Radiological aspect of lower GI diseases and hepatobiliary system

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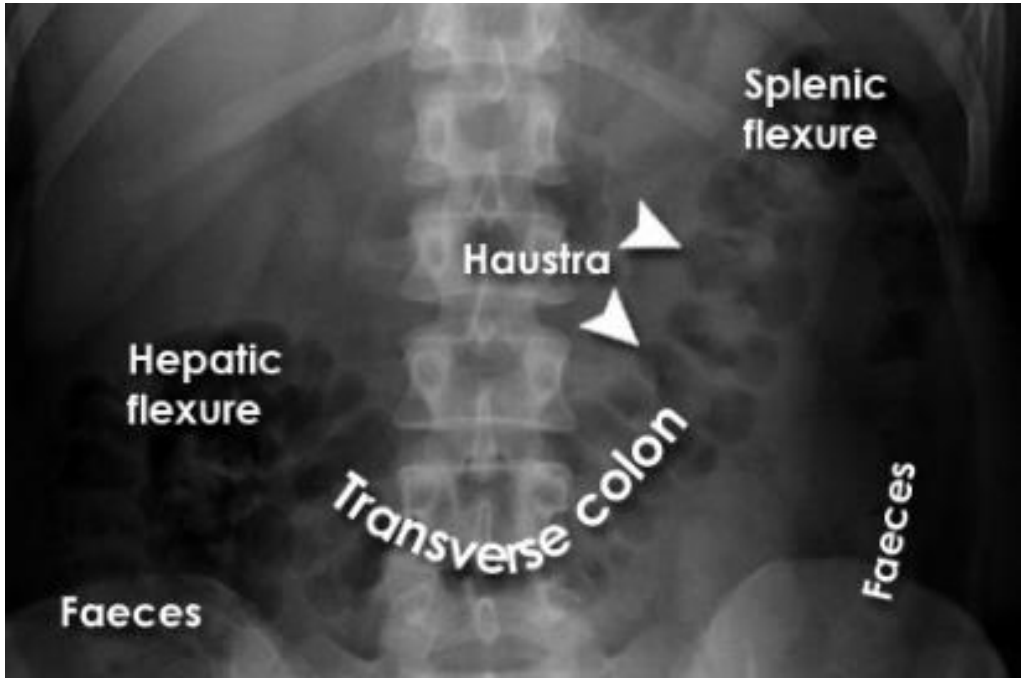
Radiological modalities

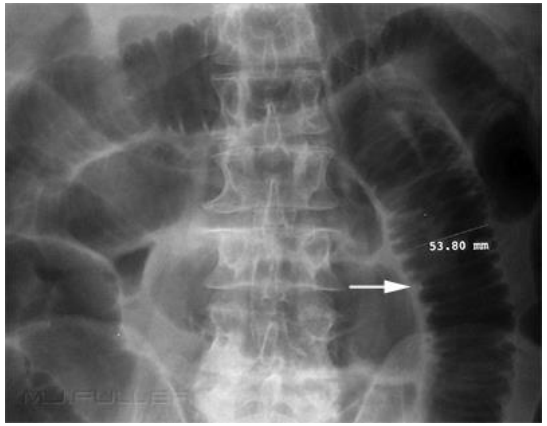
- Plain radiograph of abdomen
- Barium studies
- Ultrasound Abdomen
- CT
  - Non contrast CT, Contrast CT, Virtual colonography
- MRI
- Angiography

Plain radiograph of the abdomen

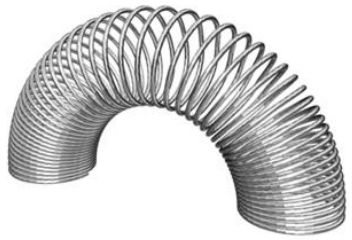
Plain radiograph of the abdomen



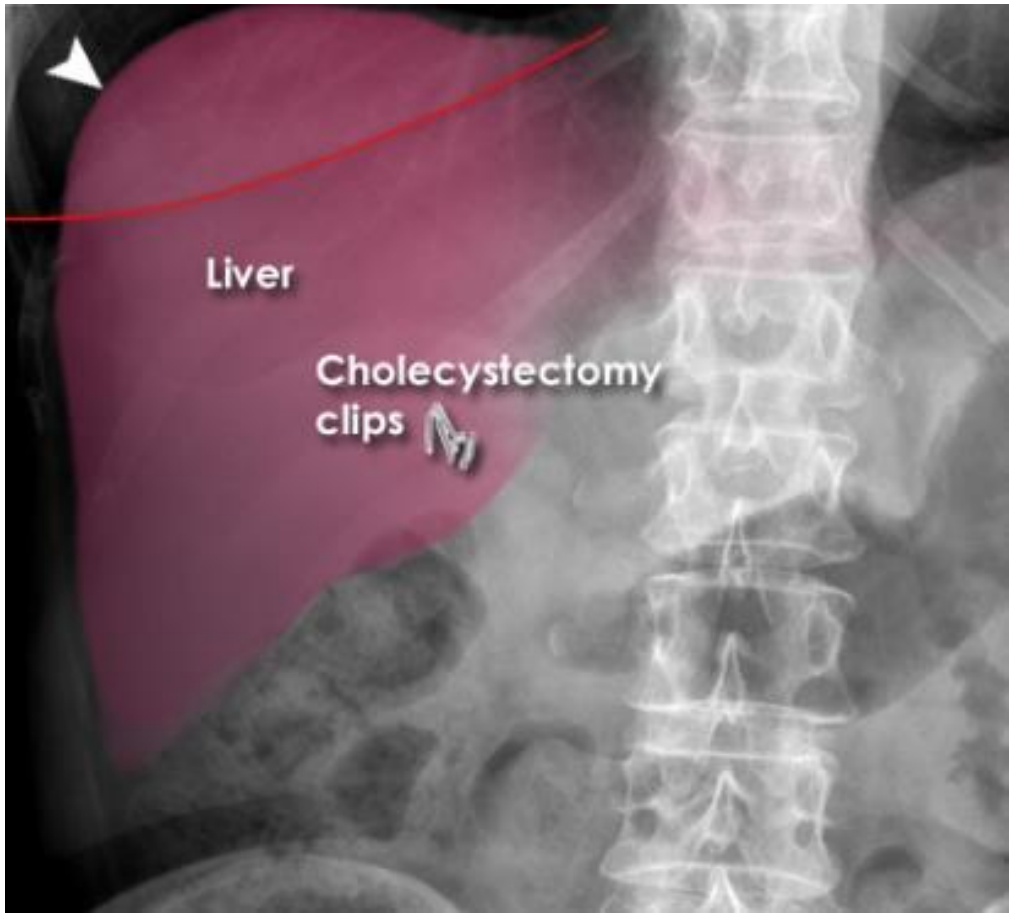
- Retroperitoneal structures of the colon (ascending colon, descending colon, and rectum) -relatively constant in position.
- Transverse colon / sigmoid colon - more variable in position.
- Differentiate from dilated small bowel:
  - Haustra
  - Faeces



