6.1 Surface markings of the main non-alimentary tract abdominal organs

Structure	Position
Liver	Upper border: fifth right intercostal space on full expiration Lower border: at the costal margin in the mid-clavicular line on full inspiration
Spleen	Underlies left ribs 9–11, posterior to the mid-axillary line
Gallbladder	At the intersection of the right lateral vertical plane and the costal margin, i.e. tip of the ninth costal cartilage
Pancreas	The neck of the pancreas lies at the level of L1; the head lies below and right; the tail lies above and left
Kidneys	Upper pole lies deep to the 12th rib posteriorly, 7 cm from the midline; the right is 2–3 cm lower than the left

6.2 Diagnosing abdominal pain

not true colic

	Disorder			
	Peptic ulcer	**Biliary colic**	**Acute pancreatitis**	**Renal colic**
Site	Epigastrium	Epigastrium/right hypochondrium	Epigastrium/left hypochondrium	Loin
Onset	Gradual	Rapidly increasing	Sudden	Rapidly increasing
Character	Gnawing	Constant	Constant	Constant
Radiation	Into back	Below right scapula	Into back	Into genitalia and inner thigh
Associated symptoms	Non-specific	Non-specific	Non-specific	Non-specific
Timing				
Frequency/ periodicity	Remission for weeks/months	Attacks can be enumerated	Attacks can be enumerated	Usually a discrete episode
Special times	Nocturnal and especially when hungry	Unpredictable	After heavy drinking	Following periods of dehydration
Duration	1/2–2 hours	4–24 hours	>24 hours	4–24 hours
Exacerbating factors	Stress, spicy foods, alcohol, non-steroidal anti-inflammatory drugs	Eating – unable to eat during bouts	Alcohol Eating – unable to eat during bouts	–
Relieving factors	Food, antacids, vomiting	–	Sitting upright	–
Severity	Mild to moderate	Severe	Severe	Severe

6.3 Non-alimentary causes of abdominal pain

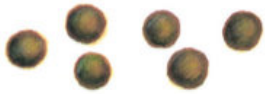
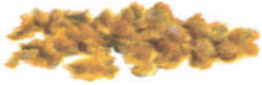
Disorder	Clinical features
Myocardial infarction	Epigastric pain without tenderness *Angor animi* (feeling of impending death) Hypotension Cardiac arrhythmias
Dissecting aortic aneurysm	Tearing interscapular pain *Angor animi* Hypotension Asymmetry of femoral pulses
Acute vertebral collapse	Lateralised pain restricting movement Tenderness overlying involved vertebra
Cord compression	Pain on percussion of thoracic spine Hyperaesthesia at affected dermatome with sensory loss below Spinal cord signs
Pleurisy	Lateralised pain on coughing Chest signs (e.g. pleural rub)
Herpes zoster	Hyperaesthesia in dermatomal distribution Vesicular eruption
Diabetic ketoacidosis	Cramp-like pain Vomiting Air hunger Tachycardia Ketotic breath
Pelvic inflammatory disease or tubal pregnancy	Suprapubic and iliac fossa pain, localised tenderness Nausea, vomiting Fever
Torsion of testis/ovary	Lower abdominal pain Nausea, vomiting Localised tenderness

