



Figure 6.26 Massive splenomegaly: note the splenic notch



a



b



c



d

Figure 6.27 Palpation of the spleen

- (a) Palpation begins in the lower mid-abdomen and finishes up under the left costal margin.
- (b) The examiner's hand supports the patient's side...
- (c) ...and then rests over the lower costal margin to reduce skin resistance.
- (d) If the spleen is not palpable when the patient is flat, he or she should be rolled towards the examiner.

If the spleen is not palpable, the patient must be rolled onto the right

side towards the examiner (the right lateral decubitus position) and palpation repeated. Here one begins close to the left costal margin ([Figure 6.27d](#)). As a general rule, splenomegaly becomes just detectable if the spleen is one-and-a-half to two times enlarged. Palpation for splenomegaly is only moderately sensitive but highly specific. The positive LR of splenomegaly when the spleen is palpable is 9.6 and the negative LR of splenomegaly if the spleen is not palpable is 0.6.¹¹ The causes of splenomegaly are listed in [Table 8.8](#) ([page 230](#)). The causes of hepatosplenomegaly are listed in [Table 6.13](#).

TABLE 6.13 Causes of hepatosplenomegaly

Chronic liver disease with portal hypertension
Haematological disease, e.g. myeloproliferative disease, lymphoma, leukaemia, pernicious anaemia, sickle cell anaemia
Infection, e.g. acute viral hepatitis, infectious mononucleosis, cytomegalovirus
Infiltration, e.g. amyloid, sarcoid
Connective tissue disease, e.g. systemic lupus erythematosus
Acromegaly
Thyroid toxicosis

The kidneys

The first important differential diagnosis to consider, if a right or left subcostal mass is palpable, must be a kidney. An attempt to palpate the kidney should be a routine part of the examination. The bimanual method is the best. The patient lies flat on his or her back. To palpate the right kidney, the examiner's left hand slides underneath the back to rest with the heel of the hand under the right loin. The fingers remain free to flex at the metacarpophalangeal joints in the area of the renal angle. The flexing fingers

can push the contents of the abdomen anteriorly. The examiner's right hand is placed over the right upper quadrant.

First an attempt should be made to capture the kidney between the two hands. It is more often possible to feel a kidney by bimanual palpation (this is traditionally called *ballotting*, although this term should probably be reserved for the palpation of an organ or mass in a fluid medium). In this case the renal angle is pressed sharply by the flexing fingers of the posterior hand. The kidney can be felt to float upwards and strike the anterior hand. The opposite hands are used to palpate the left kidney.

When palpable, the kidney feels like a swelling with a rounded lower pole and a medial dent (the hilum). However, it is unusual for a normal kidney to be felt as clearly as this. The lower pole of the right kidney may be palpable in thin, normal persons. Both kidneys move downwards with inspiration. The causes of kidney enlargement are listed in [Table 7.8 \(page 210\)](#).

It is particularly common to confuse a large left kidney with splenomegaly. The major distinguishing features are: (i) the spleen has no palpable upper border—the space between the spleen and the costal margin, which is present in renal enlargement, cannot be felt; (ii) the spleen, unlike the kidney, has a notch that may be palpable; (iii) the spleen moves inferomedially on inspiration while the kidney moves inferiorly; (iv) the spleen is not usually ballotable unless gross ascites is present, but the kidney is, again because of its retroperitoneal position; (v) the percussion note is dull over the spleen but is usually resonant over the kidney, as the latter lies posterior to loops of gas filled bowel; (vi) a friction rub may occasionally be heard over the spleen, but never over the kidney because it is too posterior.

Other abdominal masses

The causes of a mass in the abdomen, excluding the liver, spleen and kidneys, are summarised in [Table 6.14](#).

TABLE 6.14 Causes of abdominal masses

Right iliac fossa

Appendiceal abscess or mucocele of the appendix

Carcinoma of the caecum or caecal distension due to distal obstruction

Crohn's disease (usually when complicated by an abscess)

Ovarian tumour or cyst

Carcinoid tumour

Amoebiasis

Psoas abscess

Ileocaecal tuberculosis

Hernia

Transplanted kidney

Left iliac fossa

Faeces (NB: Can often be indented)

Carcinoma of sigmoid or descending colon

Diverticular abscess

Ovarian tumour or cyst

Psoas abscess

Hernia

Transplanted kidney

Upper abdomen

Retroperitoneal lymphadenopathy (e.g. lymphoma, teratoma)

Left lobe of the liver

Abdominal aortic aneurysm (expansile)

Carcinoma of the stomach

Pancreatic pseudocyst or tumour

Gastric dilatation (e.g. pyloric stenosis, acute dilatation in diabetic ketoacidosis or after surgery)

Carcinoma of the transverse colon

Omental mass (e.g. metastatic tumour)

Small bowel obstruction

Pelvis

Bladder

Ovarian tumour or cyst

Uterus (e.g. pregnancy, tumour, fibroids)

Small bowel obstruction

Stomach and duodenum

Although many clinicians palpate the epigastrium to elicit tenderness in patients with suspected peptic ulcer, the presence or absence of tenderness is not helpful in making this diagnosis. With gastric outlet obstruction due to a peptic ulcer or gastric carcinoma ([page 194](#)), the 'succussion splash' (the sign of Hippocrates) may occasionally be present but unfortunately this entertaining sign is more of historical interest than practical use now. In a case of suspected gastric outlet obstruction, after warning the patient what is to come, grasp one iliac crest with each hand, place your stethoscope close to the epigastrium and shake the patient vigorously from side to side. The listening ears eagerly await a splashing noise due to excessive fluid retained in

an obstructed stomach. The test is not useful if the patient has just drunk a large amount of milk or other fluid for his or her ulcer; the clinician must then return 4 hours later, having forbidden the patient to drink anything further.

Pancreas

A pancreatic pseudocyst following acute pancreatitis may, if large, be palpable as a rounded swelling above the umbilicus. It is characteristically tense, does not descend with inspiration and feels fixed. Occasionally a pancreatic carcinoma may be palpable in thin patients.

Aorta

Arterial pulsation from the abdominal aorta may be present, usually in the epigastrium, in thin normal people. The problem is to determine whether such a pulsation represents an aortic aneurysm (usually due to atherosclerosis) or not. Measure the width of the pulsation gently with two fingers by aligning these parallel to the aorta and placing them at the outermost palpable margins. With an aortic aneurysm, the pulsation is expansile (i.e. it enlarges appreciably with systole) ([Figure 6.28](#)). If an abdominal aortic aneurysm is larger than 5 cm in diameter, it usually merits surgical repair. The sensitivity of examination for finding an aneurysm of 5 cm or larger is 82%.^{[12,13](#)} The sensitivity of the examination for detecting an aneurysm increases *pari passu* with the size of the aneurysm. The overall LR for a significant aneurysm when one is suspected on palpation is 2.7, with a negative LR of 0.43 if the examination is normal.^{[11](#)}

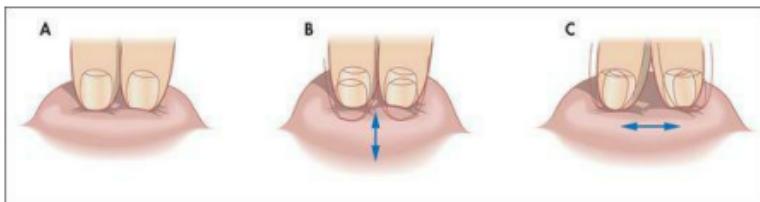


Figure 6.28 Detecting an expansile impulse

A = no impulse; B = transmitted pulsation from a neighbouring artery; C = expansile impulse, the sign of an aneurysm.

Bowel

Particularly in severely constipated patients with soft abdominal walls and retained faeces, the sigmoid colon is often palpable. Unlike other masses, faeces can usually be indented by the examiner's finger. Rarely, carcinoma of the bowel may be palpable, particularly in the caecum where masses can grow to a large size before they cause obstruction. Such a mass does not move on respiration. In the examination of children or adults with chronic constipation and a megarectum, the enlarged rectum containing impacted stool may be felt above the symphysis pubis, filling a variable part of the pelvis in the midline.

Bladder

An empty bladder is impalpable. If there is urinary retention, the full bladder may be palpable above the pubic symphysis. It forms part of the differential diagnosis of any swelling arising out of the pelvis. It is characteristically impossible to feel the bladder's lower border. The swelling is typically regular, smooth, firm and oval-shaped. The bladder may sometimes reach as high as the umbilicus. It is unwise to make a definite diagnosis concerning a swelling coming out of the pelvis until you are sure the bladder is empty. This may require the insertion of a urinary catheter.

Inguinal lymph nodes

These are described on [page 229](#).

Testes

Palpation of the testes should be considered if indicated during the abdominal examination ([page 215](#)). Testicular atrophy occurs in chronic liver disease (e.g. alcoholic liver disease, haemochromatosis); its mechanism is believed to be similar to that responsible for gynaecomastia.