Dilated small intestine

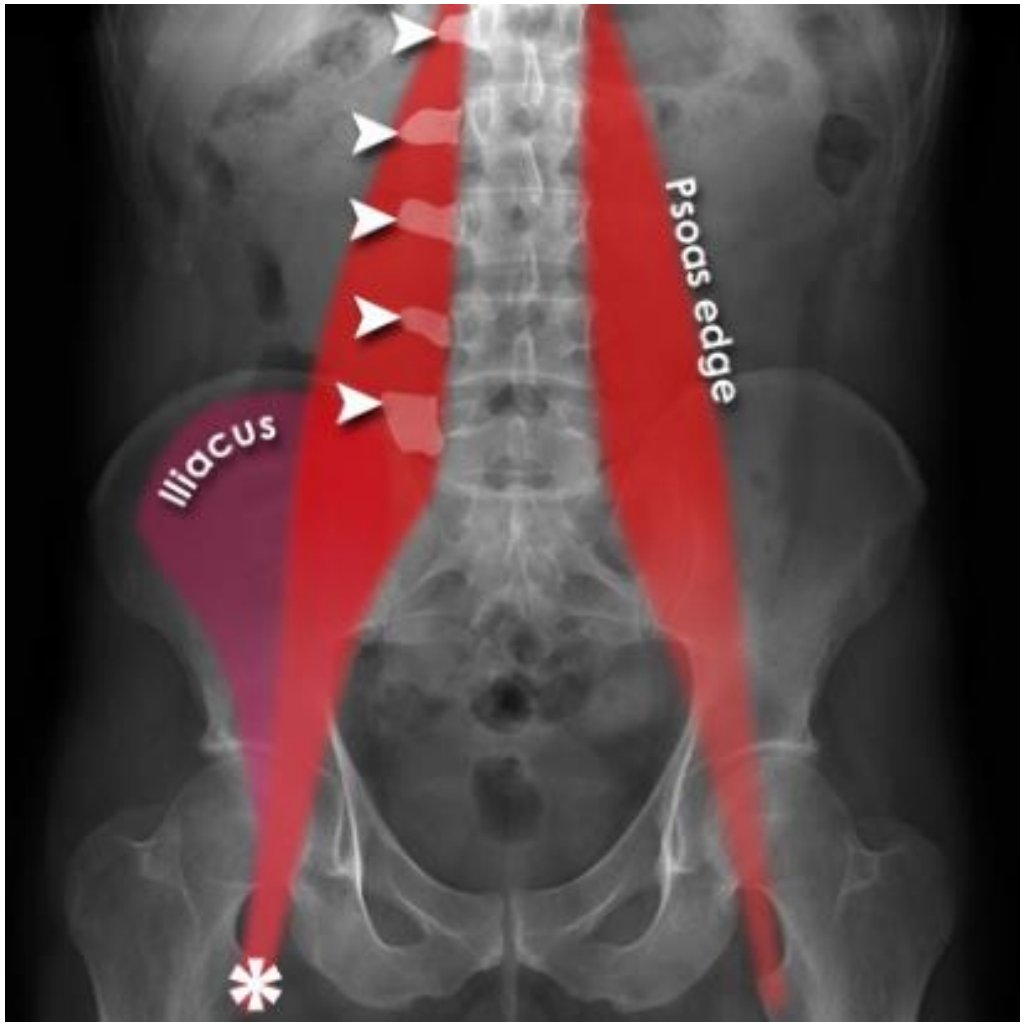


Liver on abdominal X-ray



- As a bland area of grey on an abdominal X-ray.
- Superior edge -forms the right hemi-diaphragm contour (arrowhead).
- Breast shadow some times overlies
- GB rarely visible on an abdominal X-ray.
- Its position is very variable.
- Surgical clips after cholecystectomy..

