

## ANSWER 46

**Observations (46a)**

This plain abdominal radiograph shows a large, ahaustral gas-filled viscus arising from the left side of the pelvis and extending into the upper abdomen. The loop is projected over the left side of pelvis and descending colon with its apex under the left hemidiaphragm. The medial walls of the loop form a summation line. There are several dilated loops of descending colon evident with absence of gas in the rectum. The features are typical of sigmoid volvulus and there is no free intraperitoneal gas seen to indicate perforation.

**Diagnosis**

Sigmoid volvulus.

**Differential diagnosis**

For large bowel obstruction:

- Colonic malignancy.
- Inflammatory strictures: Crohn's, ischaemia, diverticulitis.
- Volvulus.
- Infectious processes: TB, amoebiasis.
- Extrinsic lesions: abscess, bladder/prostate/uterine tumour, endometriosis.

**Discussion**

Volvulus account for ~10% of large bowel obstructions in the UK, the most common type being sigmoid volvulus. This occurs more commonly in the elderly. The twisting of the sigmoid colon on its mesenteric axis is usually a chronic problem with superimposed acute episodes, and represents a closed loop obstruction. Radiologically, the features are of large bowel obstruction with a markedly dilated loop of colon seen arising from the left iliac fossa. The volvulus is characterized by an ahaustral inverted U-shaped loop of colon. The medial walls produce a summation line and together with the lines of the lateral walls create the classic 'coffee bean' appearance. Several radiological features have been documented as typical, though the most specific are:

- Apex of the loop under the left hemidiaphragm.
- Inferior convergence of the loop in the left side of the pelvis – the main axis of the loop therefore extends from left iliac fossa towards right upper quadrant.
- 'Left flank overlap' sign – loop overlaps descending colon.
- Medial wall summation line.

Other features described include 'liver overlap' and 'pelvic overlap' signs (where the loop overlaps liver and left iliac bone, respectively); apex of loop above T10; an air to fluid ratio >2:1.

Diagnostic confusion can be resolved with a barium enema examination. This demonstrates a smooth, tapered beak-like end of the barium column termed the 'bird's beak' sign. Treatment involves the placing of a rectal flatus tube.

**Practical tips**

Caecal volvulus (46b) can sometimes be a confusing differential. It represents twisting just above the ileocaecal

valve and can usually be differentiated from sigmoid volvulus by several features:

- Caecal volvulus usually occurs in a younger age group: 30–50 years.
- Dilated obstructed caecum often dilates to fill the left upper quadrant (although in many cases vertical rotation occurs with caecum still filling the right iliac fossa). The main axis will be opposite that of sigmoid volvulus however, extending from the right iliac fossa towards the left upper quadrant.
- Some haustral markings are still evident, unlike sigmoid volvulus.
- There may well be small bowel dilatation but the rest of the colon will be undilated, unlike sigmoid volvulus.

**Further management**

Urgent surgical referral with a view to insertion of a flatus tube to decompress the bowel.

**Further reading**

Burrell HC, Baker DM, Wardrop P, Evans AJ (1994). Significant plain film findings in sigmoid volvulus. *Clinical Radiology* 49: 317–319.



**46b** Caecal volvulus with a dilated caecum extending up into the right upper quadrant. Small bowel is dilated secondary to this obstruction but large bowel is collapsed helping to differentiate caecal from sigmoid volvulus.

## CASE 47

**History**

A 35-year-old female presented with abdominal pain and vomiting.



## CASE 48

**History**

A 38-year-old woman underwent contrast enhanced CT for further evaluation of a lesion noted on ultrasound.

(see page 88 for case answer)



**ANSWER 47**

**Observations (47a)**

Multiple dilated loops of gas-filled small bowel that measure more than 3 cm in diameter are seen within the central abdomen. No gas is seen within the large bowel and appearances are consistent with small bowel obstruction. Surgical clips are noted in the right side of pelvis along with cholecystectomy clips in the right upper quadrant. Adhesions are therefore the most likely cause of the obstruction.

**Diagnosis**

Small bowel obstruction from adhesions.

**Differential diagnosis**

For small bowel obstruction:

- Adhesions – account for up to 60% of small bowel obstructions.
- Hernia.
- Gallstone ileus.
- Small bowel or caecal malignancy.
- Intussusception.
- Malrotation and volvulus.

