of rebleeding higher

References: eTG Therapeutic Guidelines — Gastrointestinal • eTG (Therapeutic Guidelines, current) • Glasgow-Blatchford score • Tintinalli's Emergency Medicine 9e Ch 75 • ANZGITA

Question 8 | Acute Lower Gastrointestinal Haemorrhage (10 marks)

A 78-year-old man presents to your emergency department with a 12-hour history of passing bright red blood per rectum. He has had approximately 6 episodes of large-volume haematochezia. He has a history of diverticulosis (on a recent colonoscopy) and atrial fibrillation (on apixaban 5 mg twice daily). His vital signs: heart rate 110 beats per minute, blood pressure 105/65 millimetres of mercury, respiratory rate 22, peripheral oxygen saturation 98 percent on room air, temperature 36.8 degrees Celsius. His haemoglobin is 78 (baseline 130 — fall of 52).

a) List 4 most likely causes of acute lower GI haemorrhage in this patient's age group. (4 marks)

- **Diverticular bleeding** (most common cause; 30-60 percent of acute lower GI bleeds) [core]
- **Angiodysplasia** (vascular ectasia — particularly right colon; older patients) [core]
- **Colorectal cancer or polyp** [core]
- **Ischaemic colitis** (particularly with cardiovascular risk factors) [core]
- Inflammatory bowel disease (ulcerative colitis, Crohn's disease)
- Haemorrhoids / anal fissure (rarely haemodynamically significant)
- Upper GI bleed presenting as bright red blood per rectum (massive haemorrhage with rapid transit) — must consider

b) State 4 immediate management priorities. (4 marks)

- **Resuscitation** — two large-bore IV access; bloods including FBC, U&E, lactate, group and crossmatch 4 units, coagulation, anti-Xa for apixaban; balanced fluid / blood resuscitation targeting haemoglobin 70 (or 80 if cardiovascular comorbidity) [core]
- **Reverse anticoagulation** if ongoing bleeding — **4-factor prothrombin complex concentrate 50 IU/kg IV** (or andexanet alfa if available); withhold apixaban; consider tranexamic acid 1 g IV [core]
- **Investigations** — exclude upper GI source: nasogastric tube aspirate for blood; consider urgent gastroscopy; **colonoscopy** within 24 hours (after bowel preparation if stable) is diagnostic and therapeutic for most lower GI bleeds [core]
- **CT angiography** for active bleeding (active extravasation rate >0.5 mL/min); guides interventional radiology embolisation if endoscopic management fails [core]
- Surgery — last resort for refractory bleeding or unstable patient
- Avoid further exposure to anticoagulants until bleeding controlled; multidisciplinary discussion regarding restart

c) List 2 risk factors for poor outcome in lower GI bleed. (2 marks)

- **Anticoagulant or antiplatelet use** (this patient on apixaban) — increases volume of bleeding, complicates resuscitation [core]
- **Age >75 with comorbidities** (reduced reserve, more haemodynamic compromise per unit blood loss) [core]
- Haemodynamic instability on presentation
- Significant comorbidities — heart failure, kidney disease, malignancy

References: eTG Therapeutic Guidelines — Gastrointestinal • eTG (Therapeutic Guidelines, current) • ACEM clinical policies and statements • Tintinalli's Emergency Medicine 9e Ch 75

Question 9 | Ruptured Abdominal Aortic Aneurysm — Operative Pathway (11 marks)

A 75-year-old man is brought to your emergency department by ambulance with sudden onset of severe abdominal and back pain that started 1 hour ago. He is pale, sweaty, and clammy. Past medical history: hypertension, smoking (30 pack-years), known abdominal aortic aneurysm (measured 5.2 centimetres at last surveillance 6 months ago, awaiting elective repair). On arrival: heart rate 130 beats per minute, blood pressure 75/45 millimetres of mercury, respiratory rate 28, peripheral oxygen saturation 96 percent on room air, Glasgow Coma Score 14. Examination: pulsatile abdominal mass; bedside ultrasound shows aortic diameter 6.8 centimetres with surrounding free fluid.

a) List 5 immediate management priorities (drug, dose, end-points). (5 marks)

- **Two large-bore intravenous access**; activate massive transfusion protocol; give O-negative blood empirically while crossmatching; target balanced 1:1:1 transfusion (packed cells, fresh frozen plasma, platelets) **[core]**
- **Permissive hypotension** — target systolic blood pressure 70-90 millimetres of mercury (preserve mentation; minimise dilutional coagulopathy and clot disruption); AVOID excessive crystalloid (less than 1 litre) **[core]**
- **Urgent vascular surgical consultation** and direct transfer to operating theatre or hybrid suite — definitive treatment is endovascular aortic repair (EVAR) or open repair; do NOT delay for further imaging if haemodynamically unstable **[core]**
- **Tranexamic acid 1 g IV bolus then 1 g over 8 hours** (CRASH-2 evidence — may benefit; specialist input) **[core]**
- **Notify blood bank, theatre, anaesthetics, and ICU simultaneously**; appoint a single team leader; document communication with family **[core]**
- Continuous monitoring — arterial line, urinary catheter, central line where possible (without delaying transfer)
- Reverse anticoagulation if relevant
- Adequate analgesia (morphine titrated)

b) List 3 contraindications to endovascular aortic repair (EVAR) for ruptured AAA. (3 marks)