Psoas edges on abdominal X-ray

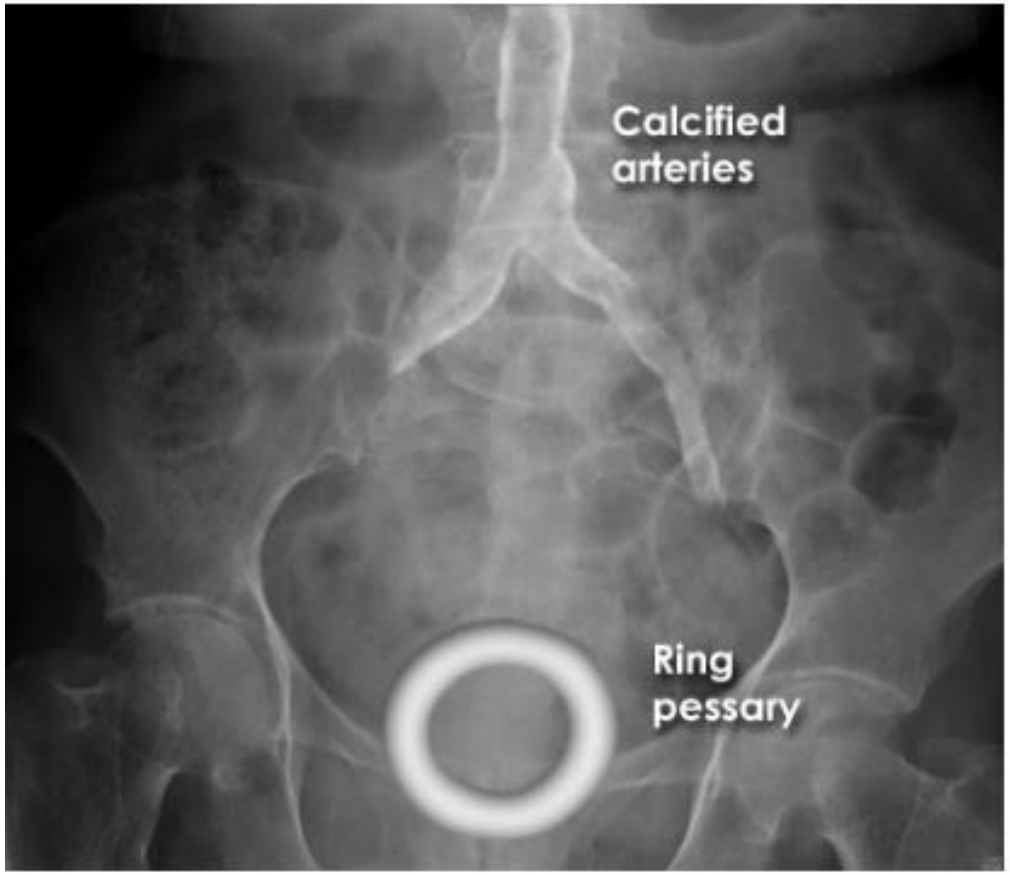


- Lateral edge of the psoas muscles as a near straight line.

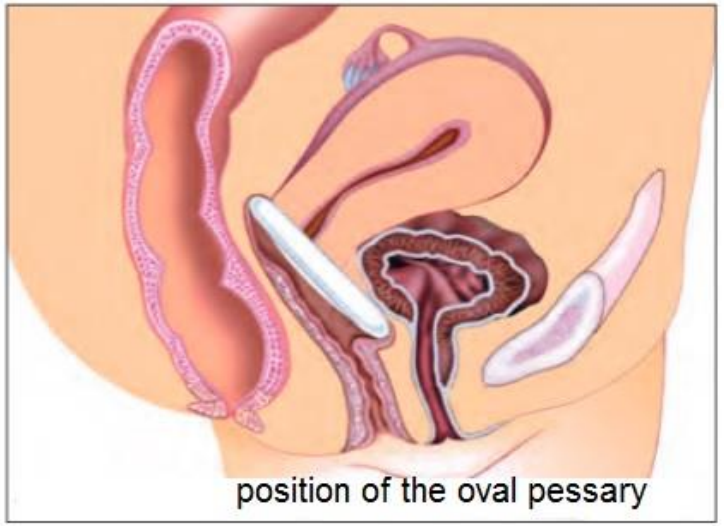
Navel jewellery artefact

- Ideally all jewellery that overlies anatomically important structures should be removed prior to acquiring an X-ray