**Discussion**

Small bowel obstruction can have a varied presentation on plain abdominal radiography. The classical appearance is of central abdominal small bowel loops dilated to >3 cm in diameter with a paucity of gas in the large bowel. Other appearances can be of:

- ‘String of beads’ sign due to small air-fluid levels in fluid-filled obstructed loops of small bowel (47b).
- Absence of gas in the small bowel due to complete obstruction and complete fluid filling of loops (47c).

Small bowel can be differentiated from large bowel using the following features:

- Presence of valvulae conniventes which extend across the width of the bowel. Colonic haustra do not traverse the whole lumen.
- Dilated bowel located in the central abdomen rather than the periphery (47d).
- Diameter of loops is <5 cm.
- Absence of solid faeces.

**Practical tips**

Always check the film to try to identify the underlying cause of the obstruction:

- Check hernial orifices at the groin – there should be no bowel gas extending below the position of the inguinal ligament (a line from public tubercle to anterior-superior iliac spine) (47e, 47f, 47g, 47h).
- Look for evidence of previous surgery, as in this case.
- Look for air in the biliary tree and radio-opaque gallstones outside the territory of the gallbladder as indicators of gallstone ileus.
- Examine bones for metastatic lesions, which can point to malignancy.
- Always remember to check for free gas secondary to perforation!

**Further management**

CT is the investigation of choice for small bowel obstruction and it can identify both the site and cause of obstruction and also the complications. Mechanical small bowel obstruction is a surgical emergency.



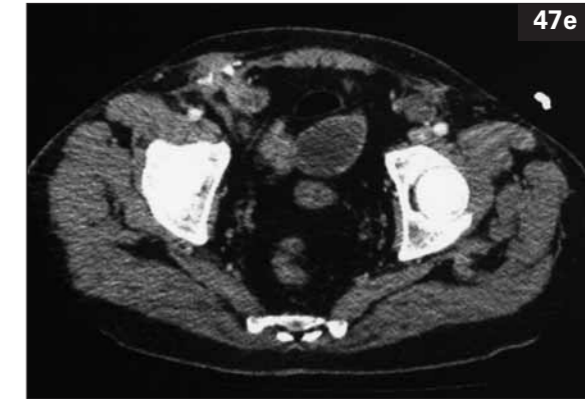
47b Plain abdominal radiograph demonstrating the ‘string of beads’ sign.



47c Plain abdominal radiograph demonstrating complete absence of small bowel gas due to fluid filling.



47d Classic distribution of dilated small bowel: dilated loops are centrally located within the abdomen.



47e Axial CT image shows that there has been a previous attempted hernia repair with a mesh noted *in situ*. There has, however, been a recurrence with dilated bowel going into the hernia and completely collapsed bowel emerging from it. This shows that this is the level of obstruction.



47f Pelvis radiograph shows loops of small bowel below the inguinal ligament.



47g Coronal CT reformatted image in the same patient demonstrates a right sided inguinal hernia.



47h Axial CT image of a patient with small bowel obstruction.

**ANSWER 48**

**Observations (48a)**

A large central mass lesion is demonstrated in the left kidney. This is slightly heterogeneous but has a predominantly fatty density. Appearances are consistent with left renal angiomyolipoma.

**Diagnosis**

Angiomyolipoma.

**Discussion**

Angiomyolipoma is a benign lesion containing fat, blood vessels and smooth muscle. They tend to present in two groups of patients:

- Women in their 4th–7th decades where lesions arise spontaneously and tend to be *solitary and unilateral*.
- Young patients with tuberous sclerosis where *multiple and bilateral* lesions are seen in up to 75% of patients (48b).

They are also seen rarely in autosomal dominant polycystic kidney disease (ADPKD) and neurofibromatosis.

- Appearance on US: typical appearance is of a well defined echobright lesion due to a high fat content (48c). There can be a variable degree of reduced echogenicity depending on the amount of smooth muscle and/or haemorrhage.

- Appearance on CT: again, appearance is of a well defined fat-containing lesion with some areas of higher attenuation tissue. Identification of fat (HU <-20) within a renal lesion is highly specific for an angiomyolipoma.
- Appearances on MRI: a fat suppression sequence can be very useful in confirming intralésional fat content.

The main complication of these lesions is haemorrhage and the risk is related to size. Lesions greater than 4 cm in diameter have a risk of spontaneous bleeding of approximately 50%.