- **Anatomic factors** — short / angulated infrarenal neck; severe iliac tortuosity; aneurysm extending to renal or visceral vessels (juxtarenal) **[core]**
- **Type IV thoracoabdominal aneurysm** or supra-renal involvement (requires specialised endograft / open repair) **[core]**
- **Patient factors** — major comorbidity precluding the procedure; iodinated contrast allergy / severe renal impairment (relative) **[core]**
- Inability to obtain anatomical detail with CT angiography in unstable patient
- Local availability of EVAR — open repair may be alternative

c) List 3 mortality risk factors for ruptured AAA. (3 marks)

- **Pre-operative cardiac arrest** — near-100 percent mortality **[core]**
- **Persistent hypotension despite resuscitation**; haemodynamic instability on arrival **[core]**
- **Age >80, severe comorbidities, renal failure, raised lactate >6, Glasgow Coma Score <10** **[core]**
- Female sex (worse outcomes)
- Prolonged transfer / delay to theatre

References: SVS Practice Guideline AAA • eTG (Therapeutic Guidelines, current) • Tintinalli's Emergency Medicine 9e Ch 60

Question 10 | Acute Diverticulitis (11 marks)

A 62-year-old man presents to your emergency department with 3 days of left lower quadrant abdominal pain, fever, and altered bowel habit. He has a history of constipation. On examination, his vital signs are: heart rate 110 beats per minute, blood pressure 130/85 millimetres of mercury, respiratory rate 22, peripheral oxygen saturation 98 percent on room air, temperature 38.4 degrees Celsius. There is left iliac fossa tenderness with localised peritonism but no generalised guarding. White cell count 16, C-reactive protein 145. CT abdomen and pelvis shows a 4 centimetre fluid collection adjacent to a thickened sigmoid colon, no free air.

a) Describe the Hinchey classification of complicated diverticulitis (4 stages). (4 marks)

- **Hinchey I:** pericolic abscess or phlegmon (this case) **[core]**
- **Hinchey II:** pelvic, intra-abdominal, or retroperitoneal abscess (greater than 4 cm) **[core]**
- **Hinchey III:** generalised purulent peritonitis **[core]**
- **Hinchey IV:** generalised faeculent peritonitis (worst prognosis) **[core]**

b) State 4 management priorities for this patient. (4 marks)

- **Empirical broad-spectrum intravenous antibiotics** — amoxicillin-clavulanate 1.2 g IV every 8 hours (per eTG) OR ceftriaxone 1 g + metronidazole 500 mg every 12 hours; covers gram-negatives and anaerobes; duration 5-7 days IV then oral **[core]**
- **Surgical / interventional radiology consultation** for percutaneous drainage if abscess >4 cm; operative management if peritonitis, perforation, or failure of conservative therapy **[core]**
- **Supportive care** — IV fluids; analgesia; nil by mouth initially; anti-emetics; admit for inpatient monitoring **[core]**
- **Outpatient follow-up** — colonoscopy in 6-8 weeks (after acute settles) to exclude underlying malignancy **[core]**
- Avoid AINS, opioids in moderation — risk of perforation in inflamed bowel
- Diet — soft / clear fluids initially, advance as tolerated; long-term — adequate fibre intake

c) List 3 indications for surgical intervention in diverticulitis. (3 marks)

- **Generalised peritonitis** (Hinchey III/IV) — emergency operation (Hartmann's procedure or sigmoid resection with primary anastomosis) **[core]**
- **Failed conservative / percutaneous management;** persistent or recurrent abscess **[core]**
- **Complicated diverticulitis with fistula formation** (colovesical, colovaginal, colo-cutaneous) **[core]**
- Bowel obstruction from chronic diverticulitis
- Recurrent diverticulitis (relative indication after >3 episodes)

References: eTG Therapeutic Guidelines — Antibiotic • eTG (Therapeutic Guidelines, current) • World Society of Emergency Surgery (current) • Tintinalli's Emergency Medicine 9e Ch 80

Question 11 | Acute Mesenteric Ischaemia — Aetiology and Treatment (11 marks)

A 78-year-old male with permanent atrial fibrillation (off anticoagulation due to recent fall) presents to your emergency department with 6 hours of severe central abdominal pain that is disproportionate to the soft, minimally tender abdomen. His vital signs: heart rate 115 beats per minute, blood pressure 110/75 millimetres of mercury, respiratory rate 26 breaths per minute, peripheral oxygen saturation 96 percent on room air, temperature 37.5 degrees Celsius. Lactate is 4.8.

a) Describe the 4 main aetiologies of acute mesenteric ischaemia. (4 marks)

- **Embolic occlusion of superior mesenteric artery** (most common — 50 percent; this case is suggestive — atrial fibrillation off anticoagulation; embolus typically lodges 3-10 cm from origin) **[core]**
- **Thrombotic occlusion of atherosclerotic SMA** (25-30 percent — pre-existing chronic intestinal angina; postprandial pain, weight loss; usually at SMA origin) **[core]**
- **Mesenteric venous thrombosis** (5-15 percent — hypercoagulable state; more chronic / sub-acute; portal vein thrombosis association; cirrhosis) **[core]**
- **Non-occlusive mesenteric ischaemia (NOMI)** (low-flow state from cardiogenic shock, systemic sepsis, vasopressor use; ICU patients) **[core]**

b) State 4 immediate management priorities. (4 marks)