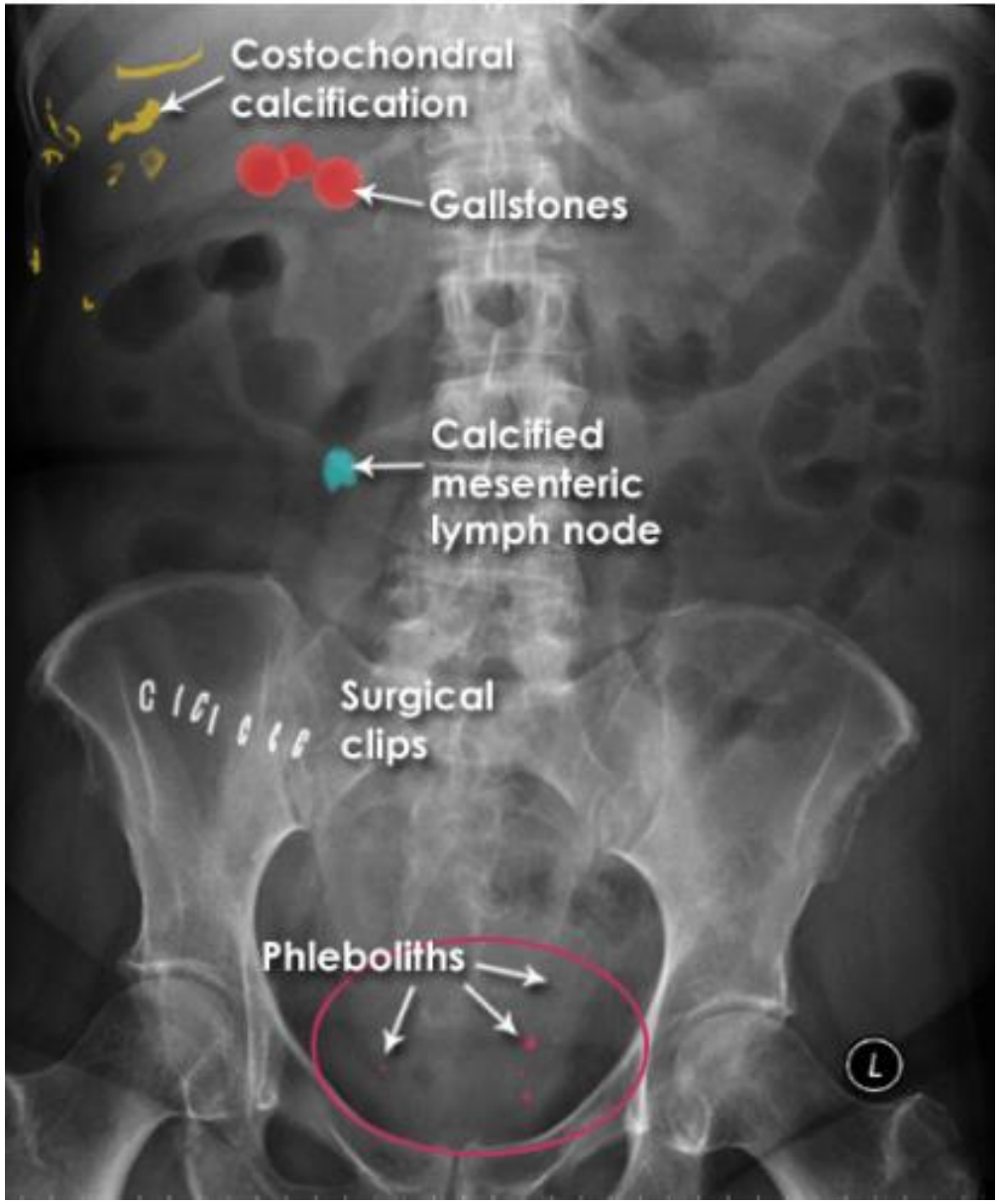
Vascular calcification



- If seen, vascular (aorto-iliac) calcification implies a more generalised atherosclerosis.
- Note the ring pessary in this elderly patient