Anterior abdominal wall

The skin and muscles of the anterior abdominal wall are prone to the same

sorts of lumps that occur anywhere on the surface of the body ([Table 6.15](#)). So to avoid embarrassment it is important not to confuse these with intra-abdominal lumps. To determine whether a mass is in the abdominal wall, ask the patient to fold the arms across the upper chest and sit halfway up. An intra-abdominal mass disappears or decreases in size, but one within the layers of the abdominal wall will remain unchanged.

TABLE 6.15 Some causes of anterior abdominal wall masses

Lipoma
Sebaceous cyst
Dermal fibroma
Malignant deposits—e.g. melanoma, carcinoma
Epigastric hernia
Umbilical or paraumbilical hernia
Incisional hernia
Rectus sheath divarication
Rectus sheath haematoma

Pain can arise from the abdominal wall; this can cause confusion with intra-abdominal causes of pain. To test for *abdominal wall pain*, feel for an area of localised tenderness that reproduces the pain while the patient is supine. If this is found, ask the patient to fold the arms across the upper chest and sit halfway up, then palpate again (Carnett's test: described by JB Carnett in 1926). If the tenderness disappears, this suggests that the pain is in the abdominal cavity (as tensed abdominal muscles are protecting the viscera), but if the tenderness persists or is greater, this suggests that the pain is arising from the abdominal wall (e.g. muscle strain, nerve entrapment, myositis). [14–16](#) However, the Carnett test may occasionally be positive when there is visceral disease with involvement of the parietal peritoneum

~~there is visceral disease with involvement of the parietal peritoneum~~
producing inflammation of the overlying muscle (e.g. appendicitis).

Percussion

Percussion is used to define the size and nature of organs and masses, but is most useful for detecting fluid in the peritoneal cavity, and for eliciting tenderness in patients with peritonitis.

Liver

The liver borders should be percussed routinely to determine the liver span. If the liver edge is not palpable and there is no ascites, the right side of the abdomen should be percussed in the midclavicular line up to the right costal margin until dullness is encountered. This defines the liver's lower border even when it is not palpable. The upper border of the liver must always be defined by percussing down the midclavicular line. Loss of normal liver dullness may occur in massive hepatic necrosis, or with free gas in the peritoneal cavity (e.g. perforated bowel).

Spleen

Percussion over the left costal margin may be more sensitive than palpation for detection of enlargement of the spleen. Percuss over the lowest intercostal space in the left anterior axillary line in both inspiration and expiration with the patient supine ([Figure 6.29](#)). Splenomegaly should be suspected if the percussion note is dull or becomes *dull on complete inspiration*. Percussion appears to be more sensitive than palpation for the detection of splenomegaly. If the percussion note is dull, palpation should be repeated.





Figure 6.29 Percussion of the spleen

Kidneys

Percussion over a right or left subcostal mass can help distinguish hepatic or splenic from renal masses: in the latter case there will usually be a resonant area because of overlying bowel (be warned, however, that sometimes a very large renal mass may displace overlying bowel).

Bladder

An area of suprapubic dullness may indicate the upper border of an enlarged bladder or pelvic mass.

Ascites

The percussion note over most of the abdomen is resonant, due to air in the intestines.¹⁷ The resonance is detectable out to the flanks. When peritoneal fluid (ascites) collects, the influence of gravity causes this to accumulate first in the flanks in a supine patient. Thus, a relatively early sign of ascites (when at least 2 litres of fluid have accumulated) is a dull percussion note in the flanks ([Good signs guide 6.3](#)). With gross ascites, the abdomen distends, the flanks bulge, umbilical eversion occurs (see [Figure 6.19](#)) and dullness is detectable closer to the midline. However, an area of central resonance will always persist. Routine abdominal examination should include percussion starting in the midline with the finger pointing towards the feet; the percussion note is tested out towards the flanks on each side.

GOOD SIGNS GUIDE 6.3 Ascites

Sign	Positive LR	Negative LR
Inspection		
Bulging flanks	1.9	0.4
Oedema	3.8	0.2
Palpation and percussion		
Flank dullness	NS	0.3
Shifting dullness	2.3	0.4
Fluid wave	5.0	0.5

NS = not significant.

From McGee S. *Evidence-based physical diagnosis*, 2nd edn. St Louis: Saunders, 2007.

If (and only if) dullness is detected in the flanks, the sign of **shifting dullness** should be sought.¹⁷ To detect this sign, while standing on the right side of the bed percuss out to the left flank until dullness is reached ([Figure 6.30a](#)). This point should be marked and the patient rolled towards the examiner. Ideally 30 seconds to 1 minute should then pass so that fluid can move inside the abdominal cavity and then percussion is repeated over the marked point ([Figure 6.30b](#)).





Figure 6.30 Shifting dullness

(a) Percuss out to the left flank until the percussion note becomes dull. Mark this spot with your finger.

(b) Roll the patient towards you, wait 30 seconds. Shifting dullness is present if the left lateral dull area is now resonant.

Shifting dullness is present if the area of dullness has changed to become resonant. This is because peritoneal fluid moves under the influence of gravity to the right side of the abdomen when this is the lowermost point. Very occasionally, fluid and air in dilated small bowel in small intestinal obstruction, or a massive ovarian cyst filling the whole abdomen, can cause confusion.

To detect a **fluid thrill** (or wave) the clinician asks an assistant (or the patient) to place the medial edges of both palms firmly on the centre of the abdomen with the fingers pointing towards each other. The examiner flicks the side of the abdominal wall, and a pulsation (thrill) is felt by the hand placed on the other abdominal wall. A fluid thrill is of more value when there is massive ascites. Interestingly, it may also occur when there is a massive ovarian cyst or a pregnancy with hydramnios.

The presence of bulging in the flanks has good sensitivity and specificity for the detection of ascites. Shifting dullness has both good sensitivity and specificity. The presence of ankle oedema increases the likelihood of ascites.

specimen. The presence of ascitic oedema increases the likelihood of ascites.
(See [Good signs guide 6.3](#).)

The causes of ascites are listed in [Table 6.16](#).

TABLE 6.16 Classification of ascites by the serum ascites to albumin concentration gradient

High gradient (>11g/L)

1. Cirrhosis*
2. Alcoholic hepatitis
3. Budd-Chiari syndrome (hepatic vein thrombosis) or veno-occlusive disease
4. Fulminant hepatic failure
5. Congestive heart failure, constrictive pericarditis (cardiac ascites)
6. Myxoedema (rare)

Low gradient (<11g/L)

1. Peritoneal carcinomatosis
2. Tuberculosis
3. Pancreatic ascites
4. Nephrotic syndrome

* Patients with a high serum-to-ascites albumin gradient most often have portal hypertension (97% accuracy).

When significant ascites is present, abdominal masses may be difficult to feel by direct palpation. Here is the opportunity to practise *dipping*. Using the hand placed flat on the abdomen, the fingers are flexed at the metacarpophalangeal joints rapidly so as to displace the underlying fluid. This enables the fingers to reach a mass covered in ascitic fluid. In particular, this

should be attempted to palpate an enlarged liver or spleen. The liver and spleen may become ballotable when gross ascites is present.

Auscultation

While some cardiologists believe that the sounds produced in the abdominal cavity are not as varied or as interesting as those one hears in the chest, they have some value.

Bowel sounds

Place the diaphragm of the stethoscope just below the umbilicus. Bowel sounds can be heard over all parts of the abdomen in normal healthy people. They are poorly localised and there is little point in listening for them in more than one place. Most bowel sounds originate in the stomach, some from the large bowel and the rest from the small bowel. They have a soft gurgling character and occur only intermittently. Bowel sounds should be described as either present or absent; the terms 'decreased' or 'increased' are meaningless because the sounds vary, depending on when a meal was last eaten.

Complete absence of any bowel sounds over a 4-minute period indicates paralytic ileus (this is complete absence of peristalsis in a paralysed bowel). As only liquid is present in the gut, the heart sounds may be audible over the abdomen, transmitted by the dilated bowel.

The bowel that is obstructed produces a louder and higher-pitched sound with a tinkling quality due to the presence of air and liquid ('obstructed bowel sounds'). The presence of normal bowel sounds makes obstruction unlikely. Intestinal hurry or rush, which occurs in diarrhoeal states, causes loud gurgling sounds, often audible without the stethoscope. These bowel sounds are called *borborygmi*.

Friction rubs

These indicate an abnormality of the parietal and visceral peritoneum due to inflammation, but are very rare and non-specific. They may be audible over the liver or spleen. A rough creaking or grating noise is heard as the patient breathes. Hepatic causes include a tumour within the liver (hepatocellular cancer or metastases), a liver abscess, a recent liver biopsy, a liver infarct, or gonococcal or chlamydial perihepatitis due to inflammation of the liver capsule (Fitz-Hugh-Curtis syndrome³). A splenic rub indicates a splenic infarct.