- **Early CT angiography of mesenteric vessels** — do not delay imaging for creatinine; benefits outweigh contrast risk; identifies occlusion site and complications **[core]**
- **Vascular surgery / interventional radiology consultation** — endovascular thrombectomy / thrombolysis OR open revascularisation; laparotomy needed for non-viable bowel **[core]**
- **Therapeutic anticoagulation** — IV heparin (5000 IU bolus then infusion) once decision made; monitors APTT / anti-Xa **[core]**
- **Aggressive resuscitation** with balanced crystalloid; correct lactic acidosis, electrolyte derangement, hypovolaemia; activate MTP if shocked **[core]**
- Empirical broad-spectrum antibiotics (piperacillin-tazobactam) — translocation risk
- ICU admission post-operatively (high mortality, 50-70 percent)
- Optimisation prior to operative intervention without delaying definitive treatment

c) List 3 features distinguishing acute mesenteric ischaemia from other causes of acute abdominal pain. (3 marks)

- **Pain disproportionate to physical examination findings** (most characteristic) — soft, minimally tender abdomen despite severe pain **[core]**
- **High-risk demographic** — elderly with vascular risk factors; AF; post-cardiac surgery; sepsis with vasopressors **[core]**
- **Raised lactate (with metabolic acidosis)** out of proportion to haemodynamic state **[core]**
- Bloody diarrhoea (later sign)
- Hypoxia, sepsis, multi-organ failure if late
- Other — leucocytosis, raised D-dimer, raised LDH

References: World Society of Emergency Surgery (current) • eTG (Therapeutic Guidelines, current) • Tintinalli's Emergency Medicine 9e Ch 80 • ESVS Guidelines AMI 2017

Question 12 | Strangulated Inguinal Hernia (9 marks)

A 75-year-old man presents to your emergency department with sudden-onset severe right inguinal pain that started 6 hours ago, associated with vomiting and abdominal distension. He has had a chronic right inguinal hernia for years that he could previously reduce. On examination, there is a tender, erythematous, irreducible right inguinal mass. His vital signs: heart rate 105 beats per minute, blood pressure 110/70 millimetres of mercury, respiratory rate 22, peripheral oxygen saturation 98 percent on room air, temperature 37.8 degrees Celsius. White cell count 14, lactate 2.5.

a) Distinguish between reducible, incarcerated, AND strangulated hernia. (3 marks)

- **Reducible:** hernia contents can be returned to abdominal cavity with manual pressure; non-tender; usually asymptomatic [core]
- **Incarcerated:** contents stuck in the hernia sac and cannot be reduced; not necessarily ischaemic; non-tender or mildly tender [core]
- **Strangulated:** incarcerated AND the blood supply is compromised (ischaemia / necrosis); painful, tender, erythematous; systemic features (fever, raised inflammatory markers, lactate); MEDICAL EMERGENCY [core]
- Richter's hernia — only part of the bowel wall involved (often incarcerated; can strangulate without obstruction)

b) State 4 management priorities for this patient. (4 marks)

- **Urgent surgical consultation for operative repair** — strangulated hernia is a surgical emergency; delay risks bowel necrosis and perforation; operative time-frame <6 hours from symptom onset to preserve bowel viability [core]
- **Resuscitation** — IV fluids (0.9 percent saline 20 mL/kg bolus); bloods including FBC, U&E; lactate, group and crossmatch; broad-spectrum antibiotics if signs of sepsis (cefazolin + metronidazole) given concern for ischaemic bowel [core]
- **Single attempt at gentle taxis (reduction)** with adequate analgesia and Trendelenburg position — do NOT attempt if signs of strangulation (tender, erythematous, systemic features) — risk of reducing necrotic bowel into peritoneal cavity [core]
- **Nasogastric tube on free drainage;** make nil by mouth; analgesia (opioid titrated); anti-emetics [core]
- Investigate for contamination — blood culture if signs of sepsis
- Urinary catheter (post-void residual; ureteric compression in hernia)

c) List 2 alternative diagnoses to consider in the patient with a tender groin mass. (2 marks)

- **Femoral hernia** (more common in elderly women; higher risk of strangulation than inguinal — narrow neck; lies BELOW the inguinal ligament) [core]
- **Lymphadenopathy / lymphadenitis** (infection, malignancy) [core]
- Saphena varix (cough impulse on standing; disappears on lying)
- Femoral artery aneurysm
- Psoas abscess (rare)
- Testicular pathology (torsion in younger patients)

References: World Society of Emergency Surgery (current) • eTG (Therapeutic Guidelines, current) • Tintinalli's Emergency Medicine 9e Ch 81

Question 13 | Anorectal Abscess (9 marks)

A 35-year-old man with a history of Crohn's disease presents to your emergency department with severe perianal pain for 3 days, worse on sitting, and now associated with fever. On examination, there is an obvious tender, erythematous, fluctuant swelling in the right ischiorectal fossa. His vital signs: heart rate 105 beats per minute, blood pressure 130/80 millimetres of mercury, respiratory rate 18, peripheral oxygen saturation 99 percent on room air, temperature 38.5 degrees Celsius.

a) List 3 anatomical types of anorectal abscess. (3 marks)

- **Perianal abscess** (most common, 60 percent) — superficial, beneath perianal skin **[core]**
- **Ischiorectal abscess** (20 percent) — fluctuant tender mass lateral to the anus; this case **[core]**
- **Intersphincteric or supralelevator** (deep — often missed; pain on rectal examination; require imaging — MRI / endoanal ultrasound) **[core]**
- Submucosal abscess — uncommon

b) State 3 management priorities. (3 marks)