**Practical tips**

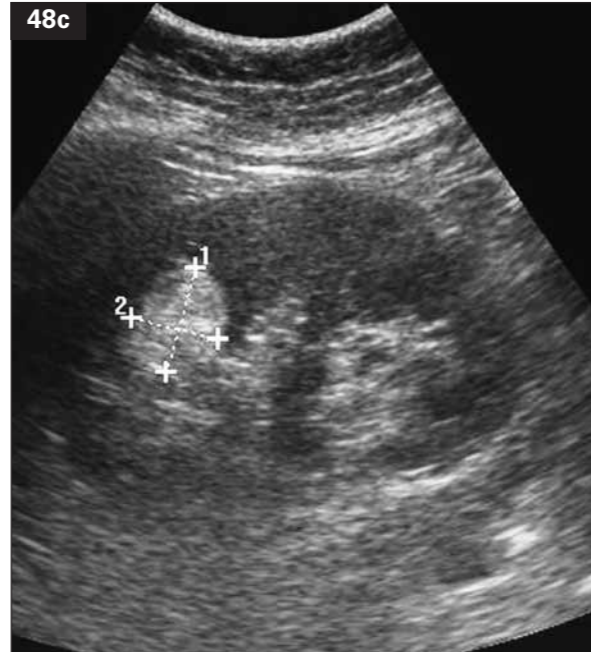
Identification of fat in a renal lesion is very specific for angiomyolipoma.

**Further management**

Small lesions (<4 cm) are usually asymptomatic but lesions >4 cm are almost always symptomatic with pain and a risk of haemorrhage. Lesion resection or nephrectomy should be considered in these patients. Transcatheter arterial embolization is an alternative.



**48b** Single axial CT image demonstrating multiple low-attenuation lesions in both kidneys in a patient with tuberous sclerosis.

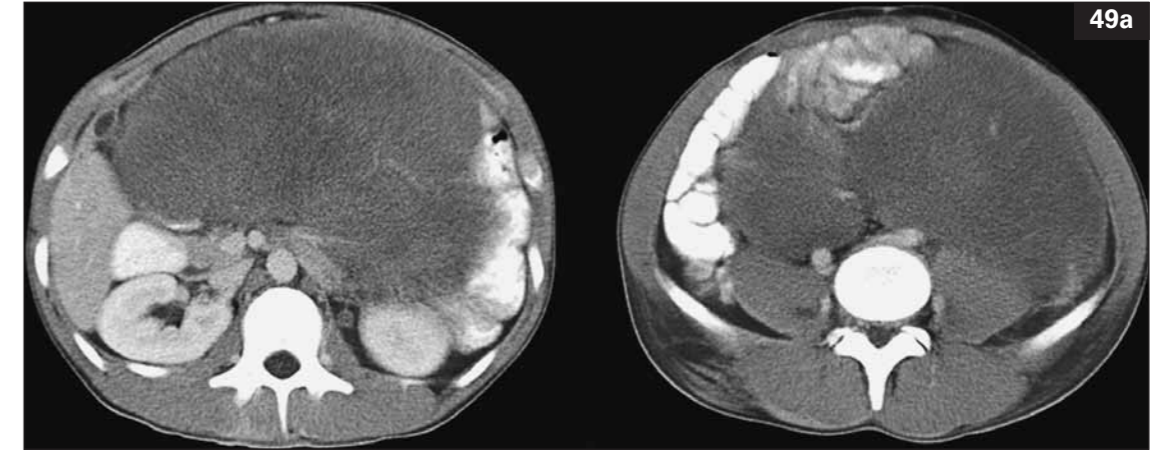


**48c** US appearances of angiomyolipomas, which appear as well defined hyperechoic lesions.

**CASE 49**

**History**

A 30-year-old male presented with abdominal swelling over several months.



**49a** Selected images from a recent contrast enhanced CT study.

**49b** A barium enema done on the same patient 3 years previously.



**ANSWER 49**

**Observations (49a, 49b)**

The two CT images (49a) demonstrate a large, well defined soft tissue mass in the central abdomen. This displaces adjacent bowel loops and most likely originates in the mesentery.

The single image (49b) from a double contrast barium enema examination shows multiple small, well defined mucosal filling defects throughout the colon consistent with widespread colonic polyposis. Multiple polyps throughout the colon suggest an underlying genetic condition.