6.4 Typical clinical features in patients with an 'acute abdomen'

*IMPORTANT

Condition	History	Examination
Acute appendicitis	Nausea, vomiting, central abdominal pain that later shifts to the right iliac fossa	Fever, tenderness, guarding or palpable mass in the right iliac fossa, pelvic peritonitis on rectal examination
Perforated peptic ulcer with acute peritonitis	Vomiting at onset associated with severe acute-onset abdominal pain, previous history of dyspepsia, ulcer disease, non-steroidal anti-inflammatory drugs or glucocorticoid therapy	Shallow breathing with minimal abdominal wall movement, abdominal tenderness and guarding, board-like rigidity, abdominal distension and absent bowel sounds
Acute pancreatitis	Anorexia, nausea, vomiting, constant severe epigastric pain, previous alcohol abuse/cholelithiasis	Fever, periumbilical or loin bruising, epigastric tenderness, variable guarding, reduced or absent bowel sounds
Ruptured aortic aneurysm	Sudden onset of severe, tearing back/loin/abdominal pain, hypotension and past history of vascular disease and/or high blood pressure	Shock and hypotension, pulsatile, tender, abdominal mass, asymmetrical femoral pulses
Acute mesenteric ischaemia	Anorexia, nausea, vomiting, bloody diarrhoea, constant abdominal pain, previous history of vascular disease and/or high blood pressure	Atrial fibrillation, heart failure, asymmetrical peripheral pulses, absent bowel sounds, variable tenderness and guarding
Intestinal obstruction	Colicky central abdominal pain, nausea, vomiting and constipation	Surgical scars, hernias, mass, distension, visible peristalsis, increased bowel sounds
Ruptured ectopic pregnancy	Premenopausal female, delayed or missed menstrual period, hypotension, unilateral iliac fossa pain, pleuritic shoulder-tip pain, 'prune juice'-like vaginal discharge	Suprapubic tenderness, periumbilical bruising, pain and tenderness on vaginal examination (cervical excitation), swelling/fullness in fornix on vaginal examination
Pelvic inflammatory disease	Sexually active young female, previous history of sexually transmitted infection, recent gynaecological procedure, pregnancy or use of intrauterine contraceptive device, irregular menstruation, dyspareunia, lower or central abdominal pain, backache, pleuritic right upper quadrant pain (Fitz-Hugh–Curtis syndrome)	Fever, vaginal discharge, pelvic peritonitis causing tenderness on rectal examination, right upper quadrant tenderness (perihepatitis), pain/tenderness on vaginal examination (cervical excitation), swelling/fullness in fornix on vaginal examination

THE BRISTOL STOOL FORM SCALE

Type 1		Separate hard lumps, like nuts (hard to pass)
Type 2		Sausage-shaped but lumpy
Type 3		Like a sausage but with cracks on its surface
Type 4		Like a sausage or snake, smooth and soft
Type 5		Soft blobs with clear-cut edges (passed easily)
Type 6		Fluffy pieces with ragged edges, a mushy stool
Type 7		Watery, no solid pieces ENTIRELY LIQUID

* not required

Show patient in HPI to know consistency

6.5 Prediction of the risk of mortality in patients with upper gastrointestinal bleeding: Rockall score

Criterion	Score
Age	
<60 years	0
60–79 years	1
>80 years	2
Shock	
None	0
Pulse >100 beats per minute and systolic blood pressure >100 mmHg	1
Systolic blood pressure <100 mmHg	2
Comorbidity	
None	0
Heart failure, ischaemic heart disease or other major illness	2
Renal failure or disseminated malignancy	3
Endoscopic findings	
Mallory–Weiss tear and no visible bleeding	0
All other diagnoses	1
Upper gastrointestinal malignancy	2
Major stigmata of recent haemorrhage	
None	0
Visible bleeding vessel/adherent clot	2
Total score	
Pre-endoscopy (maximum score = 7)	Score 4 = 14% mortality pre-endoscopy
Post-endoscopy (maximum score = 11)	Score 8+ = 25% mortality post-endoscopy

Reproduced from Rockall TA, Logan RF, Devlin HB, et al. Risk assessment after acute upper gastrointestinal haemorrhage. Journal of the British Society of Gastroenterology 1996; 38(3):316, with permission from BMJ Publishing Group Ltd.