- **Surgical incision and drainage** — first-line treatment; antibiotics alone are NOT adequate; can be performed in ED with local anaesthetic for superficial perianal abscess; surgical theatre for deeper / immunocompromised patients **[core]**
- **Empirical antibiotics** — amoxicillin-clavulanate 875/125 mg orally twice daily for 5-7 days (per eTG); reserved for systemic infection, immunocompromise, or Crohn's; not routinely after I&D; **[core]**
- **Investigate for fistula** — particularly in Crohn's disease (this case); MRI of pelvis to characterise; refer to colorectal surgery for fistulectomy or seton placement **[core]**
- Adequate analgesia (oral / IV opioid)
- Stool softeners and dietary fibre to minimise constipation post-drainage
- Outpatient surgical follow-up; sitz baths

c) List 3 conditions associated with recurrent perianal abscesses / fistulae. (3 marks)

- **Crohn's disease** (this patient — common; complex / recurrent fistulae characteristic) **[core]**
- **Diabetes mellitus, immunocompromise** (HIV, chemotherapy, post-transplant) **[core]**
- **Hidradenitis suppurativa** (chronic relapsing skin condition with follicular obstruction) **[core]**
- Sexually-transmitted infections (syphilis, chlamydia, gonorrhoea, HSV, HPV)
- Tuberculosis (rare)
- Pilonidal disease (related but distinct)

References: eTG Therapeutic Guidelines — Antibiotic • eTG (Therapeutic Guidelines, current) • Tintinalli's Emergency Medicine 9e Ch 82

Question 14 | Toxic Megacolon (Inflammatory Bowel Disease) (11 marks)

A 28-year-old female with known severe ulcerative colitis (treated with mesalazine and azathioprine) presents to your emergency department with a 7-day history of bloody diarrhoea (15-20 episodes per day), severe abdominal pain, fever, and feeling unwell. On arrival: heart rate 130 beats per minute, blood pressure 95/60 millimetres of mercury, respiratory rate 26, peripheral oxygen saturation 96 percent on room air, temperature 39.0 degrees Celsius. Examination: distended, tender abdomen with reduced bowel sounds. White cell count 22, C-reactive protein 220, albumin 20, haemoglobin 92, lactate 4. Plain abdominal radiograph shows transverse colon dilated to 7 centimetres with multiple thumbprinting features.

a) List the 4 diagnostic criteria for toxic megacolon (Jalan criteria). (4 marks)

- **Radiographic colonic dilatation** >6 cm (transverse colon >7 cm or ascending colon >9 cm) **[core]**
- **Plus 3 of:** fever >38.6 degrees Celsius, heart rate >120, white cell count >10.5, anaemia (haemoglobin <75 percent of predicted) **[core]**
- **Plus 1 of:** dehydration, altered mental status, electrolyte disturbance, hypotension **[core]**
- This patient meets criteria — clinical and radiographic features support diagnosis; severity is reflected by lactate 4 (suggests ischaemia / sepsis) **[core]**

b) State 4 immediate management priorities. (4 marks)

- **Aggressive resuscitation** — IV fluid, electrolyte correction (potassium and magnesium replacement is essential), blood transfusion if haemoglobin low; ICU / HDU admission **[core]**
- **Empirical broad-spectrum intravenous antibiotics** — piperacillin-tazobactam 4.5 g IV every 8 hours (or ceftriaxone + metronidazole); covers gram-negatives and anaerobes (translocation risk) **[core]**
- **High-dose intravenous corticosteroids** — methylprednisolone 60 mg IV every 6 hours OR hydrocortisone 100 mg IV every 6 hours; treats underlying ulcerative colitis flare **[core]**
- **Urgent gastroenterology AND colorectal surgical consultation** — consider rescue therapy (ciclosporin or infliximab) if no response to corticosteroids in 72-96 hours; colectomy for deterioration / perforation **[core]**
- Make nil by mouth; nasogastric decompression
- Stop offending drugs — antidiarrhoeal agents (loperamide, opioids, anticholinergics) — PRECIPITANTS of toxic megacolon
- Test for *Clostridioides difficile* (common complication / cause)
- Daily plain abdominal radiographs to monitor colonic diameter

c) List 3 indications for emergency colectomy. (3 marks)

- **Perforation** (free air on imaging) **[core]**
- **Failure of medical therapy after 72 hours of optimal medical management** — rescue therapy or surgery **[core]**
- **Massive haemorrhage** requiring transfusion; haemodynamic instability despite resuscitation **[core]**
- Worsening colonic dilatation despite treatment
- Generalised peritonitis

References: eTG Therapeutic Guidelines — Gastrointestinal • eTG (Therapeutic Guidelines, current) • Tintinalli's Emergency Medicine 9e Ch 80 • Jalan criteria

Question 15 | Post-Operative Complications (10 marks)

A 65-year-old man presents to your emergency department with fever and worsening abdominal pain on day 5 following a laparoscopic-converted-to-open right hemicolectomy for caecal carcinoma. His vital signs: heart rate 120 beats per minute, blood pressure 105/65 millimetres of mercury, respiratory rate 24, peripheral oxygen saturation 95 percent on room air, temperature 38.8 degrees Celsius. Examination: tachycardic, abdomen mildly distended, surgical wound appears clean. Bloods: white cell count 18, C-reactive protein 280, lactate 3.5.