**Diagnosis**

Familial adenomatous polyposis (FAP) with mesenteric desmoid tumour.

**Discussion**

Familial adenomatous polyposis is an autosomal dominant disease (chromosome 5) characterized by multiple colonic adenomatous polyps that inevitably progress to colorectal cancer within 20 years of diagnosis. Treatment involves prophylactic total colectomy in early adult life and genetic screening of family members from the second decade with a view to prophylactic surgery. All patients have colonic polyps but small bowel and gastric adenomas are also found (periampullary cancer is the most common cause of death once colectomy has been performed).

Other associated features include:

- Desmoid tumours.
- Mesenteric fibrosis.
- Gastric hamartomas.
- Hypertrophy of retinal pigment epithelium.

Gardner and Turcot syndromes are variants of FAP.

Gardner syndrome also includes:

- Osteomas of the skull and mandible.
- Dental abnormalities – dentigerous cysts, odontoma, hypercementoma, supernumerary teeth.
- Soft tissue tumours such as fibroma, lipoma, leiomyoma, neurofibroma.
- Epidermal cysts.
- Association with thyroid cancer.

Turcot syndrome is FAP with associated CNS malignancy such as medulloblastoma.

Other polyposis conditions are:

- Peutz–Jeghers – autosomal dominant (AD) hamartomatous polyposis condition with features of mucocutaneous pigmentation (usually brown pigmented freckling on the mucous membranes of lips and gums) and multiple polyps found predominantly in the stomach and small bowel, with a few also seen in the large bowel. Hamartomas have no malignant potential but the condition is associated with an increased risk of upper GI tract malignancies. Complications of the condition include:
  - Malabsorption.
  - Transient intussusception.
  - Carcinoma of the GI tract.
  - Carcinoma of breast, pancreas, ovary, endometrium and testes.

- Cowden’s syndrome – AD condition characterized by multiple hamartomatous polyps, breast and thyroid malignancy and skin lesions.
- Cronkhite–Canada syndrome – hamartomatous colonic polyps are associated with alopecia, skin pigmentation and nail atrophy.

**Practical tips**

- Images should be carefully inspected for a coexistent colonic tumour as well as extracolonic malignancies.
- Intussusception in adults indicates an underlying bowel pathology, whereas in children it can be idiopathic.

**Further management**

Surgical referral is required for prophylactic colectomy, as is referral for genetic screening of relatives.

**Further reading**

Galiatsatos P, Foulkes WD (2006). Familial adenomatous polyposis. *American Journal of Gastroenterology* 101(2): 385–398.

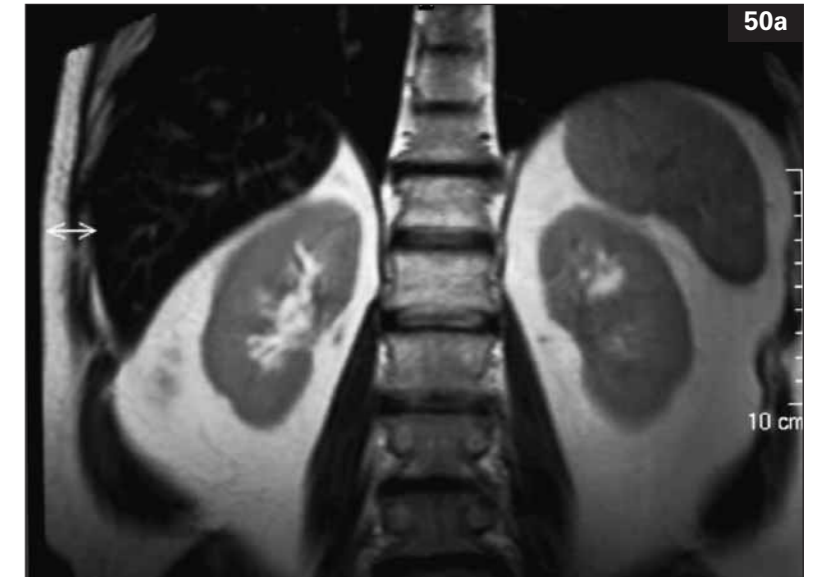


**49b** Multiple polyps.

**CASE 50**

**History**

A 43-year-old male presented with abnormal liver function tests.



**CASE 51**

**History**

A 19-year-old male presented with multiple episodes of renal colic.