Venous hums

A venous hum is a continuous, low-pitched, soft murmur that may become louder with inspiration and diminish when more pressure is applied to the stethoscope. Typically it is heard between the xiphisternum and the umbilicus in cases of portal hypertension, but is rare. It may radiate to the chest or over to the liver. Large volumes of blood flowing in the umbilical or para-umbilical veins in the falciform ligament are responsible. These channel blood from the left portal vein to the epigastric or internal mammary veins in the abdominal wall. A venous hum may occasionally be heard over the large vessels such as the inferior mesenteric vein or after portacaval shunting. Sometimes a thrill is detectable over the site of maximum intensity of the hum. The Cruveilhier-Baumgarten^Y syndrome is the association of a venous hum at the umbilicus and dilated abdominal wall veins. It is almost always due to cirrhosis of the liver. It occurs when patients have a patent umbilical vein, which allows portal-to-systemic shunting at this site. The presence of a venous hum or of prominent central abdominal veins suggests that the site of portal obstruction is intrahepatic rather than in the portal vein itself.

Bruits

Uncommonly, an arterial systolic bruit can be heard over the liver. This sound is higher pitched than a venous hum, is not continuous and is well localised. This is usually due to a hepatocellular cancer but may occur in acute alcoholic hepatitis, with an arteriovenous malformation, or transiently after a liver biopsy. Auscultation for renal bruits on either side of the midline above the umbilicus is indicated if renal artery stenosis is suspected. A bruit in the epigastrium may be heard in patients with chronic intestinal ischaemia from mesenteric arterial stenosis, but may also occur in the absence of pathology. A bruit may occasionally be audible over the spleen when there is a tumour of the body of the pancreas or a splenic arteriovenous fistula.

Hernias

Hernias are of surgical importance and should not be missed during an abdominal examination. They are very frequently the focus of student assessment examinations. This section will be restricted to examination of groin hernias, which comprise inguinal and femoral hernias.

The principal sign of a hernia is that of a lump in the groin region.

naturally, not all lumps in the region are hernias ([Table 6.1](#)). A lump that is present on standing or during manoeuvres that raise intra-abdominal pressure (such as coughing or straining), and that disappears on recumbency, is easily identified as a hernia. Some hernias, however, are *irreducible*. Another term used for irreducible is incarcerated, but this term is probably best avoided. Some irreducible hernias contain bowel, which may become *obstructed*, giving rise to symptoms of small bowel obstruction in addition to the irreducible lump. Sometimes the bowel contents' blood supply becomes jeopardised, and these are known as *strangulated* hernias; they are usually painful, red, tense and tender.

TABLE 6.17 Differential diagnosis of a solitary groin lump

Above the inguinal ligament

Inguinal hernia

Undescended testis

Cyst of the canal of Nuck

Encysted hydrocele or lipoma of the cord

Iliac node

Large femoral hernia (rare)

Below the inguinal ligament

Femoral hernia

Lymph node

Saphena varix (sensation of a 'jet of water' on palpation, disappears when supine)

Femoral aneurysm (pulsatile)

Examination technique

A thorough examination for a hernia should be commenced with the patient standing if possible. The patient should be asked to stand with full exposure from the thigh to the upper abdomen.

Inspection is carried out initially. Pay careful attention to scars from previous surgery, which may be difficult to see. Look for obvious lumps and swellings. Before palpation is commenced the patient is asked to turn the head away from the examiner and to cough. The examiner's eyes should be fixed in the region of the pubic tubercle (see below) and note the presence of a visible cough impulse. The patient is then asked to cough again with the examiner inspecting the opposite side.

Of key importance is the position of a hernia in relation to the *pubic tubercle*, which can usually easily be felt *lateral to the symphysis pubis* (2–3 cm from the midline). In the obese individual, it may be difficult to locate the pubic tubercle and in such situations if the thigh is flexed and abducted, the adductor longus muscle can be traced proximally, leading the examiner to the pubic tubercle.

Palpation is commenced with the gloved fingers being placed over the region of the pubic tubercle. Once again the patient is asked to cough and a palpable expansile impulse is sought. If a hernia is present, attempts at reduction should *not* be performed while the patient is erect, as it is more difficult and painful than when the patient is placed supine.

The patient is then asked to lie supine on the examination couch. The procedure of inspection and palpation is performed in the same manner again. The exact position of any hernia is usually easier to define with the patient lying supine.

If a lump or cough impulse is present, it must be determined whether this is a hernia and, if so, what sort of hernia. Identify the pubic tubercle. If an inguinal hernia is large, the pubic tubercle may be obscured by the hernia (especially by an irreducible inguinal hernia) and its position may be less distinct, but an accurate indication can usually be made by comparing the lump with the pubic tubercle on the opposite side.

Inguinal hernias

Inguinal hernias typically bulge above the crease of the groin. They arise from a deficiency above the inguinal ligament and this is where they are

from a deficiency *above* the inguinal ligament and this is where they are usually felt ([Figure 6.31](#)). The inguinal ligament lies between the anterior superior iliac spine and the pubic tubercle. The pubic tubercle is just above the attachment of the adductor longus tendon to the pubic bone (feel the upper medial aspect of the thigh to palpate the tendon). The internal inguinal ring lies 2 cm above the midpoint of the inguinal ligament.

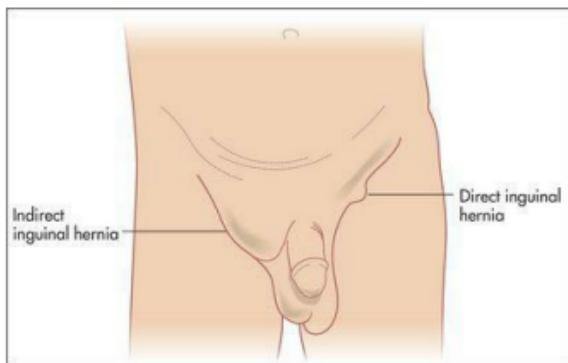


Figure 6.31 Note the elliptical swelling of an indirect inguinal hernia descending into the scrotum on the right side. Also note the globular swelling of a direct inguinal hernia on the left side

An *indirect* inguinal hernia protrudes through the deep inguinal ring. The best surface marking for this point is just above the midpoint of the inguinal ligament, which is halfway between the pubic tubercle and the anterior superior iliac spine (it is the position where the spermatic cord structures enter the inguinal canal). This is lateral to the inferior epigastric vessels. A *direct* hernia, on the other hand, pushes into the inguinal canal posteriorly through a region of weakness known as Hesselbach's triangle.² This triangle is bounded inferiorly by the inguinal ligament, laterally by the inferior epigastric vessels and medially by the lateral border of the rectus sheath.

The student may be asked to differentiate between direct and indirect inguinal hernias. However, clinically this is difficult and the true nature of an inguinal hernia can often be determined only at the time of operation. The muscular defect in a direct hernia is usually larger than that of an indirect hernia, and as such direct hernias are typically easier to demonstrate and usually reduce immediately and spontaneously. An indirect hernia may often be felt on palpation to slide along the direction of the inguinal canal under the examining fingers.

A large inguinal hernia may descend through the external ring immediately above the pubic tubercle into the scrotum. Gentle invagination of the scrotum with the tip of the gloved little finger in the external ring may be performed to confirm an indirect hernia in men but this can be difficult to interpret without substantial experience ([Figure 6.32](#)). A maldescended testis can be confused with an inguinal hernia; always confirm that there is a testis in each scrotum. A large inguinal hernia may present as a lump in the scrotum. It is important initially in this situation to ascertain whether one can get above the lump. If so, the lump is of primary intrascrotal pathology and is not a hernia.

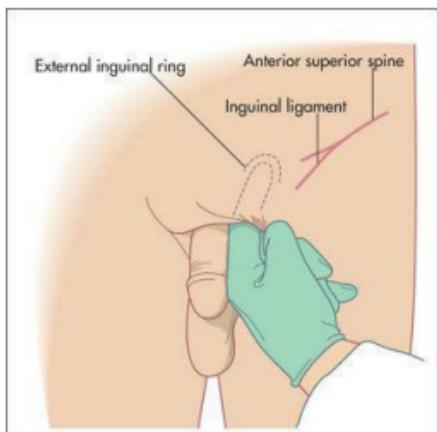


Figure 6.32 To examine the inguinal canal in a male, the scrotum can be invaginated as shown (always wear gloves)

Femoral hernias

Femoral hernias typically bulge into the groin crease at its medial end. Hence they occur lateral to and below the pubic tubercle, just medial to the femoral pulse (about 2 cm away) ([Table 6.17](#)). They are less common than inguinal hernias and are not related to the inguinal canal. They are usually smaller and firmer than inguinal hernias and quite commonly do not exhibit a cough impulse. They are frequently irreducible. As such, they are commonly mistaken for an enlarged inguinal lymph node. A cough impulse is rare from a femoral hernia and needs to be distinguished from the thrill produced by a

sapnena varix when a patient coughs.

Remember that hernias are often bilateral and that two different types may occur on the one side. Sometimes there is also a hydrocele ([Figure 7.11, page 217](#))—one can get above a hydrocele in the inguinal canal but not a hernia.