a) List 4 differential diagnoses for fever post-laparotomy AND state typical timing. (4 marks)

- **Atelectasis / aspiration pneumonia** (Days 1-3) — most common in early period; basal lung collapse **[core]**
- **Surgical site infection / wound infection** (Days 3-7) — superficial (redness, swelling, discharge) or deep / organ-space (intra-abdominal abscess) **[core]**
- **Anastomotic leak / intra-abdominal abscess** (Days 5-7 — this patient's presentation) — major surgical complication; investigate with computed tomography **[core]**
- **Urinary tract infection** (Days 3-5) — particularly with catheter use **[core]**
- Deep vein thrombosis / pulmonary embolism (Days 5-10)
- Catheter / line-related infection
- Drug reaction (e.g. heparin-induced thrombocytopenia, antibiotic-associated)
- Clostridium difficile infection (associated with antibiotic use)

b) State 4 immediate management priorities. (4 marks)

- **Sepsis Six** — measure lactate, blood cultures, urine, and other appropriate cultures BEFORE antibiotics; broad-spectrum antibiotics within 1 hour; IV crystalloid 30 mL/kg; vasopressor if persistent hypotension **[core]**
- **Empirical antibiotics** — piperacillin-tazobactam 4.5 g IV every 8 hours (covers nosocomial gram-negatives, anaerobes, Enterococcus); add vancomycin if MRSA / catheter-related **[core]**
- **Computed tomography of abdomen and pelvis with contrast** — identifies anastomotic leak, abscess, free fluid, obstruction; magnetic resonance alternative if contrast contraindicated **[core]**
- **Surgical consultation** — operative re-exploration for anastomotic leak; percutaneous drainage of abscess; ICU admission if septic shock **[core]**
- Investigate for VTE — Wells score, D-dimer; CTPA if PE suspected
- Wound examination — open and probe if any concern; swab for culture
- Urinalysis with culture; chest radiograph

c) List 2 risk factors for anastomotic leak. (2 marks)

- **Smoking, malnutrition, diabetes**; preoperative chemoradiotherapy **[core]**
- **Tension on anastomosis, poor blood supply, technical factors**; emergency surgery **[core]**
- Prolonged surgical time, blood loss, intra-operative steroid use
- Pre-existing inflammatory bowel disease, previous radiation to area
- Anti-platelet / anticoagulant therapy

References: eTG Therapeutic Guidelines — Antibiotic • eTG (Therapeutic Guidelines, current) • ACEM clinical policies and statements • Tintinalli's Emergency Medicine 9e Ch 79

Question 16 | Acute Appendicitis in Pregnancy (11 marks)

A 30-year-old woman who is 28 weeks pregnant presents to your emergency department with a 24-hour history of progressive abdominal pain, now localised to the right side. Her vital signs: heart rate 105 beats per minute, blood pressure 120/75 millimetres of mercury, respiratory rate 20, peripheral oxygen saturation 99 percent on room air, temperature 38.0 degrees Celsius. On examination, there is right-sided abdominal tenderness located at the level of the umbilicus and right lateral abdomen, with rebound. White cell count 16, lactate 2.0.

a) List 4 considerations specific to appendicitis in pregnancy. (4 marks)

- **Atypical pain location** — as the uterus enlarges, the appendix is displaced superiorly and laterally; RLQ pain may shift to RUQ in third trimester **[core]**
- **Diagnostic difficulty** — pregnancy physiology causes leukocytosis and tachycardia; nausea and vomiting common; may delay diagnosis **[core]**
- **Imaging considerations** — first-line ultrasound (no radiation); MRI second-line (no radiation, no gadolinium for foetus); CT only if essential and benefit outweighs minimal radiation risk to foetus **[core]**
- **Higher rates of perforation and peritonitis** due to delayed diagnosis; pre-term labour, foetal loss higher with perforation than with operative management of appendicitis **[core]**
- Maternal mortality with perforated appendicitis is approximately 5 percent versus <1 percent for early appendectomy

b) State 4 management priorities. (4 marks)

- **Imaging confirmation** — graded compression ultrasound first-line; if non-diagnostic, MRI (preferred) OR limited CT (with shielding) if imaging needed **[core]**
- **Surgical consultation for appendectomy** — laparoscopic appendectomy preferred (less post-operative pain, lower wound complications, similar maternal / foetal outcomes); open appendectomy for late pregnancy / surgeon preference **[core]**
- **Empirical broad-spectrum antibiotics** — amoxicillin-clavulanate 1.2 g IV every 8 hours (safe in pregnancy); cefazolin + metronidazole alternative **[core]**
- **Obstetric consultation and monitoring** — fetal monitoring (cardiotocography in third trimester); consider tocolytic agents if pre-term labour develops; corticosteroids for fetal lung maturity if <34 weeks and pre-term delivery anticipated **[core]**
- Multidisciplinary management — obstetrician + general / paediatric surgeon + anaesthetist
- Position and analgesia — left lateral tilt to avoid aortocaval compression; opioids for pain

c) List 3 differential diagnoses to consider. (3 marks)

- **Pre-term labour** (uterine contractions, cervical change) **[core]**
- **Round ligament stretch / pain** **[core]**
- **Pyelonephritis** (right side; hydronephrosis common in pregnancy) **[core]**
- Cholecystitis
- Ovarian torsion / ruptured ovarian cyst
- Placental abruption
- Bowel pathology — diverticulitis, ischaemic, obstruction

