

Acute abdomen

Following history and clinical examination, plain film radiographs have traditionally been one of the first and most useful methods of further investigation, in certain specific condition e.g. acute chole- cystitis, ultrasound has become the initial imaging technique of choice

Radiographic Technique

A supine abdomen and an erect chest can be regarded as the basic standard radiographs. A horizontal-ray abdominal radiograph. In erect position is frequently taken to add more information and to demonstrate fluid levels.

CXR

A chest radiograph can be regarded as an essential exam for any patient presenting with an acute abdomen. The reasons are as follows:

1. The erect chest film is the best radiograph for showing the presence of a small pneumoperitoneum, particularly on the right side between the liver and the diaphragm. It is superior to the erect abdominal film for this purpose.
2. A no. of chest conditions may present as acute abdominal pain & mimic acute abd.

3. Acute abdominal conditions may be complicated by chest pathology. For example, pleural effusions frequently complicate acute pancreatitis,

Abdominal radiograph

The supine abdominal radiograph is probably the single most useful film. It allows the distribution of gas and the caliber of bowel to be determined

Traditionally an erect abdominal radiograph is taken 'to show fluid levels and free gas'.

Pneumoperitonium.

The demonstration of a small pneumoperitoneum in a patient presenting with acute abdominal pain is one of the most significant signs in medicine.

It is possible, by careful radiographic technique, to demonstrate as little as 1 ml of free gas on erect chest or left lateral decubitus abdominal films. However, radiographic technique and positioning are important and a patient should be in position for 10 min before the film is taken, for it takes this time for free gas to rise to the highest point in the abdomen.

On erect cxr gas is relatively easy to detect under the RT, hemidiaphragm, but on the lt. free gas can be difficult to differentiated from stomach & colonic gas.

On supine film Visualisation of the outer as well as the inner wall of a loop of bowel (Rigler's sign) is a valuable indication of a pneumoperitoneum

Relatively large amounts of gas may accumulate beneath the diaphragm (the `cupola' sign) or in the centre of the abdomen over a fluid collection (the `football' sign).

Intestinal obstruction

Small intestinal obstruction

Causes

Complete obstruction of the small bowel usually causes small-bowel dilatation with accumulation of both gas and fluid and a reduction in caliber of the large bowel

In most cases of small-bowel obstruction, however, dilated gas filled loops of small bowel are readily identified on the supine radiograph, multiple fluid levels are present on erect films

In dilated small bowel which is almost completely filled with fluid, small bubbles of gas may be trapped in rows between the valvulae conniventes on horizontal-ray films; this is known as the `string of beads' sign . This sign, if present, is virtually diagnostic of small-bowel obstruction and does not occur in normal people.

Large intestinal obstruction

The commonest cause of large-bowel obstruction is carcinoma, of which about 60% are situated in the sigmoid colon.

The key to the radiological appearances of large-bowel obstruction depends on the state of competence of the ileocaecal valve.

In type I the ileocaecal valve is competent and the radiological appearance is one of dilated colon with a distended thin-walled caecum with or without distension of small bowel.

In type II obstruction the ileocaecal valve is incompetent and the caecum and ascending colon are not distended, but the back-pressure from the colon extends into the small bowel and there are numerous dilated loops of small bowel which may simulate small-bowel obstruction.

THE DISTINCTION BETWEEN SMALL- AND LARGE-BOWEL DILATATION

	Small bowel	large bowel
Valvulae conniventes	Present in jejunum	Absent
No. of loops	Many	Few
Distribution of loops	Central	peripheral
haustra	absent	Present

diameter	3-5 c m	5cm+
radius of curvature	small	large
solid faeces	absent	present

The role of CT scan in diagnosis of intestinal obstruction

CT is the investigation of choice for suspected bowel obstruction when clinical and AXR assessments are inconclusive. CT is highly accurate for establishing the diagnosis of bowel obstruction, defining the location and cause of obstruction

common findings include:

- **a distinct transition point where bowel caliber changes from normal to abnormal**
- **dilated bowel loops proximal to the transition point**
 - **small bowel >3.0 cm**
 - large bowel >5 cm**
- **collapsed or normal caliber bowel distal to the transitional point**
- **bowel wall thickening.**
- **If bowel obstruction is identified it is important to assess for complications and assess the viability of the involved bowel:**
- **pneumoperitoneum indicating perforation**
- **bowel ischemia**
- **strangulation**

ACUTE APPENDICITIS:

In a significant minority of patients, particularly the young and the old- clinical features of appendicitis are obscure and the diagnosis is difficult; plain films are frequently taken to elucidate the cause of abdominal pain and may subsequently play a significant role in making the diagnosis. The radiological signs result from the

localised inflammatory change. which may then progress to perforation and abscess formation with an associated paralytic ileus.

Ultrasound in acute appendicitis

The graded compression technique for ultrasound examination of the appendix Using a probe of at least 7 MHz over the point of maximum tenderness in the right iliac fossa, pressure is gradually increased over the area in order to displace the bowel loops. The appendix then may be seen overlying the psoas muscle. The ultrasound features of appendicitis are

Blind ending tubular structure at site of tenderness

Non-compressible

Diameter 7 mm or greater

No peristalsis

Appendicolith casting acoustic shadow

High echogenicity non-compressible surrounding fat

Surrounding fluid or abscess

Edema of caecal pole

The most sensitive sign is a non-compressible appendix with a diameter of 7 mm or greater.

The role of CT scan in diagnosis of acute appendicitis

Acute cholecystitis

Ultrasound is widely used for the diagnosis of acute cholecystitis. A thickened echogenic gallbladder wall with a hypoechoic margin can be identified in about 50-70% of cases. Other signs include an indistinct contour to the gallbladder wall and fluid around the fundus of the gallbladder. Gallstones are readily identified and cast acoustic shadows. A stone obstructing the cystic duct may produce a grossly distended gallbladder. Echogenic sediment may be seen in the lumen, caused by inspissated bile or pus.

Tenderness of the gallbladder as it lies immediately beneath the ultrasound transducer is also a very reliable sign that the gallbladder is inflamed (positive sonographic Murphy sign).