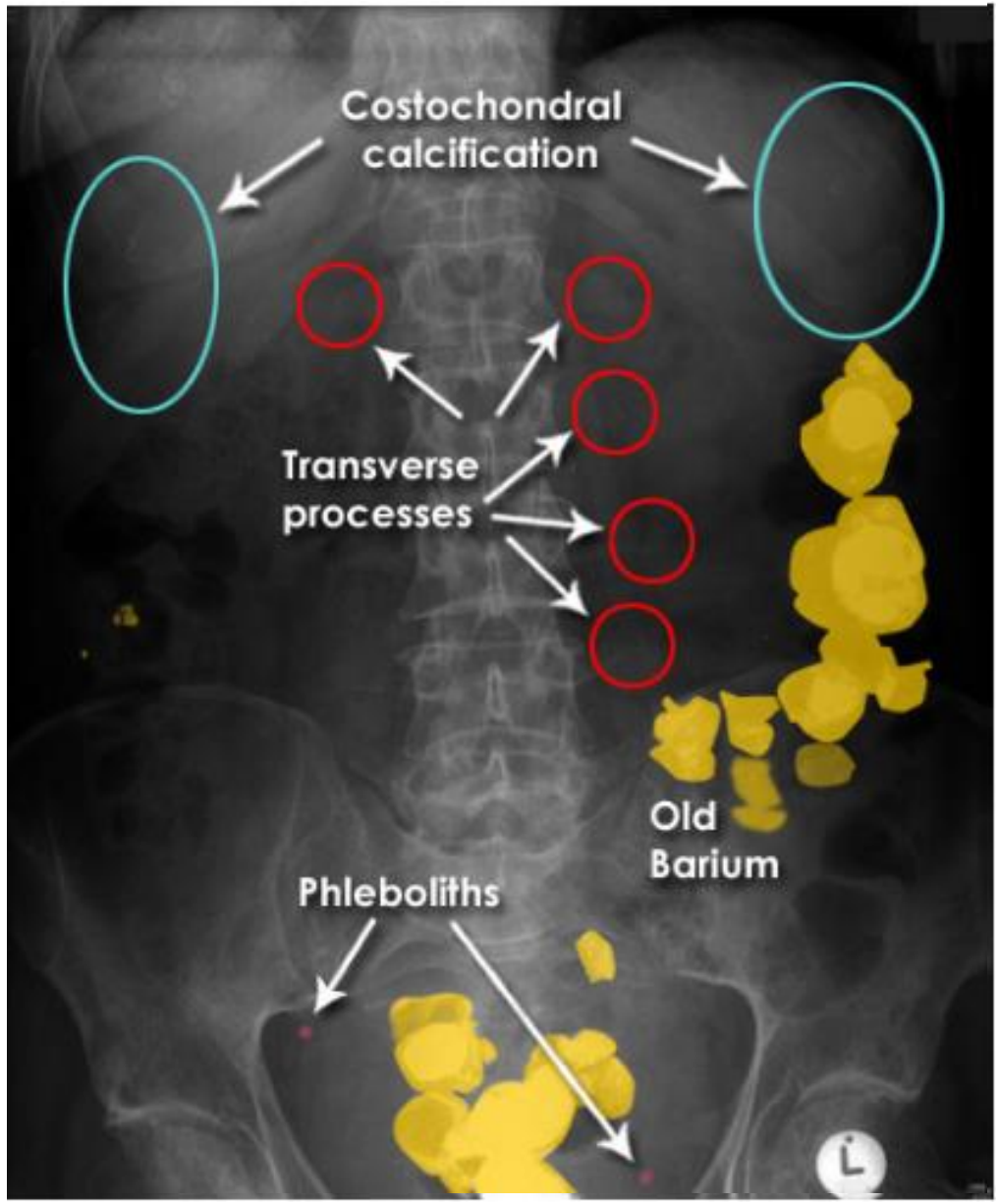


Calcified structures



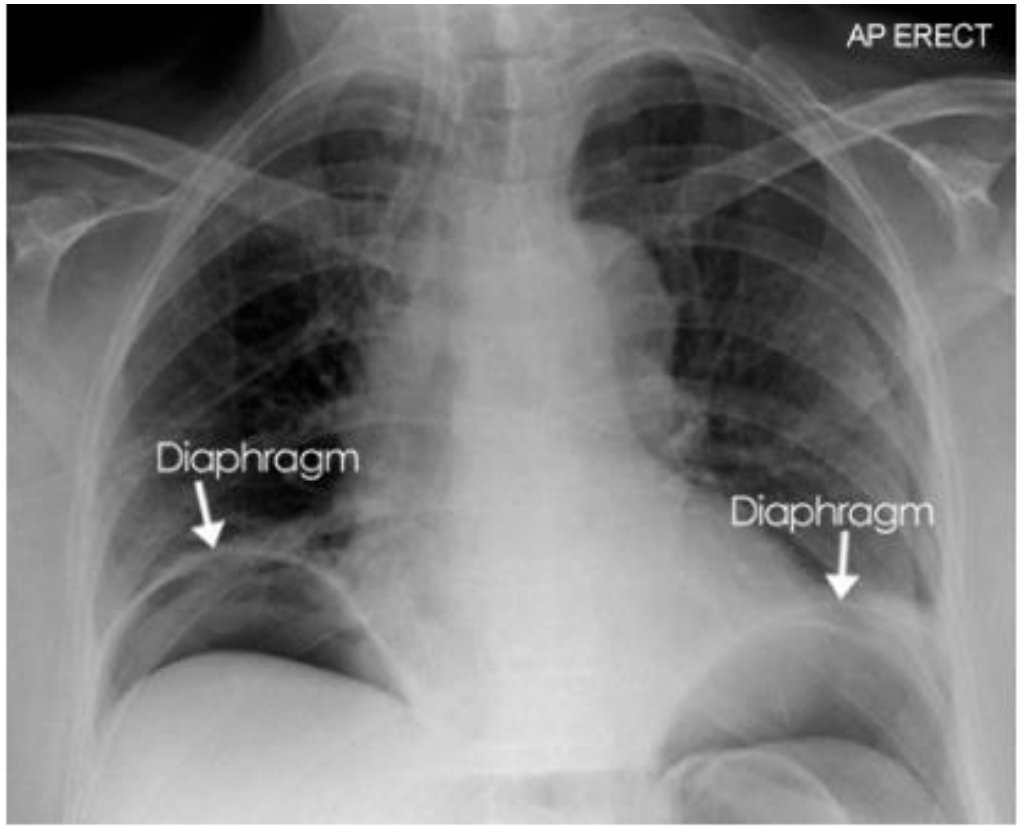
- Multiple incidental and asymptomatic calcified structures common in x rays.
- Gallstones are seen only if calcified (20% are calcified).
- Other calcifications:
  - Costochondral calcification
  - Calcified mesenteric lymph nodes
  - Phleboliths (calcified pelvic veins)
    - Phleboliths may be mistaken for ureteric calculi
  - Calcified ovarian cysts ,fibroids

Residual contrast



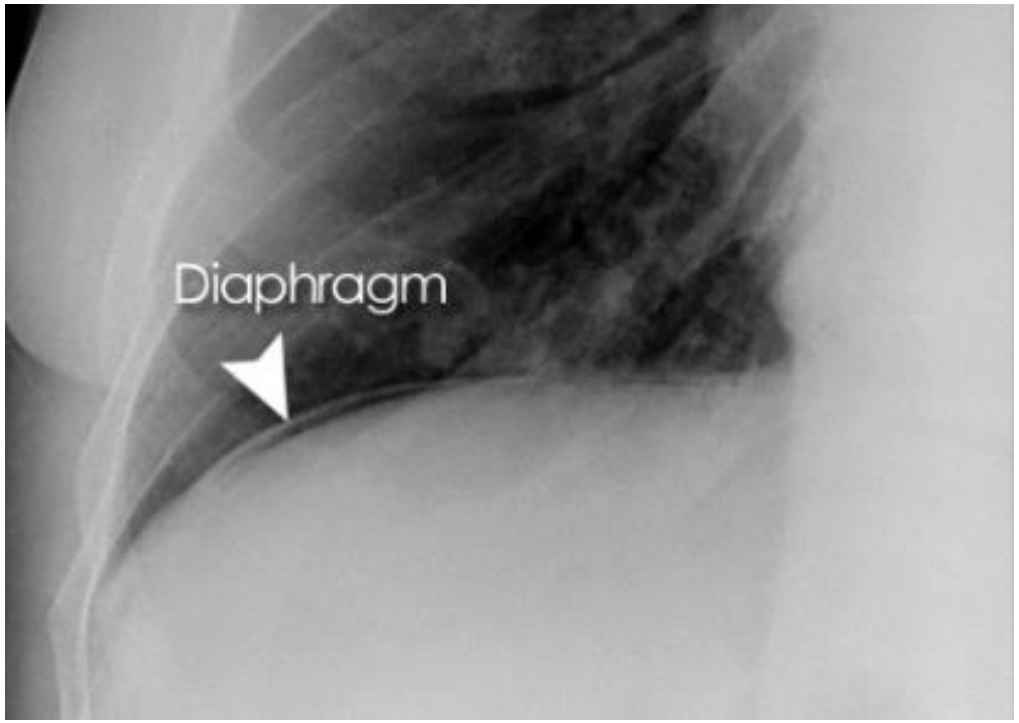
- Large areas of very high density in descending colon and rectum are caused by residual contrast material in this patient who had a Barium enema 10 days previously.
- Also note costochondral calcification, and phleboliths.
- Do not mistake the tips of the transverse processes for ureteric calculi.