References: eTG Therapeutic Guidelines — Antibiotic • eTG (Therapeutic Guidelines, current) • ACEM clinical policies and statements • RANZCOG Statement • Tintinalli's Emergency Medicine 9e Ch 79

Question 17 | Pneumoperitoneum — Causes and Investigation (9 marks)

A 70-year-old male with a history of chronic constipation presents to your emergency department with sudden-onset severe abdominal pain. He has been straining for 2 days with no bowel movement. His vital signs: heart rate 110 beats per minute, blood pressure 110/70 millimetres of mercury, respiratory rate 26, temperature 37.5 degrees Celsius. Examination: abdomen rigid with generalised tenderness. Erect chest radiograph shows free gas under both hemidiaphragms.

a) List 5 causes of pneumoperitoneum. (5 marks)

- **Perforated peptic ulcer** (most common cause of spontaneous pneumoperitoneum; 50-80 percent) **[core]**
- **Perforated diverticulum** (typically sigmoid) **[core]**
- **Perforated colon malignancy** **[core]**
- **Bowel ischaemia / infarction** (secondary perforation) **[core]**
- **Iatrogenic**: post-laparoscopy (can persist 7-14 days; benign), post-endoscopy / colonoscopy perforation, post-laparotomy **[core]**
- Trauma (penetrating or blunt with bowel perforation)
- Foreign body perforation; ingested objects
- Toxic megacolon with perforation
- Pneumatosis intestinalis (rare; can mimic free gas)

b) List 2 investigations to confirm the diagnosis. (2 marks)

- **Erect chest radiograph** — first-line; sensitivity ~80 percent; free gas under diaphragm **[core]**
- **Computed tomography of abdomen and pelvis with contrast** — most sensitive (>95 percent); identifies site of perforation, underlying pathology, complications **[core]**
- Plain abdominal radiograph (Rigler's sign — double-wall sign; football sign)
- Left lateral decubitus film if patient cannot stand for erect chest

c) State 2 immediate management priorities. (2 marks)

- **Aggressive resuscitation** — IV fluid 30 mL/kg; vasopressor support if persistent hypotension; bloods including FBC, coagulation, group and crossmatch, lactate; broad-spectrum antibiotics (piperacillin-tazobactam 4.5 g IV every 8 hours) **[core]**
- **Urgent surgical consultation for operative management** — laparotomy (or laparoscopy) for source control; nasogastric tube on free drainage; make nil by mouth; analgesia **[core]**
- Reverse anticoagulation if relevant
- ICU admission if shocked / multi-organ involvement

References: eTG Therapeutic Guidelines — Antibiotic • eTG (Therapeutic Guidelines, current) • Tintinalli's Emergency Medicine 9e Ch 79

Question 18 | Severity Scoring in Acute Pancreatitis (9 marks)

A 60-year-old woman presents to your emergency department with severe epigastric abdominal pain radiating to the back, vomiting, and feeling unwell for 12 hours. She has had a previous episode of similar pain 6 months ago. Her vital signs: heart rate 105 beats per minute, blood pressure 110/75 millimetres of mercury, respiratory rate 22, peripheral oxygen saturation 95 percent on room air, temperature 37.8 degrees Celsius. Bloods: lipase 4500 (diagnostic of pancreatitis); urea 9; creatinine 120; haematocrit 38; PaO₂ 75; Glasgow Coma Score 15.

a) List the 5 components of BISAP score for acute pancreatitis severity. (4 marks)

- **B — BUN (urea) >25 mg/dL (>8.9 mmol/L) [core]**
- **I — Impaired mental state (Glasgow Coma Score <15); S — Systemic inflammatory response syndrome (SIRS) — 2 of 4 (temperature <36 or >38, HR >90, RR >20 or PaCO₂ <32, WCC <4 or >12 or >10 percent bands) [core]**
- **A — Age >60 years [core]**
- **P — Pleural effusion present on imaging [core]**
- **BISAP score ≥3 = high risk for severe disease (mortality >5 percent); used in the first 24 hours**
- Alternatives: Glasgow / Imrie; APACHE II; Atlanta classification (mild / moderate / severe)

b) List 3 causes of acute pancreatitis (besides alcohol and gallstones). (3 marks)

- **Hypertriglyceridaemia** (fasting TG >11 mmol/L; uncommon but increasingly recognised; treat with fasting and insulin infusion) [core]
- **Hypercalcaemia** (hyperparathyroidism, malignancy) [core]
- **Drug-induced** — thiazide diuretics, valproate, azathioprine, sulfonamides, oestrogens, statins [core]
- Iatrogenic — ERCP (3-5 percent of procedures)
- Trauma (blunt or penetrating)
- Infection — viral (mumps, coxsackievirus, HIV), parasitic (Ascaris)
- Autoimmune pancreatitis (IgG4-associated)
- Pancreas divisum, ampullary stenosis (structural)
- Idiopathic (10-15 percent — workup if recurrent)

c) List 2 indications for early endoscopic retrograde cholangiopancreatography (ERCP) in acute pancreatitis. (2 marks)

- **Cholangitis** in patient with biliary pancreatitis (within 24 hours) [core]
- **Persistent biliary obstruction** (elevated bilirubin, dilated common bile duct on imaging) with progressive or severe pancreatitis (within 72 hours) [core]
- ERCP with sphincterotomy reduces complications and mortality in severe biliary pancreatitis
- Routine ERCP in mild biliary pancreatitis is NOT recommended (no benefit)