6.6 Prediction of need to have a medical intervention (e.g. blood transfusion or endoscopy) in patients with upper gastrointestinal bleeding: The Glasgow-Blatchford bleeding score

Admission risk marker	Score component value
Blood urea (mmol/L)	
>6–5 <8–0	2
>8–0 <10–0	3
<1–0 <25–0	4
>25	6
Haemoglobin (g/L) for men	
>120 <130	1
>100 <120	3
<10–0	6
Haemoglobin (g/L) for women	
≥100<120	1
<100	6
Systolic blood pressure (mmHg)	
<100–109	1
90–99	2
<90	3
Other markers	
Pulse >100 (per min)	1
Presentation with melaena	1
Presentation with synoope	2
Hepatic disease	2
Cardiac failure	2

Score of 0 no interventions needed; patient can be treated as an outpatient

Scores of 6 >50% risk of needing an intervention.

Reprinted with permission from Elsevier, Blatchford O, Murray WR, Blatchford M. A risk score to predict need for treatment for upper-gastrointestinal haemorrhage. Lancet *2000;356:1318–21.*

6.7 Common causes of jaundice

Increased bilirubin production

- Haemolysis (unconjugated hyperbilirubinaemia)

Impaired bilirubin excretion

- Congenital:
  - Gilbert's syndrome (unconjugated)
- Hepatocellular:
  - Viral hepatitis
  - Cirrhosis
  - Drugs
  - Autoimmune hepatitis
- Intrahepatic cholestasis:
  - Drugs
  - Primary biliary cirrhosis
- Extrahepatic cholestasis:
  - Gallstones
  - Cancer: pancreas, cholangiocarcinoma

6.8 Urine and stool analysis in jaundice

* important

	Urine			Stools
	Colour	Bilirubin	Urobilinogen	Colour
Unconjugated	Normal	–	++++	Normal
Hepatocellular	Dark	++	++	Normal
Obstructive	Dark	++++	–	Pale

6.9 Examples of drug-induced gastrointestinal conditions

Symptom	Drug
Weight gain	Oral glucocorticoids
Dyspepsia and gastrointestinal bleeding	Aspirin Non-steroidal anti-inflammatory drugs
Nausea	Many drugs, including selective serotonin reuptake inhibitor antidepressants
Diarrhoea (pseudomembranous colitis)	Antibiotics Proton pump inhibitors
Constipation	Opioids
Jaundice: hepatitis	Paracetamol (overdose) Pyrazinamide Rifampicin Isoniazid
Jaundice: cholestatic	Flucloxacillin Chlorpromazine Co-amoxiclav
Liver fibrosis	Methotrexate

6.10 Specific signs in the 'acute abdomen'

Sign	Disease associations	Examination
Murphy's	Acute cholecystitis: Sensitivity 50–97% Specificity 50–80%	As the patient takes a deep breath in, gently palpate in the right upper quadrant of the abdomen; the acutely inflamed gallbladder contacts the examining fingers, evoking pain with the arrest of inspiration
Rovsing's	Acute appendicitis: Sensitivity 20–70% Specificity 40–96%	Palpation in the left iliac fossa produces pain in the right iliac fossa
Iliopsoas	Retroileal appendicitis, iliopsoas abscess, perinephric abscess	Ask the patient to flex their thigh against the resistance of your hand; a painful response indicates an inflammatory process involving the right psoas muscle
Grey Turner's and Cullen's	Haemorrhagic pancreatitis, aortic rupture and ruptured ectopic pregnancy (see Fig. 6.13)	Bleeding into the falciform ligament; bruising develops around the umbilicus (Cullen) or in the loins (Grey Turner)

6.11 Causes of hepatomegaly

Chronic parenchymal liver disease

- Alcoholic liver disease
- Hepatic steatosis
- Autoimmune hepatitis
- Viral hepatitis
- Primary biliary cirrhosis

Malignancy

- Primary hepatocellular cancer
- Secondary metastatic cancer

Right heart failure

Haematological disorders

- Lymphoma
- Leukaemia
- Myelofibrosis
- Polycythaemia

Rarities

- Amyloidosis
- Budd–Chiari syndrome
- Sarcoidosis
- Glycogen storage disorders

6.12 Grading of hepatic encephalopathy (West Haven)

Stage	State of consciousness
0	No change in personality or behaviour No asterixis (flapping tremor)
1	Impaired concentration and attention span Sleep disturbance, slurred speech Euphoria or depression Asterixis present
2	Lethargy, drowsiness, apathy or aggression Disorientation, inappropriate behaviour, slurred speech
3	Confusion and disorientation, bizarre behaviour Drowsiness or stupor Asterixis usually absent
4	Comatose with no response to voice commands Minimal or absent response to painful stimuli