Air/gas under the diaphragm - erect chest X-ray



- Perforation of a hollow viscous-
  Gastric/Duodenal/Ileal/Typhoid/Crohn's/ malignancy
- Penetrating injury Abdomen
- Infection with gas forming organisms
- Following Laparoscopic procedure
- Most common cause of free gas under the Diaphragm is –Laparotomy or post operative patients.

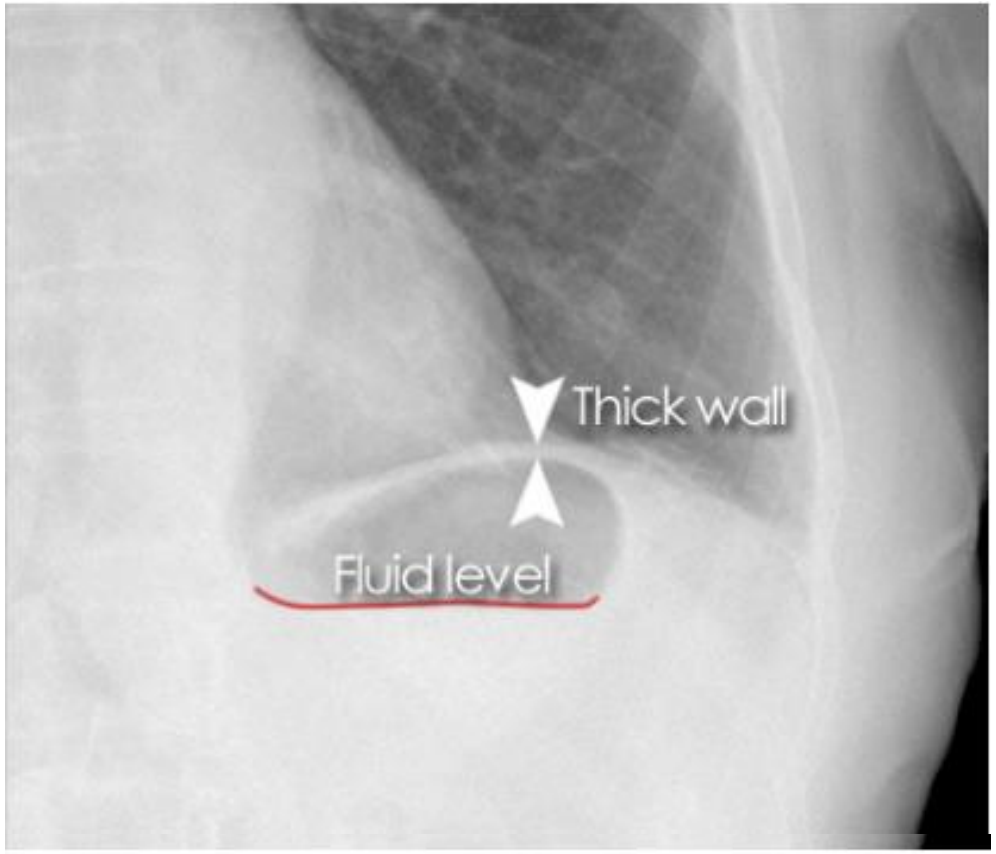
Pneumoperitoneum

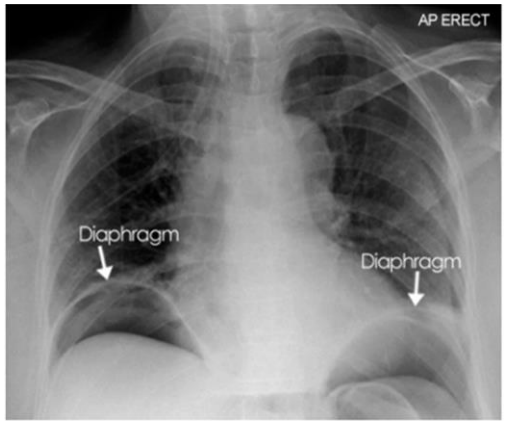


- Most common cause of free gas under the Diaphragm is –Laparotomy or post operative patients.