References: eTG Therapeutic Guidelines — Gastrointestinal • eTG (Therapeutic Guidelines, current) • BISAP score (Wu 2008) • Tintinalli's Emergency Medicine 9e Ch 79

Question 19 | Chronic Mesenteric Ischaemia (Intestinal Angina) (9 marks)

A 70-year-old male smoker presents to your emergency department with several months of post-prandial abdominal pain (occurring 30-60 minutes after eating) and significant weight loss (15 kilograms over 6 months). He has developed 'food fear' and is now eating only small amounts. He has past medical history of peripheral vascular disease and ischaemic heart disease. On examination, he is cachectic, with diffuse abdominal tenderness without peritonism. His vital signs are stable. Bloods are unremarkable (white cell count 9, lactate 1.5).

a) List 4 features supporting chronic mesenteric ischaemia. (4 marks)

- **Post-prandial abdominal pain** (30-60 minutes after eating; called 'intestinal angina') **[core]**
- **Significant weight loss with food fear** (this patient — 15 kg over 6 months; reduced intake to avoid pain) **[core]**
- **Cardiovascular risk factors** — peripheral vascular disease, ischaemic heart disease, atherosclerosis (atherosclerotic occlusion of mesenteric vessels) **[core]**
- **Often abnormal abdominal auscultation** (epigastric bruit may be present) **[core]**
- Smoking, hyperlipidaemia, diabetes
- Diarrhoea / malabsorption may be present

b) List 3 investigations. (3 marks)

- **Computed tomography angiography of mesenteric vessels** — first-line; demonstrates atherosclerotic stenosis or occlusion of celiac, SMA, or IMA **[core]**
- **Mesenteric Doppler ultrasound** — non-invasive; assesses peak systolic velocity in celiac and SMA (elevated in stenosis) **[core]**
- **Magnetic resonance angiography** — alternative if contrast contraindicated **[core]**
- Conventional angiography — gold standard; needed for endovascular intervention
- Investigate for cardiovascular risk factors and other manifestations of atherosclerosis

c) State 2 management options. (2 marks)

- **Endovascular angioplasty and stenting** — first-line for most patients; lower morbidity than open surgery **[core]**
- **Open mesenteric revascularisation** (mesenteric artery bypass / endarterectomy) — more durable; reserved for patients with anatomy unsuitable for endovascular approach **[core]**
- Smoking cessation, statin therapy, antiplatelet (aspirin)
- Nutritional support during diagnostic and treatment phase

References: World Society of Emergency Surgery (current) • eTG (Therapeutic Guidelines, current) • Tintinalli's Emergency Medicine 9e Ch 80

Question 20 | Rectal Foreign Body (9 marks)

A 35-year-old man self-presents to your emergency department with a retained rectal foreign body inserted approximately 8 hours ago. He is embarrassed and reluctant to give details. He has had no further bowel motions or flatus since insertion. On examination, he is haemodynamically stable but mildly anxious; abdominal examination shows mild lower abdominal tenderness without peritonism. The object cannot be palpated on digital rectal examination.

a) List 3 clinical features that would raise concern for complications. (3 marks)

- **Peritonism / abdominal guarding** — suggests perforation **[core]**
- **Bleeding per rectum or in stool** — mucosal injury or perforation **[core]**
- **Systemic features (fever, tachycardia, hypotension)** — perforation with sepsis **[core]**
- Subcutaneous emphysema in pelvis or scrotum (perforation with retroperitoneal gas)
- Severe pain

b) List 3 investigations. (3 marks)

- **Plain abdominal radiograph** — identifies radio-opaque foreign body and free gas (perforation) **[core]**
- **Erect chest radiograph** — perforation with gas under diaphragm **[core]**
- **Computed tomography of abdomen and pelvis with contrast** — characterises the foreign body, its position, signs of perforation; highly sensitive **[core]**

c) State 3 management priorities. (3 marks)

- **Approach with sensitivity** — respect privacy and dignity; non-judgmental approach; explain process clearly; female chaperone if appropriate **[core]**
- **Attempt manual removal under adequate analgesia / sedation** with gloved hand and lubrication; anal sphincter relaxation important; rigid sigmoidoscopy may be needed; abdominal pressure to descend the object **[core]**
- **Surgical consultation** — for operative removal under general anaesthesia if bedside removal fails; laparotomy for perforation; post-removal sigmoidoscopy to assess mucosal injury **[core]**
- Tetanus update if any concern
- Counsel re: patient education — risk of future complications; mental health support if needed

References: World Society of Emergency Surgery (current) • eTG (Therapeutic Guidelines, current) • Tintinalli's Emergency Medicine 9e Ch 82 • ACEM clinical policies and statements

Question 21 | Tokyo Severity Grading for Cholangitis (9 marks)

A 38-year-old woman presents to your emergency department with right upper quadrant pain and jaundice for 3 days. She has a past history of cholelithiasis. Her vital signs: heart rate 125 beats per minute, blood pressure 95/70 millimetres of mercury, respiratory rate 24, peripheral oxygen saturation 99 percent on room air, temperature 39.2 degrees Celsius, Glasgow Coma Score 15. She has a known penicillin sensitivity producing rash.