Reproduced from Conn HO, Leevy CM, Vlahcevic ZR, et al. Comparison of lactulose and neomycin in the treatment of chronic portal-systemic encephalopathy. A double-blind controlled trial. Gastroenterology. 1977;72(4):573, with permission from Elsevier Inc.

6.13 Differentiating a palpable spleen from the left kidney

Distinguishing feature	Spleen	Kidney
Mass is smooth and regular in shape	More likely	Polycystic kidneys are bilateral irregular masses
Mass descends in inspiration	Yes, travels superficially and diagonally	Yes, moves deeply and vertically
Ability to feel deep into the mass	Yes	No
Palpable notch on the medial surface	Yes	No
Bilateral masses palpable	No	Sometimes (e.g. polycystic kidneys)
Percussion resonant over the mass	No	Sometimes
Mass extends beyond the midline	Sometimes	No (except with horseshoe kidney)

6.14 Causes of splenomegaly

Haematological disorders

- Lymphoma and lymphatic leukaemias
- Myeloproliferative diseases, polycythaemia rubra vera and myelofibrosis
- Haemolytic anaemia, congenital spherocytosis

Portal hypertension

Infections

- Glandular fever
- Malaria, kala-azar (leishmaniasis)
- Bacterial endocarditis
- Brucellosis, tuberculosis, salmonellosis

Rheumatological conditions

- Rheumatoid arthritis (Felty's syndrome)
- Systemic lupus erythematosus

Rarities

- Sarcoidosis
- Amyloidosis
- Glycogen storage disorders

6.15 Causes of ascites

Diagnosis	Comment
Common	
Hepatic cirrhosis with portal hypertension	Transudate
Intra-abdominal malignancy with peritoneal spread	Exudate, cytology may be positive
Uncommon	
Hepatic vein occlusion (Budd–Chiari syndrome)	Transudate in the acute phase
Constrictive pericarditis and right heart failure	Check jugular venous pressure and listen for pericardial rub
Hypoproteinaemia (nephrotic syndrome, protein-losing enteropathy)	Transudate
Tuberculous peritonitis	Low glucose content
Pancreatitis, pancreatic duct disruption	Very high amylase content

6.16 Indications for rectal examination

Alimentary

- Suspected appendicitis, pelvic abscess, peritonitis, lower abdominal pain
- Diarrhoea, constipation, tenesmus or anorectal pain
- Rectal bleeding or iron deficiency anaemia
- Unexplained weight loss
- Bimanual examination of lower abdominal mass for diagnosis or staging
- Malignancies of unknown origin

Genitourinary

- Assessment of prostate in prostatism or suspected prostatic cancer
- Dysuria, frequency, haematuria, epididymo-orchitis
- Replacement for vaginal examination when this would be inappropriate

Miscellaneous

- Unexplained bone pain, backache or lumbosacral nerve root pain
- Pyrexia of unknown origin
- Abdominal, pelvic or spinal trauma

6.17 Causes of abnormal stool appearance

Stool appearance	Cause
Abnormally pale	Biliary obstruction
Pale and greasy	Steatorrhoea
Black and tarry (melaena)	Bleeding from the upper gastrointestinal tract
Grey/black	Oral iron or bismuth therapy
Silvery	Steatorrhoea plus upper gastrointestinal bleeding (e.g. pancreatic cancer)
Fresh blood in or in stool	Large bowel, rectal or anal bleeding
Stool mixed with pus	Infective colitis or inflammatory bowel disease
Rice-water stool (watery with mucus and cell debris)	Cholera