Incisional hernias

Any abdominal scar may be the site of a hernia because of abdominal wall weakness. Assess this by asking the patient to cough while you look for abnormal bulges. Next have the patient lift the head and shoulders off the bed while the examiner's hand rests on the forehead and resists this movement. If a bulge is seen, the examiner's other hand should palpate for a fascial layer defect in the muscle.

Rectal examination ([Figure 6.33](#))

The examining physician often hesitates to make the necessary examination because it involves soiling the finger.

William Mayo (1861–1939)

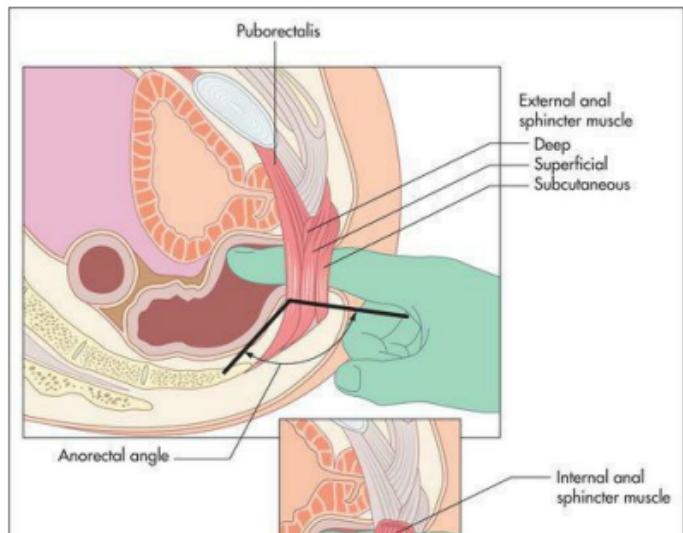




Figure 6.33 The rectal examination: regional anatomy

From Talley NJ. *American Journal of Gastroenterology*. 2008; 108: 802–803, with permission.

The abdominal examination is not complete without the performance of a rectal examination.^{18,19} It should be considered in all patients admitted to hospital who are over the age of 40, unless the examiner has no fingers, the patient no anus, or acute illness such as myocardial infarction presents a temporary contraindication.

The patient's permission must be obtained and if indicated a chaperone introduced to the patient. Privacy must be ensured for the patient throughout the examination. Following an explanation as to what is to happen and why, the patient lies on his or her left side with the knees drawn up and back to the examiner. This is called the left lateral position. The examination can be performed with the patient standing and in the bent-over position. This may help provide good information about the prostate, but makes assessment of rectal function more difficult.

The examiner dons a pair of gloves and begins the inspection of the anus and perianal area by separating the buttocks. The following must be looked for:

1. **Thrombosed external haemorrhoids (piles).** Small (less than 1 cm), tense bluish swellings may be seen on one side of the anal margin. They are painful and are due to rupture of a vein in the external haemorrhoidal plexus. They are also called perianal haematomas.
2. **Skin tags.** These look like tags elsewhere on the body and can be an incidental finding or occur with haemorrhoids or Crohn's disease.
3. **Rectal prolapse.** Circumferential folds of red mucosa are visible protruding from the anus. These may become apparent only when the patient is asked to strain as if to pass stool. A gaping anus suggests loss of internal and external sphincter tone. This may coexist with prolapse.
4. **Anal fissure (fissure-in-ano).** This is a crack in the anal wall which may be painful enough to prevent rectal examination with the finger. Fissures-in-ano usually occur directly posteriorly and in the midline. A tag of skin may be present at the base: this is called a sentinel pile. It indicates that the fissure is chronic. It may be necessary to get the patient to bear down for

the fissure is chronic. It may be necessary to get the patient to bear down for a fissure to become visible. Multiple or broad-based fissures may be present in patients with inflammatory bowel disease, malignancy or sexually transmitted disease.

5. Fistula-in-ano. The entrance of this tract may be visible, usually within 4 cm of the anus. The mouth has a red pouting appearance caused by granulation tissue. This may occur with Crohn's disease or perianal abscess ([page 191](#)).

6. Condylomata acuminata (anal warts) may be confused with skin tags, but are in fact pedunculated papillomas with a white surface and red base. They may surround the anus.

7. Carcinoma of the anus. This may be visible as a fungating mass at the anal verge.

8. Pruritus ani. The appearance of this irritating anal condition varies from weeping red dermatitis to a thickened white skin. It is usually caused by faecal soiling.

9. Excoriation as a result of inflammation or **contact dermatitis** caused by faeces—diarrhoea.

Next ask the patient to strain and watch the perineum: look for incontinence and leakage of faeces or mucus, abnormal descent of the perineum or the presence of a patulous anus. The presence of a gaping anus often correlates with lower resting pressures on anorectal manometry. Internal haemorrhoids can prolapse in the right anterior, right posterior and left lateral positions.

If there is rectal prolapse, straining may cause a dark red mass to appear at the anal verge; mucosal prolapse causes the appearance of radial folds and concentric folds are a sign of complete prolapse. This mass is continuous with the perianal skin and is usually painless. In cases of mucosal rectal prolapse, the prolapsed mucosa can be felt between the examiner's thumb and forefinger.

Now test the anal wink. Stroke a cotton pad in all four quadrants around the anus. Usually you will see a brisk anal contraction which indicates the sacral nerve pathways are intact. Sometimes the response is weak in healthy people. However, the complete absence of an anal wink, particularly in the setting of faecal incontinence, suggests that there is a spinal cord problem and indicates the need to perform a more detailed neurological examination and consider further investigations accordingly.

Now the time for action has come. The tip of the gloved right index finger is lubricated and placed over the anus. Ask the patient to breathe in

and out quietly through the mouth, as a distraction and to aid relaxation. If there is excruciating pain at the start of the examination, this strongly suggests that there is an anal fissure and the remainder of the rectal examination should be abandoned. Often the fissure can be seen on inspection. An anal fissure can precipitate constipation but may be secondary to constipation itself. By liberally lubricating the rectum with lignocaine jelly, it may still be possible to complete the rest of the examination, but usually it is better to perform anoscopy under appropriate sedation for these patients. Other causes of significant anal pain during palpation include recently thrombosed external haemorrhoids, an ischiorectal abscess, active proctitis, or anal ulceration from another cause.

Slowly increasing pressure is applied with the pulp of the finger until the sphincter is felt to relax slightly. At this stage the finger is advanced into the rectum slowly. During entry, sphincter tone should be assessed as normal or reduced. The accuracy of this assessment has been questioned in the past, but more recently has been shown to correlate well with anorectal manometry measurements.²⁰ This resting tone is predominantly (70%–80%) attributable to the internal anal sphincter muscle. Reduced sphincter tone may indicate a sphincter tear. A high anal resting tone may contribute to difficulties with evacuation.

Palpation of the anterior wall of the rectum for the *prostate gland* in the male and for the *cervix* in the female is performed first. The normal prostate is a firm, rubbery bilobed mass with a central furrow. It becomes firmer with age. With prostatic enlargement, the sulcus becomes obliterated and the gland is often asymmetrical. A very hard nodule is apparent when a carcinoma of the prostate is present. The prostate is boggy and tender in prostatitis. A mass above the prostate or cervix may indicate a metastatic deposit on Blumer's shelf.²¹

The finger is then rotated clockwise so that the left lateral wall, posterior wall and right lateral wall of the rectum can be palpated in turn. Then the finger is advanced as high as possible into the rectum and slowly withdrawn along the rectal wall. A soft lesion, such as a small rectal carcinoma or polyp, is more likely to be felt this way^{bh} ([Table 6.18](#)). Ask the patient to squeeze your finger with the anal muscles as a further test of anal tone.

TABLE 6.18 Causes of a palpable mass in the rectum

Rectal carcinoma
Rectal polyp
Hypertrophied anal papilla
Diverticular phlegmon (recent or old)
Sigmoid colon carcinoma (prolapsing into the pouch of Douglas*)
Metastatic deposits in the pelvis (Blumer's shelf)
Uterine or ovarian malignancy
Prostatic or cervical malignancy (direct extension)
Endometriosis
Pelvic abscess or sarcoma
Amoebic granuloma
Foreign body

Note: Faeces, while palpable, also indent.

* James Douglas (1675–1742), Scottish anatomist and male midwife, physician to Queen Caroline (wife of George II) in London.

Ask the patient to strain again when the examiner's finger is rotated anteriorly. In this position a *rectocele* (a defect in the anterior wall of the rectum) may be palpable.