Free gas mimics :

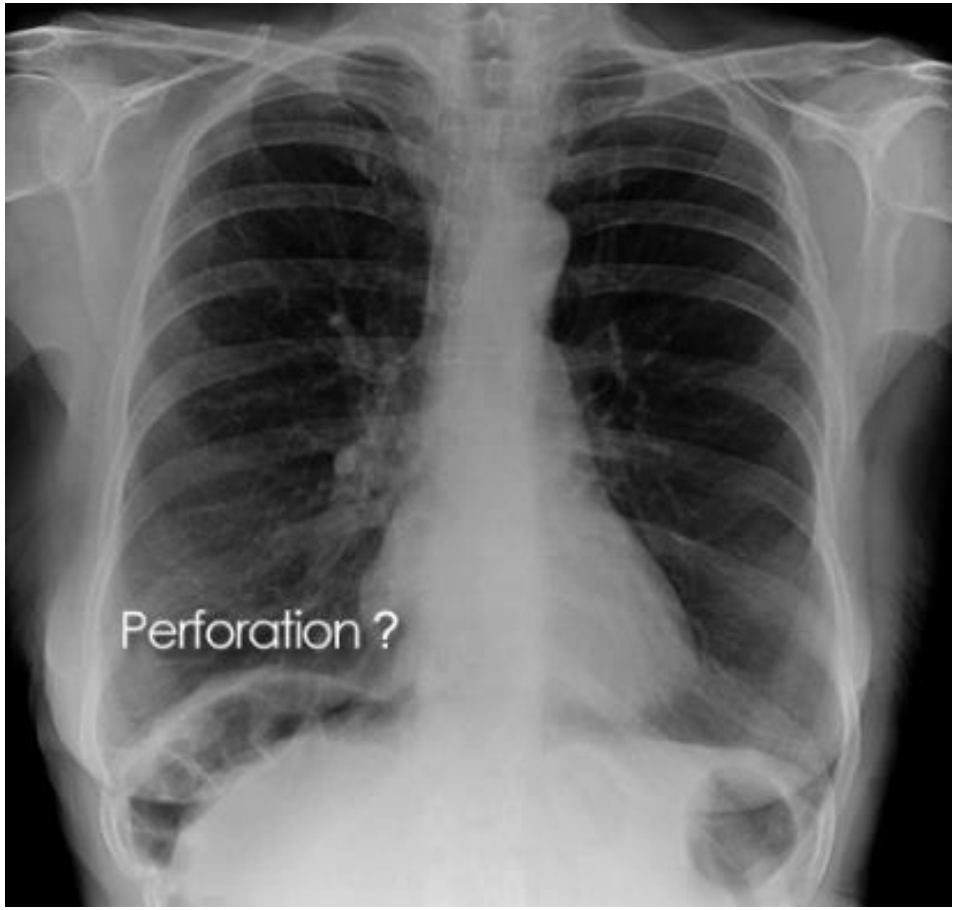
Normal stomach bubble - erect chest X-ray





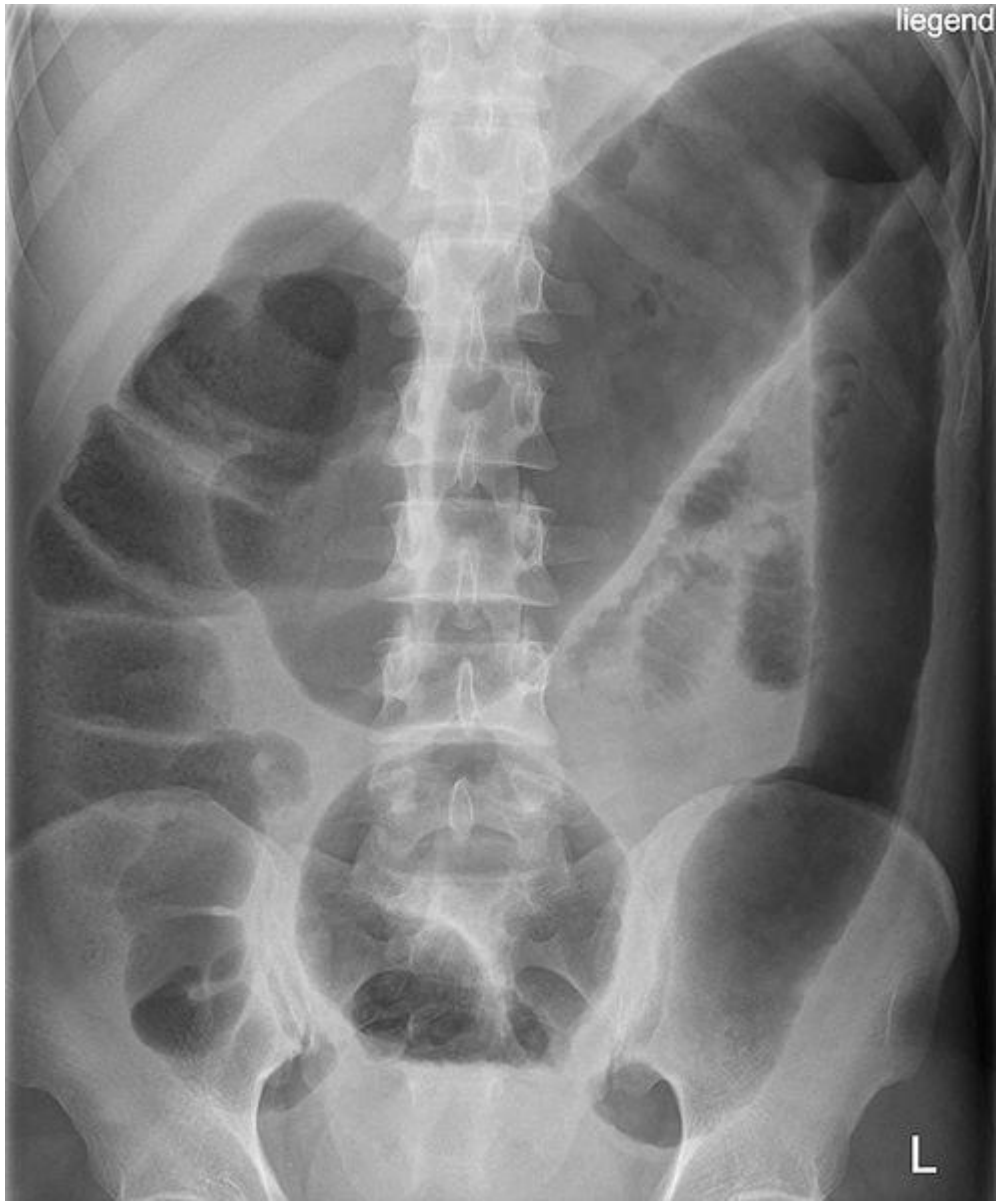
- Round/ovoid - 'bubble' shape
- Thick upper wall
  (partly consisting of stomach wall)
- Fluid level or food contents