a) Apply the Tokyo severity grading (TG18) to this patient. (3 marks)

- **Grade I (mild):** meets diagnostic criteria but not Grade II or III criteria **[core]**
- **Grade II (moderate):** any 2 of: fever >39 degrees Celsius; age >75; hyperbilirubinaemia >5 mg/dL; raised WCC >12 or <4; albumin <0.7 of normal **[core]**
- **Grade III (severe):** dysfunction in ≥1 organ system: cardiovascular (hypotension requiring vasopressor); neurological (decreased GCS); respiratory ($\text{PaO}_2/\text{FiO}_2 < 300$); renal (creatinine >2 OR oliguria); hepatic (INR >1.5); haematological (platelets <100). **This patient appears Grade II - III given hypotension and tachycardia [core]**

b) List 4 specific antibiotic considerations given penicillin allergy. (4 marks)

- **Document allergy details** — rash (this patient — likely cell-mediated reaction; cephalosporins may be used cautiously); anaphylaxis or Stevens-Johnson syndrome (avoid all beta-lactams) **[core]**
- **Ciprofloxacin 400 mg IV every 12 hours + metronidazole 500 mg IV every 12 hours** (good biliary penetration; covers gram-negatives and anaerobes); or piperacillin-tazobactam if mild rash only (cross-reactivity rare) **[core]**
- **Aminoglycoside (gentamicin 5 mg/kg) + metronidazole** as alternative; monitor renal function; not first-line for severe sepsis **[core]**
- **Carbapenem (meropenem 1 g IV every 8 hours)** reserved for severe cholangitis or known multi-drug resistance **[core]**
- Aztreonam (no cross-reactivity with penicillin) — for severe penicillin allergy

c) List 2 ongoing inpatient orders to write. (2 marks)

- Continue antibiotics (ciprofloxacin and metronidazole as above) for minimum 7-10 days IV then switch to oral once temperature normal for 48 hours **[core]**
- Plan for ERCP and / or cholecystectomy after acute episode settles (within 24 hours for severe; within 1-2 weeks for mild cholangitis to definitive treatment); monitor LFTs daily **[core]**
- Anti-emetic, IV fluids, analgesia, monitoring of vitals; nil by mouth pending intervention
- Anticoagulant prophylaxis (mechanical or pharmacological depending on bleeding risk)

References: Tokyo Guidelines TG18 • eTG Therapeutic Guidelines — Antibiotic • eTG (Therapeutic Guidelines, current)

Question 22 | Post-Cholecystectomy Complications (9 marks)

A 50-year-old woman presents to your emergency department on day 4 after laparoscopic cholecystectomy with progressive abdominal pain, fever, and feeling unwell. Her past surgery was uneventful. On examination, she has generalised abdominal tenderness with peritonism. Her vital signs: heart rate 115 beats per minute, blood pressure 105/65 millimetres of mercury, respiratory rate 24, peripheral oxygen saturation 96 percent on room air, temperature 38.5 degrees Celsius. Bloods: white cell count 18, C-reactive protein 280, bilirubin 80 (raised), alkaline phosphatase 220, lactate 3.0.

a) List 4 differential diagnoses. (4 marks)

- **Bile leak** (from cystic duct stump or accessory duct of Luschka — typical post-cholecystectomy; raised bilirubin and ALP supports) **[core]**
- **Bile duct injury** (typically discovered intraoperatively; less commonly delayed presentation; Strasberg classification of injury) **[core]**
- **Retained common bile duct stone** (post-cholecystectomy syndrome; typical jaundice + pain pattern) **[core]**
- **Intra-abdominal abscess / haematoma** (sub-hepatic, sub-phrenic, peritoneal); perforated viscus; bowel injury **[core]**
- Pulmonary complications (atelectasis, aspiration pneumonia, pulmonary embolism)
- Wound / port-site complications (haematoma, infection, hernia)
- Sepsis from other source

b) List 3 investigations. (3 marks)

- **Computed tomography of abdomen and pelvis with contrast** — first-line; identifies bile collection (biloma), abscess, peritoneal fluid, free air, underlying biliary anatomy **[core]**
- **HIDA (hepatobiliary iminodiacetic acid) scan** — confirms ongoing bile leak (extravasation of tracer); magnetic resonance cholangiopancreatography (MRCP) for definition of biliary anatomy **[core]**
- **Endoscopic retrograde cholangiopancreatography (ERCP)** — diagnostic AND therapeutic (stenting, sphincterotomy) **[core]**
- Bloods (FBC, LFTs, CRP, lactate, blood cultures)
- Diagnostic / therapeutic paracentesis if fluid collection accessible (biloma drainage)

c) State 2 management priorities. (2 marks)

- **Empirical broad-spectrum antibiotics** — piperacillin-tazobactam 4.5 g IV every 8 hours or ceftriaxone + metronidazole; covers gram-negatives and anaerobes; fluid resuscitation **[core]**
- **Surgical / interventional consultation** — drainage of biloma (percutaneous or surgical); ERCP for stenting / sphincterotomy if cystic duct leak; surgical re-exploration for major bile duct injury **[core]**
- Multidisciplinary management — gastroenterology, surgery, interventional radiology
- ICU / HDU admission if septic

References: eTG Therapeutic Guidelines — Antibiotic • eTG (Therapeutic Guidelines, current) • Australia / NZ Gastroenterological Society • Tintinalli's Emergency Medicine 9e Ch 79