The pelvic floor—special tests for pelvic floor dysfunction

The first test is simple: ask the patient to strain and try to push out your finger. Normally, the anal sphincter and puborectalis should relax and the perineum should descend by 1–3.5 cm. If the muscles seem to tighten, particularly when there is no perineal descent, this suggests paradoxical external anal sphincter and puborectalis contraction, which in fact are blocking normal defaecation (pelvic floor dysfunction). Second, press on the

blocking normal defaecation (pelvic floor dyssynergia). Second, press on the posterior rectal wall and ask if this causes pain; this suggests puborectalis muscle tenderness, which can also occur in pelvic floor dyssynergia. Third, assess whether the anal sphincter and the puborectalis contract when you ask your patient to contract or squeeze the pelvic floor muscles. Puborectalis contraction is perceived as a 'lift'; that is, the muscle lifts the examining finger toward the umbilicus. Many patients with faecal incontinence cannot augment anal pressure when asked to squeeze. Finally, place your other hand on the anterior abdominal wall while asking the patient to strain again. This provides some information on whether the patient is excessively contracting the abdominal wall (e.g. by performing an inappropriate Valsalva manoeuvre) and perhaps also the pelvic floor muscles while attempting to defaecate, which may impede evacuation. However, the exact value of this test is unclear.

Constipation that is due to pelvic floor dysfunction responds to biofeedback in about 70% of cases, and this treatment can result in a laxative-free existence for patients with troubling outlet constipation; the diagnosis should be entertained in all patients with chronic constipation, and a good rectal examination can help guide you as to whether anorectal manometry testing is warranted.

After the finger has been withdrawn, the glove is inspected for bright blood or melaena, mucus or pus, and the colour of the faeces is noted. Haemorrhoids are not palpable unless thrombosed. Persistent gaping of the anal canal after withdrawal of the examining finger may indicate external anal sphincter denervation.

Proctosigmoidoscopy

The examination of the rectum with a sigmoidoscope is an essential part of the physical examination of any patient with symptoms referable to the anorectal region or large bowel. The principal indications include rectal bleeding, chronic diarrhoea, constipation or change in bowel habit. It should also be performed in some patients with abdominal pain, before treatment is begun for any anorectal condition, and before a barium enema is ordered for any reason.

The examination can be performed without anaesthesia, except in patients who have a very painful anal condition.

Procedure

Begin by inspecting the anal area as outlined earlier. Then a digital examination of the rectum is performed.

Explain to the patient what is about to happen. Warn him or her that there will be a feeling of fullness and the desire to defecate, and possibly cramps in the rectal region. The patient is then placed in the left lateral position and asked to relax and breathe quietly through the mouth.

If a rigid sigmoidoscope is to be used, it is warmed slightly and, with the obturator in place, is inserted into the rectum in the direction of the umbilicus until the rectal ampulla is reached (4–5 cm). This is the only part of the examination that is performed blind. The obturator is then removed. The tip of the sigmoidoscope is gently swung posteriorly under direct vision to follow the curve of the sacrum. The important landmarks to note during sigmoidoscopy are the anal verge, the dentate line, the anorectal junction, the lowest and middle rectal valves, and finally the rectosigmoid junction. Small amounts of air may be insufflated to assist with this. At about 12–15 cm, smooth rectal mucosa gives way to the concentric rugae of the distal sigmoid. It is possible to advance the rigid instrument into the distal sigmoid in the majority of men and in many women. The flexible sigmoidoscope usually can examine the entire left colon in skilled hands. The instrument must *never* be advanced unless the lumen is clearly visible and the patient is not experiencing pain.

Once the sigmoidoscope has been advanced as far as possible, it should be withdrawn gradually while the circumference of the mucosa is inspected carefully. Look behind for the valves of Houston.²⁵ It is possible to sample faeces from areas away from the anal margin, which can be tested for occult blood and subjected to microbiological examination. Mucosal lesions can also be biopsied.

Common abnormalities seen on sigmoidoscopy

1. Blood, seen to be arising from above the highest level examined, indicates that a total examination of the colon by colonoscopy is essential.
2. Erythematous and ulcerated areas indicating inflammation, which may be local or diffuse.
3. Mucosal oedema, where there is loss of the normal vascular pattern of the colon, may be seen in mild inflammatory bowel disease.
4. Polyps, which may be sessile or pedunculated, solitary or multiple.
5. Carcinoma.

6. Strictures, which may be due to carcinoma, Crohn's disease, trauma, ischaemia, radiation or (very rarely) tuberculosis.

7. The orifices of diverticula.

8. Fissures.

If an abnormality of the anal canal is suspected, this is best seen using *anoscopy*, which can be carried out after sigmoidoscopy. Lesions to look for in the anal canal include swellings, masses, fissures, the internal openings of fistulae, squamous metaplasia and haemorrhoids. Haemorrhoids appear as swellings at the site of the normal anal cushions at 3, 7 and 11 o'clock, and they descend on straining. Remember that haemorrhoids are common and may coexist with more sinister bowel disease.

Testing of the stools for blood

Testing of the stools for blood may be considered in the assessment of anaemia, iron deficiency, gastrointestinal bleeding or symptoms suggesting colonic cancer. In the guaiac test, stool is placed on a guaiac-impregnated paper; blood results in phenolytic oxidation, causing a blue colour. Newer tests can quantify the amount of blood in the stool.

Unfortunately, both false-positive and false-negative results occur with the occult blood tests. Peroxidase and catalase, present in various foods (e.g. fresh fruit, uncooked vegetables), and haem in red meat can cause false-positive results, as can aspirin, anticoagulants or oral iron. Vitamin C can reduce the sensitivity of guaiac results, and should not be taken before testing.

False-negative results are not uncommon with colorectal neoplasms because they bleed intermittently. Hence, testing for faecal occult blood from the glove after a rectal examination is of little value,²¹ and more sensitive and specific testing (e.g. colonoscopy) is required, depending on the clinical setting.

Other

Examine the legs for bruising or oedema, which may be the result of liver disease. Neurological signs of alcoholism (e.g. a coarse tremor) or evidence of thiamine deficiency (peripheral neuropathy or memory loss) may also be present.

Examination of the cardiovascular system may be helpful in patients with hepatomegaly. Cardiac failure is a common cause of liver enlargement and can cause ascites. Measurement of the patient's temperature is

and can even cause cirrhosis. Measurement of the patient's temperature is important, especially in an acute abdominal case or if there is any suggestion of infection.

Examine with particular care all lymph node groups, the breasts and chest if there is any evidence of malignant disease such as firm, irregular hepatomegaly (see [Table 8.9, page 230](#)).

Examination of the gastrointestinal contents

Faeces

Never miss an opportunity to inspect a patient's faeces, because considerable information about the gastrointestinal tract can be obtained in this way.

Melaena

Melaena stools are poorly formed, black and have a tarry appearance. They have a very characteristic and offensive smell. The cause is the presence of blood digested by gastric acid and colonic bacteria. Melaena usually indicates bleeding from the oesophagus, stomach or duodenum. The most common cause is acute or chronic peptic ulceration. Less often, right-sided colonic bleeding and (rarely) small-bowel bleeding can cause melaena. The differential diagnosis of dark stools includes ingestion of iron tablets, bismuth, liquorice or charcoal. However, these tend to result in small well-formed non-tarry stools and the offensive smell is absent.

Bright-red blood (haematochezia)

This appearance usually results from haemorrhage from the rectum or left colon. Beetroot ingestion can sometimes cause confusion. Blood loss may result from a carcinoma or polyp, an arteriovenous malformation, inflammatory bowel disease or diverticular disease. It can occasionally occur with massive upper gastrointestinal bleeding. The blood is mixed in with the bowel motion if it comes from above the anorectum, but if blood appears on the surface of the motion or only on the toilet paper this suggests, but does not guarantee, that bleeding is from a local rectal cause, such as internal haemorrhoids or a fissure. Dark red jelly-like stools may be seen with ischaemic bowel.

Steatorrhoea

The stools are usually very pale, offensive, smelly and bulky. They float and are difficult to flush away. However, the commonest cause of floating stools is gas and water rather than fat.

Steatorrhoea results from malabsorption of fat. In severe pancreatic disease, oil (triglycerides) may be passed per rectum and this is virtually pathognomonic of pancreatic steatorrhoea (lipase deficiency).

'Toothpaste' stools

Here the faeces are expressed like toothpaste from a tube: the condition is usually due to severe constipation with overflow diarrhoea. It may, however, also occur in the irritable bowel syndrome, with a stricture, or in Hirschsprung's disease.

Rice-water stools

Cholera causes massive excretion of fluid and electrolytes from the bowel, which results in a severe secretory diarrhoea. The pale watery stools are of enormous volume and contain mucous debris.

Vomitus

The clinician who is fortunate enough to have vomitus available for inspection (ill-informed staff may throw out this valuable substance) should not lose the opportunity of a detailed examination. There are a number of interesting types of vomitus.

'Coffee grounds'

An old blood clot in vomitus has the appearance of the dregs of a good cup of espresso coffee. Unfortunately, darker vomitus is often described as having this appearance. This emphasises the need for personal inspection. Iron tablets and red wine, not to mention coffee ingestion, can have the same effect on the vomitus.

Bright-red blood (haematemesis)

Look for the presence of fresh clot. It usually indicates fresh bleeding from the upper gastrointestinal tract.