RENAL TABLES

12.1 Definition of acute kidney injury

RIFLE[a] AKIN[b]	Serum creatinine criteria	Urine output criteria
Risk AKIN stage 1	Increase>50%	< 0.5 mL/kg/h for 6 hours
Injury AKIN stage 2	Increase>100%	<0.5 mL/kg/h for 12 hours
Failure AKIN stage 3	Increase>200% or serum creatinine >350 μmol/L (3.96 mg/dL)	0.3 mL/kg/h for 24 hours or anuria for 12 hours
Loss	Renal replacement therapy for >4 weeks	–
End-stage kidney disease	Renal replacement therapy for >3 months	–

[a]Risk, injury, failure, loss, end-stage kidney disease
[b]Acute kidney injury network

12.2 Causes of acute kidney injury

Prerenal

- Hypovolaemia (e.g. blood loss, diarrhoea, vomiting, diuresis or inadequate oral intake)
- Relative hypovolaemia (e.g. heart failure or nephrotic syndrome)
- Sepsis
- Drugs (e.g. antihypertensives, diuretics or non-steroidal anti-inflammatory drugs)
- Renal artery stenosis or occlusion
- Hepatorenal syndrome

Intrarenal

- Glomerular disease (e.g. immunoglobulin A nephropathy, systemic vasculitis or systemic lupus erythematosus)
- Interstitial nephritis (drug-induced)
- Acute tubular necrosis/injury (may follow a prerenal cause)
- Multiple myeloma
- Rhabdomyolysis
- Intrarenal crystal deposition (e.g. urate nephropathy or ethylene glycol poisoning)
- Thrombotic microangiopathy (e.g. haemolytic uraemic syndrome or scleroderma renal crisis)
- Accelerated-phase hypertension
- Cholesterol emboli

Postrenal

- Renal stones (in papilla, ureter, or bladder)
- Papillary necrosis
- Ureteric or bladder transitional cell carcinoma
- Intraabdominal or pelvic malignancy (e.g. cervical carcinoma)
- Retroperitoneal fibrosis
- Blood clot
- Bladder outflow obstruction (e.g. prostatic enlargement)
- Neurogenic bladder
- Urethral stricture
- Posterior urethral valves
- Iatrogenic (e.g. ureteric damage at surgery, blocked urethral catheter)

12.3 Definition of chronic kidney disease

CKD stage	eGFR (mL/min/1.73 m^2)	Description	Management
1	≥90	Kidney damage with normal or ↑ GFR	Observe; control blood pressure and risk factors
2	60–89	Kidney damage with mild ↓ GFR	
3A	45–59	Moderate ↓ GFR	
3B	30–44		
4	15–29	Severe ↓ GFR	Prepare for kidney failure
5	<15	Kidney failure	Dialysis, transplantation or conservative care

p: the addition of p to a stage (e.g. 2p, 3Bp) means that there is significant proteinuria. Proteinuria is quantified on the basis of an albumin : creatinine (ACR) or protein : creatinine (PCR; see Box 12.4).
T: the addition of T to a stage (e.g. 4T) indicates that the patient has a renal transplant.
D: the addition of D to stage 5 CKD (i.e. 5D) indicates that the patient is on dialysis.

(e)GFR, (estimated) glomerular filtration rate.

12.4 Quantification of proteinuria using either urine albumin:creatinine ratio or protein:creatinine ratio

ACR (mg/mmol)	PCR (mg/mmol)	Interpretation
>2.5/3.5[a]	>15	Abnormal; adequate to define CKD stages 1 and 2; start ACE inhibitor or angiotensin-receptor blocker if diabetes is present
30	>50	Use ACE inhibitor or angiotensin-receptor blocker if blood pressure is elevated; suffix 'p' on CKD stage
70	100	Requires tight blood pressure control
>250	>300	Nephrotic-range proteinuria

[a]Values for males/females

ACE, Angiotensin-converting enzyme; *CKD,* chronic kidney disease.