Yellow-green vomitus

This results from the vomiting of bile and upper small bowel contents, often when there is obstruction.

Faeculent vomiting

Here brown offensive material from the small bowel is vomited. It is a late sign of small intestinal obstruction. Recently ingested tea can have the same appearance but lacks the smell.

Brownish-black fluid in large volumes may be vomited in cases of acute dilatation of the stomach. A succussion splash will usually be present. Acute dilatation may occur in association with diabetic ketoacidosis or following abdominal surgery. It represents a medical emergency because of the risk of aspiration; there is a need for urgent placement of a nasogastric tube (see [Figure 6.42, page 194](#)).

Projectile vomiting

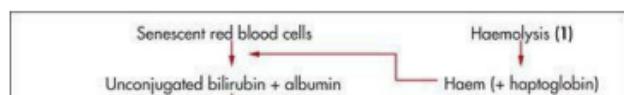
This term describes the act of vomiting itself and may indicate pyloric stenosis (a paediatric illness). It may also occur with raised intracranial pressure.

Urinalysis

Note that testing of the urine can be very helpful in diagnosing liver disease.

Strip colour tests can detect the presence of bilirubin and urobilinogen in the urine. False-positive or false-negative results can occur with vitamin C or even exposure to sunlight.

An understanding of the reasons for the presence of bilirubin or urobilinogen in the urine necessitates an explanation of the metabolism of these substances ([Figure 6.34](#)).



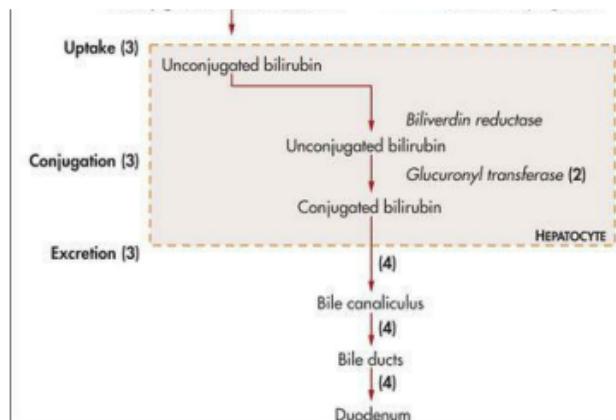


Figure 6.34 Schematic representation of the bilirubin pathway

Increased haemolysis (1) overwhelms the hepatocytes' ability to conjugate bilirubin and excrete the conjugated form, leading to increased serum levels of unconjugated bilirubin. Low levels of glucuronyl transferase (2) (e.g. Gilbert's disease) cause decreased conjugation. Hepatocellular dysfunction (3) causes decreased uptake, conjugation and excretion with increases of unconjugated bilirubin and conjugated bilirubin. Posthepatic obstruction (4) from stones or tumour prevents passage of bilirubin through the bile ducts into the bowel, leading to increased serum levels of conjugated bilirubin.

Red blood cells are broken down by the reticuloendothelial system, causing the release of haem, which is converted to biliverdin and then *unconjugated bilirubin*, a water-insoluble compound. For this reason, unconjugated bilirubin released with haemolytic anaemia will not appear in the urine (termed *acholuric jaundice*).

Unconjugated bilirubin is transported in the blood bound largely to albumin but also to other plasma proteins. Unconjugated bilirubin is then taken up by the liver cells and transported to the endoplasmic reticulum, where glucuronyl transferases conjugate bilirubin with glucuronide. This results in the formation of *conjugated bilirubin*, which is water-soluble. Conjugated bilirubin is then concentrated and excreted by the liver cell into the canalculus.

Conjugated bilirubin is virtually all excreted into the small bowel; it is converted in the terminal ileum and colon to *urobilinogen*, and then to *stercobilin*. Stercobilin is responsible for the normal colour of the stools with other non-bilirubinoid dietary pigments. Up to 20% of urobilinogen is reabsorbed by the bowel, and small amounts are excreted in the urine as urinary urobilinogen. This can often be normally detected by reagent strips.

Total biliary obstruction, from whatever cause, results in absence of

From urinary excretion, from whatever cause, results in absence of urinary urobilinogen, as no conjugated bilirubin reaches the bowel, resulting in pale stools (absence of stercobilin). The conjugated bilirubin, unable to be excreted (the rate-limiting step), leaks from the hepatocytes into the blood and from there is excreted into the urine (normally there is no bilirubin detected in urine). This results in dark urine (excess conjugated bilirubin). Acute liver damage, as in viral hepatitis, may sometimes initially result in excessive urinary urobilinogen, because the liver is unable to re-excrete the urobilinogen reabsorbed from the bowel. These changes are summarised in [Table 6.19](#).

TABLE 6.19 Changes in urine and faeces with jaundice

Cause of jaundice:			
Substance and site	Haemolysis	Obstruction or cholestasis	Hepatocellular liver disease
Urine			
Bilirubin (conjugated)	Normal*	Raised	Normal or raised
Urobilinogen	Raised	Absent or decreased	Normal or raised
Faeces			
Stercobilinogen	Raised	Absent or decreased	Normal
Causes	Haemolytic anaemia	Extrahepatic biliary obstruction (e.g. gallstones, carcinoma of pancreas or bile duct, strictures of the bile duct), intrahepatic cholestasis (e.g. drugs, recurrent jaundice of pregnancy)	Hepatitis, cirrhosis, drugs, venous obstruction

* Unconjugated bilirubin levels are elevated in the serum.

Examination of the acute abdomen

It is very important to try to determine whether a patient who presents with acute abdominal pain requires an urgent operation or whether careful observation with reassessment is the best course of action.²²²³ First, take note of the *general appearance* of the patient. The patient who is obviously distressed with pain or who looks unwell often is, and conversely some reassurance can be gained if a patient does not look sick and appears comfortable.

Assess the patient's *vital signs* immediately and recheck these at frequent intervals. Signs of reduced circulating blood volume and

dehydration, including tachycardia, postural hypotension, tachypnoea, vasoconstriction and sweating, are of great concern. These signs associated with abdominal pain are usually an indication of substantial intra-abdominal blood loss (such as a ruptured aortic aneurysm), or of substantial fluid losses (e.g. due to acute pancreatitis), or of septic shock (as with a perforated viscus or abscess). Take the patient's temperature.

Inspect the abdomen. Look particularly for lack of movement with respiration, with splinting of the abdominal wall muscles. Note any abdominal distension, visible peristalsis or other lumps and masses, without forgetting the groin region and hernias. Note also any abdominal scars and inquire as to their nature and age.

Palpate very gently. The presence or absence of peritonism is first assessed. Peritonism is an inflammation that causes pain when peritoneal surfaces are moved relative to each other ([Table 6.20](#); see also [Good signs guide 6.4](#)). Traditionally, rebound tenderness is used to assess whether peritonism is present or not. However, if peritonism is present, this test is far more uncomfortable (and cruel) than eliciting tenderness to light percussion. If the patient is extremely apprehensive, ask him or her first to cough; the reaction will be a guide to the degree of peritonism and also its location. Palpation is then continued slowly, but more deeply if possible and if masses are sought. Do not forget to palpate for the pulsatile mass of a ruptured aneurysm. This may be quite indistinct.

TABLE 6.20 Differential diagnosis of the acute abdomen

Severe abdominal pain with rigidity of the entire abdominal wall and prostration

Perforated peptic ulcer

Perforation of other intra-abdominal organs

Dissecting aneurysm

Severe pancreatitis

Tenderness and rigidity in the right hypochondrium

Acute cholecystitis

Appendicitis in a high appendix

Perforated or penetrating duodenal ulcer

Pleurisy, pneumonitis

Subphrenic abscess

Acute pyelonephritis

Cholangitis

Bleed into an hepatic tumour

Tenderness and rigidity in the left hypochondrium

Pancreatitis

Subphrenic abscess

Diverticulitis

Ruptured spleen

Acute pyelonephritis

Leaking aneurysm of the splenic artery

Acute gastric distension

Tenderness and rigidity in the right iliac fossa

Appendicitis

Perforated or penetrating duodenal ulcer

Crohn's disease or inflamed ileocaecal glands

Inflamed Meckel's diverticulum

Cholecystitis with a low gallbladder

Tenderness and rigidity in the left iliac fossa

Diverticulitis

Colitis

Colonic cancer

Pelvic peritonitis, ruptured ovarian cyst

Perumbilical pain without abdominal signs

Acute mesenteric ischaemia/infarction

Acute appendicitis

Acute small bowel obstruction

Acute pancreatitis

Obstetric and gynaecological causes

Ectopic pregnancy

Torsion of, or haemorrhage into, an ovarian cyst

Acute salpingitis

Ruptured uterus

Sign	Positive LR	Negative LR
Abdominal examination		
Guarding	2.6	0.6
Rigidity	5.1	NS
Rebound tenderness	2.1	0.5
Abnormal bowel sounds	NS	0.8
Rectal examination		
Rectal tenderness	NS	NS
Other tests		
Positive abdominal wall tenderness test	0.1	NS

NS = not significant.

Then perform light percussion over areas of tenderness. If generalised peritonitis is present, this almost invariably necessitates a surgical approach, with the notable exception of acute pancreatitis.

Examine for hernias. The presence of a hernia does not necessarily mean that this is the cause of pathology, as they are quite common. However, a tender or irreducible hernia is more likely to be of significance, particularly if this has only very recently been noticed by the patient or has recently become tender.

Auscultation is now performed. In the presence of a bowel obstruction ([*Good signs guide 6.5*](#)), bowel sounds will be louder, more frequent and high-pitched. In an ileus from any cause, bowel sounds are usually reduced or absent.

GOOD SIGNS GUIDE 6.5 Acute bowel obstruction

Sign	Positive LR	Negative LR
Inspection of the abdomen		
Visible peristalsis	18.8	NS
Abdominal distension	9.6	0.4
Palpation		
Guarding	NS	NS
Rigidity	NS	NS
Rebound tenderness	NS	NS
Auscultation		
Increased (obstructed) bowel sounds	5.0	0.6
Abnormal bowel sounds	3.2	0.4
Rectal examination		
Rectal tenderness	NS	NS

NS = not significant.

From McGee S. *Evidence-based physical diagnosis*, 2nd edn. St Louis: Saunders, 2007.

Rectal and vaginal examinations may be very important but the findings are not helpful for the diagnosis of appendicitis or obstruction; note any tenderness (and its location), masses or blood loss. Per rectal blood should make the examiner think of acute colitis (e.g. Crohn's disease, ulcerative colitis, ischaemic colitis or infectious colitis), or of mesenteric ischaemia. A purulent vaginal discharge suggests salpingitis.

Urinalysis may show glycosuria and ketonuria in diabetic ketoacidosis (which can cause acute abdominal pain), haematuria in renal colic, bilirubinuria in cholangitis or proteinuria in pyelonephritis ([page 200](#)).

Examine the *respiratory system* for signs of consolidation, a pleural rub or pleural effusion, and examine the *cardiovascular system* for atrial fibrillation (a major cause of embolism to a mesenteric artery) or for signs of a myocardial infarction. Examine the *back* for evidence of spinal disease that may radiate to the abdomen. Remember that herpes zoster may cause abdominal pain before the typical vesicular rash appears.

abdominal pain before the typical vesicles erupt.

Consider the symptoms and signs of appendicitis.²² Malaise and fever is usually associated with abdominal pain, which is at first worst in the hypogastrium and then moves to the right iliac fossa. The examination will often reveal tenderness and guarding in the right iliac fossa. The pain and tenderness are usually maximum over *McBurney's point*.²³ He described this point as 1½ to 2 in (3.8 to 5.0 cm) along a line from the anterior superior iliac spine to the umbilicus. *Rovsing's sign*²⁴ is another way of testing rebound tenderness. Press over the patient's left lower quadrant, then release quickly; this causes pain in the right iliac fossa. The *psoas sign* is positive when the patient lies on the left side and the clinician attempts to extend the right hip. If this is painful and resisted, the sign is positive. When the appendix causes pelvic inflammation, rectal examination evokes tenderness on the right side. These signs are of variable usefulness ([Good signs guide 6.6](#)).

GOOD SIGNS GUIDE 6.6 Appendicitis

Sign	LR	Negative LR
Vital signs		
Fever	1.8	0.5
Abdominal examination		
Severe right lower quadrant tenderness	NS	0.2
McBurney's point tenderness	3.4	0.4
Rovsing's sign	2.5	0.7
Rectal examination		
Rectal tenderness	NS	NS
Others		
Psoas sign	NS	NS

NS = not significant.

From McGee S. *Evidence-based physical diagnosis*, 2nd edn. St Louis: Saunders, 2007.

Remember that in elderly patients these signs may be reduced or absent.²³

Correlation of physical signs and gastrointestinal disease

Liver disease

Signs

- **Hands:** leuconychia, clubbing, palmar erythema, bruising, asterixis.
- **Face:** jaundice, scratch marks, spider naevi, fetor hepaticus.
- **Chest:** gynaecomastia, loss of body hair, spider naevi, bruising, pectoral muscle wasting.

- **Abdomen:** hepatosplenomegaly, ascites, signs of portal hypertension, testicular atrophy.

- **Legs:** oedema, muscle wasting, bruising.

- **Fever:** may occur in up to one-third of patients with advanced cirrhosis (particularly when this is secondary to alcohol) or if there is infected ascites.

The presence of two or more of the following signs suggests cirrhosis:
(i) spider naevi; (ii) palmar erythema; (iii) splenomegaly or ascites; (iv) abnormal collateral veins on the abdomen; (v) ascites. See also [Good signs guide 6.7](#).

GOOD SIGNS GUIDE 6.7 Jaundice due to hepatocellular disease

Sign	Positive LR	Negative LR
General appearance		
Weight loss	NS	NS
Skin		
Spider naevi	4.7	0.6
Palmar erythema	9.8	0.5
Distended abdominal veins	17.5	0.6
Abdomen		
Ascites	4.4	0.6
Palpable spleen	2.9	0.7
Palpable gallbladder	0.04	1.4
(Courvoisier's law)		
Palpable liver	NS	NS
Liver tenderness	NS	NS

NS = not significant.

From McGee S. Evidence-based physical diagnosis, 2nd edn. St Louis: Saunders, 2007.

Portal hypertension

Signs

- **Splenomegaly:** correlates poorly with the degree of portal hypertension.
- **Collateral veins:** haematemesis (from oesophageal or gastric varices).

• Ascites.

Causes

1. **Cirrhosis** of the liver.

2. **Other causes:**

(a) *Presinusoidal*: (i) portal vein compression (e.g. lymphoma, carcinoma); (ii) intravascular clotting (e.g. in polycythaemia); (iii) umbilical vein phlebitis.

(b) *Intrahepatic*: (i) sarcoid, lymphoma or leukaemic infiltrates; (ii) congenital hepatic fibrosis.

(c) *Postsinusoidal*: (i) hepatic vein outflow obstruction (Budd-Chiari syndrome) may be idiopathic, or caused by myeloproliferative disease, cancer (kidney, pancreas, liver), the contraceptive pill or pregnancy, paroxysmal nocturnal haemoglobinuria (PNH), fibrous membrane, trauma, schistosomiasis; (ii) veno-occlusive disease; (iii) constrictive pericarditis; (iv) chronic cardiac failure.

Hepatic encephalopathy

Grading

Grade 0—normal mental state

Grade 1—mental changes (lack of awareness, anxiety, euphoria, reduced attention span, impaired ability to add and subtract)

Grade 2—lethargy, disorientation (for time), personality changes, inappropriate behaviour

Grade 3—stupor, but responsive to stimuli; gross disorientation, confusion

Grade 4—coma.

Causes

These include:

- Acute liver failure (e.g. postviral hepatitis, alcoholic hepatitis).
- Cirrhosis.
- Chronic portosystemic encephalopathy (e.g. from a portacaval shunt). Encephalopathy may be precipitated by:
 - Diarrhoea, diuretics or vomiting (resulting in hypokalaemia which may increase renal ammonia and other toxin production, or alkalosis which may increase the amount of ammonia and other toxins that cross the blood-brain barrier).
 - Gastrointestinal bleeding or a relatively high-protein diet (causing an acute increase in nitrogenous contents in the bowel).
 - Infection (e.g. urinary tract, chest or spontaneous bacterial peritonitis).
 - Acute liver cell decompensation (e.g. from an alcoholic binge or a hepatoma).
 - Sedatives.
 - Metabolic disturbances such as hypoglycaemia.

Dysphagia

Dysphagia (difficulty in swallowing) and odynophagia (pain on swallowing) are important symptoms of underlying organic disease. It is important to examine such patients carefully for likely causes (see [Table 6.2, page 148](#)).

Signs

- **General inspection.** Note weight loss, due to decreased food intake or oesophageal cancer per se.
- **The hands.** Inspect the nails for koilonychia ([page 208](#)), and the palmar creases for pallor indicative of anaemia. Iron deficiency anaemia can be associated with an upper oesophageal web, which is a thin structure consisting of mucosa and submucosa but not muscle. Iron deficiency anaemia and dysphagia due to an upper oesophageal web is called the Plummer-Vinson^{ff} (or sometimes the Paterson-Brown-Kelly^{gg} syndrome).

Also examine the hands for signs of scleroderma.

- **The mouth.** Inspect the mucosa for ulceration or infection (e.g. candidiasis), which can cause odynophagia; examine the lower cranial nerves for evidence of bulbar or pseudobulbar palsy.
- **The neck.** Palpate the supraclavicular nodes, which may occasionally be involved with oesophageal cancer; examine for evidence of retrosternal thyroid enlargement. A mass on the left side of the neck that is accompanied by gurgling sounds may rarely be caused by a Zenker's diverticulum, an outpouching of the posterior hypopharyngeal wall.
- **The lungs.** Examine for evidence of aspiration into the lungs (due to overflow of retained material, gastro-oesophageal reflux or, rarely, the development of a tracheo-oesophageal reflux from oesophageal cancer).
- **The abdomen.** Feel for hepatomegaly due to secondary deposits from oesophageal cancer and for an epigastric mass from a gastric cancer; perform a rectal examination to exclude melaena (albeit uncommon with oesophageal disease).

Assessment of gastrointestinal bleeding

Haematemesis, melaena or massive rectal bleeding are dramatic signs of gastrointestinal haemorrhage. It is important in such a case to assess the amount of blood loss and attempt to determine the likely site of bleeding. Haematemesis indicates bleeding from a site proximal to, or in, the duodenum.

Assessing degree of blood loss

First take the pulse rate and the blood pressure lying and sitting. As a general rule, loss of 1.5 litres or more of blood volume over a few hours results in a fall in cardiac output, causing hypotension and tachycardia. A pulse rate of more than 100 a minute or a systolic blood pressure of less than 100 mmHg, or a 15 mmHg postural fall in systolic blood pressure, suggests significant recent blood loss. These are indications for blood transfusion. The signs depend to some extent on the state of the patient's cardiovascular system. Those who have pre-existing cardiovascular disease will become shocked much earlier than young fit patients with a normal cardiovascular system.

Once signs of shock are present, massive blood loss has occurred.
These signs include established anaesthesia with cold extremitie

These signs include peripheral cyanosis with cool extremities, clammy skin, dyspnoea and air hunger; the patients are anxious. The blood pressure is low, with a compensating tachycardia, and the urine output is reduced or absent. These are ominous signs in patients with gastrointestinal haemorrhage. Urgent resuscitative measures must be instituted.

Determining the possible bleeding site

The causes of acute gastrointestinal haemorrhage are listed in [Table 6.3, page 151](#).

Examine the patient with *acute upper gastrointestinal bleeding* for signs of chronic liver disease and portal hypertension. Part of the assessment should include inspection of the vomitus and stools ([pages 183–184](#)) and a rectal examination. Remember that, of patients with chronic liver disease and upper gastrointestinal bleeding, only about half are bleeding from varices. The others are usually bleeding from peptic ulceration (either acute or chronic). Look for evidence of a bleeding diathesis.

Finally, examine the patient for any evidence of skin lesions that can be associated with vascular anomalies in the gastrointestinal tract, although these are rare ([Tables 6.3, 6.4](#)). For example, pseudoxanthoma elasticum is an autosomal recessive disorder of elastic fibres that results in xanthoma-like yellowish nodules, particularly in the axillae or neck. These patients may also have angiod streaks of the optic fundus and angiomatic malformations of blood vessels that can bleed into the gastrointestinal tract. Ehlers-Danlos syndrome is a group of connective tissue disorders resulting in fragile and hyperextensible skin ([Figure 6.35](#)). In a number of types, blood vessels are involved. Type IV is characterised by gastrointestinal tract bleeding, spontaneous bowel perforation, minimal skin hyperelasticity and minimal joint hyperextension.





Figure 6.35 Ehlers-Danlos syndrome: (a) arms; (b) hands

Abnormal elasticity of the skin is typical of the Ehlers-Danlos syndrome. The skin may be greatly stretched and takes much longer than normal to return to its normal position. It is also more fragile than normal. Joint hypermobility occurs in type III Ehlers-Danlos syndrome.

Examine the patient with *acute lower gastrointestinal bleeding* as described above, paying close attention to the abdominal examination and the rectal examination. Inspect the stools and test them for blood. Colonoscopy is a key test for all these patients.

Malabsorption

Numerous diseases can cause maldigestion or malabsorption of food. Fat, protein and/or carbohydrate absorption may be affected.

Signs

- **General:** wasting (protein and fat malabsorption), folds of loose skin (recent weight loss), pallor (anaemia) or pigmentation (e.g. as in Whipple's diseaseⁱⁱ).
- **Stools:** steatorrhoea (pale, bulky and offensive stools).
- **Mouth:** glossitis and angular stomatitis (deficiency in vitamin B₂, vitamin B₆, vitamin B₁₂, folate or niacin), intraoral purpura (vitamin K deficiency) or hyperkeratotic white patches (vitamin A deficiency).
- **Limbs:** bruising (vitamin K deficiency), oedema (protein deficiency),

peripheral neuropathy (vitamin B_{12} or thiamine deficiency), bone pain (vitamin D deficiency).

- **Signs suggesting the underlying cause:** in the abdomen these include scars from previous surgery, such as a gastrectomy, operations for Crohn's disease or massive small bowel resection; on the skin dermatitis herpetiformis (itchy red lumps on the extensor surfaces) may be found—this condition is strongly associated with coeliac disease and the histocompatibility antigen HLA-B8; there may be *signs of chronic liver disease*, or *signs of inflammatory bowel disease*.

Causes

Common causes include coeliac disease, chronic pancreatitis and a previous gastrectomy.

Classification of malabsorption

- **Lipolytic phase defects** (pancreatic enzyme deficiency): (i) chronic pancreatitis; (ii) cystic fibrosis.
- **Micellar phase defects** (bile salt deficiency): (i) extrahepatic biliary obstruction; (ii) chronic liver disease; (iii) bacterial overgrowth; (iv) terminal ileal disease, such as Crohn's disease or resection.
- **Mucosal defects** (diseased epithelial lining): (i) coeliac disease; (ii) tropical sprue; (iii) lymphoma; (iv) Whipple's disease; (v) bowel ischaemia or resection; (vi) amyloidosis; (vii) hypogammaglobulinaemia; (viii) HIV infection.
- **Delivery phase defects** (inability to transport fat out of cells to lymphatics): (i) intestinal lymphangiectasia; (ii) abetalipoproteinaemia; (iii) carcinomatous infiltration of lymphatics.

Inflammatory bowel disease

Inflammatory bowel disease refers to two chronic idiopathic diseases of the gastrointestinal tract: ulcerative colitis and Crohn's disease.

Ulcerative colitis

In the gastrointestinal tract only the large bowel is affected. Occasionally the terminal ileum can be secondarily involved (backwash ileitis). The disease almost always involves the rectum and may extend, without skip areas, to involve a variable part of the colon.

- **Abdominal signs:** if there is proctitis only, there are usually no abnormal external findings (except at sigmoidoscopy and biopsy); occasionally, anal fissures are present; with colitis, in the uncomplicated case the abdominal examination may be normal or there may be tenderness and guarding over the affected colon.

- **Signs of complications:** local signs include the following: (i) *toxic dilatation (megacolon)*—one of the most feared complications in which there are signs of distension, generalised guarding and rigidity (peritonism), pyrexia and tachycardia; (ii) *massive bleeding or perforation*; (iii) *carcinoma*—there is an increased incidence of colonic cancer in extensive, long-standing ulcerative colitis.

- **Systemic signs include:** (i) *chronic liver disease*—primary sclerosing cholangitis or cirrhosis; (ii) *anaemia*—due to chronic disease per se, or blood loss, or autoimmune haemolysis; (iii) *arthritis*—there may be a peripheral non-deforming arthropathy affecting particularly the knees, ankles and wrists (10%), and there may be signs of ankylosing spondylitis in 3%; (iv) *skin manifestations*: erythema nodosum (2%) consists of tender red nodules usually on the shins ([Figure 6.36](#)); pyoderma gangrenosum (rare) starts as a tender, red raised area which becomes bullous and ulcerates ([Figure 6.37](#))—it may occur anywhere but is often on the anterior aspects of the legs; mouth ulcers are common and are due to aphthous ulceration (5%); finger clubbing may be present; (v) *ocular changes* include conjunctivitis, iritis and episcleritis, which are strongly associated with arthritis and skin rash. (*Conjunctivitis* is an inflammation of the conjunctiva which then appears red and swollen: the eye itself is not tender. *Iritis* is an inflammation of the iris with central scleral injection, which radiates out from the pupil: the eye is tender. *Episcleritis* is a nodule of inflammation on the scleral surface.)



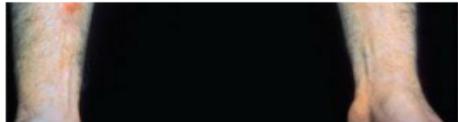


Figure 6.36 Erythema nodosum

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Figure 6.37 Pyoderma gangrenosum

From Misiewicz JJ, Bantrum CI, Cotton PB et al, Slide atlas of gastroenterology. London: Gower Medical Publishing, 1985, with permission.

Crohn's disease

The whole of the gastrointestinal tract may be affected from the mouth to the anus. However, most commonly the terminal ileum, with or without the colon, is involved.

- **Abdominal signs:** if the condition affects only the terminal ileum there are often no abnormal findings, although tenderness, fullness or a mass (either soft or firm) in the right iliac fossa may be present. Occasionally there