Free gas mimics : Chilaiditi's phenomenon



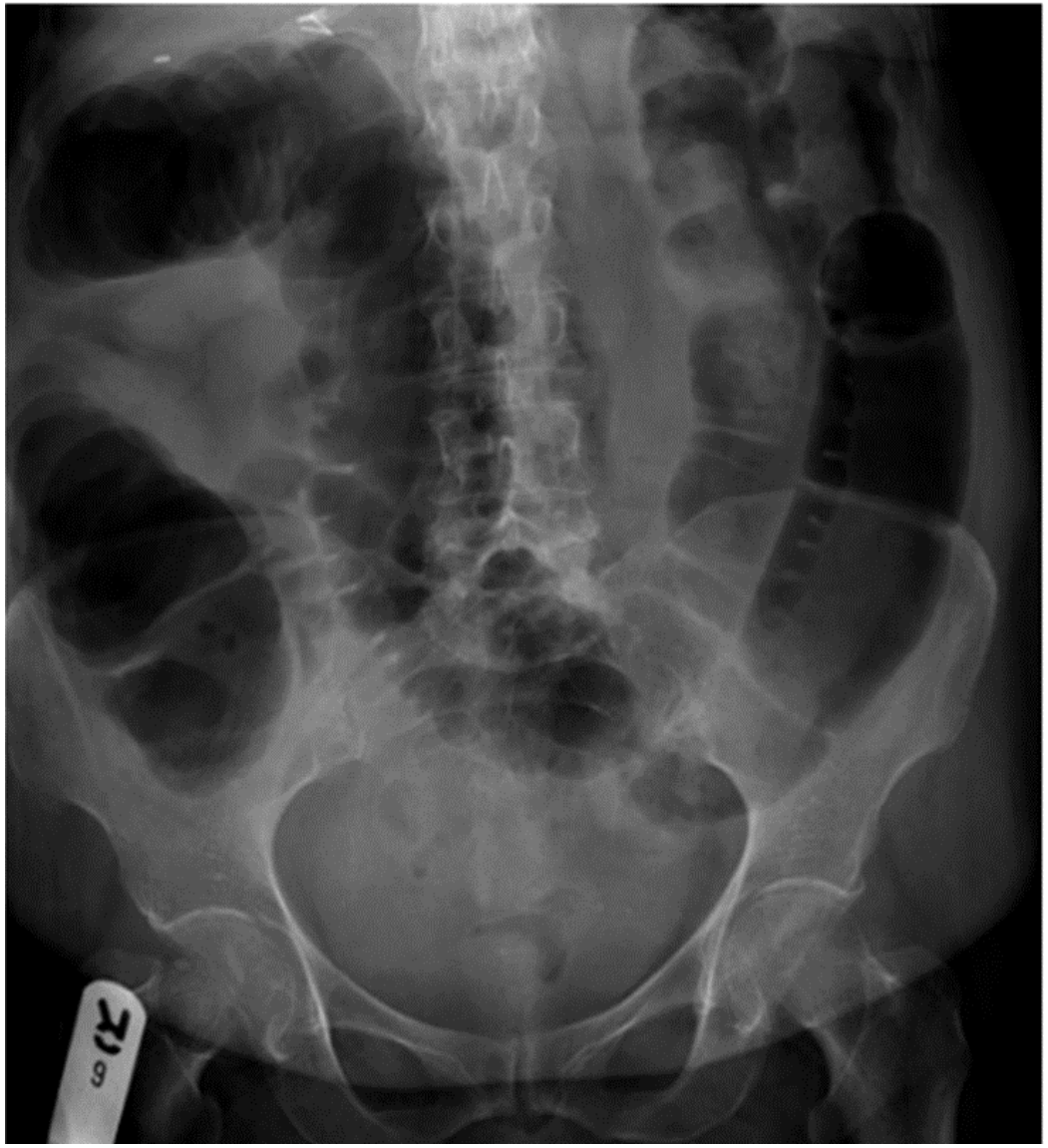
- Gas forms a near crescent shape under the right hemidiaphragm
- There is however a thick hemidiaphragm (partly consisting of bowel wall)
- Gas can be seen to lie within bowel

Large bowel obstruction



- Most common causes of large bowel obstruction
  - Colo-rectal carcinoma
  - Diverticular strictures.
- Less common causes
  - Hernias
  - Volvulus (twisting of the bowel on its mesentery).
- Adhesions do not commonly cause large bowel obstruction.

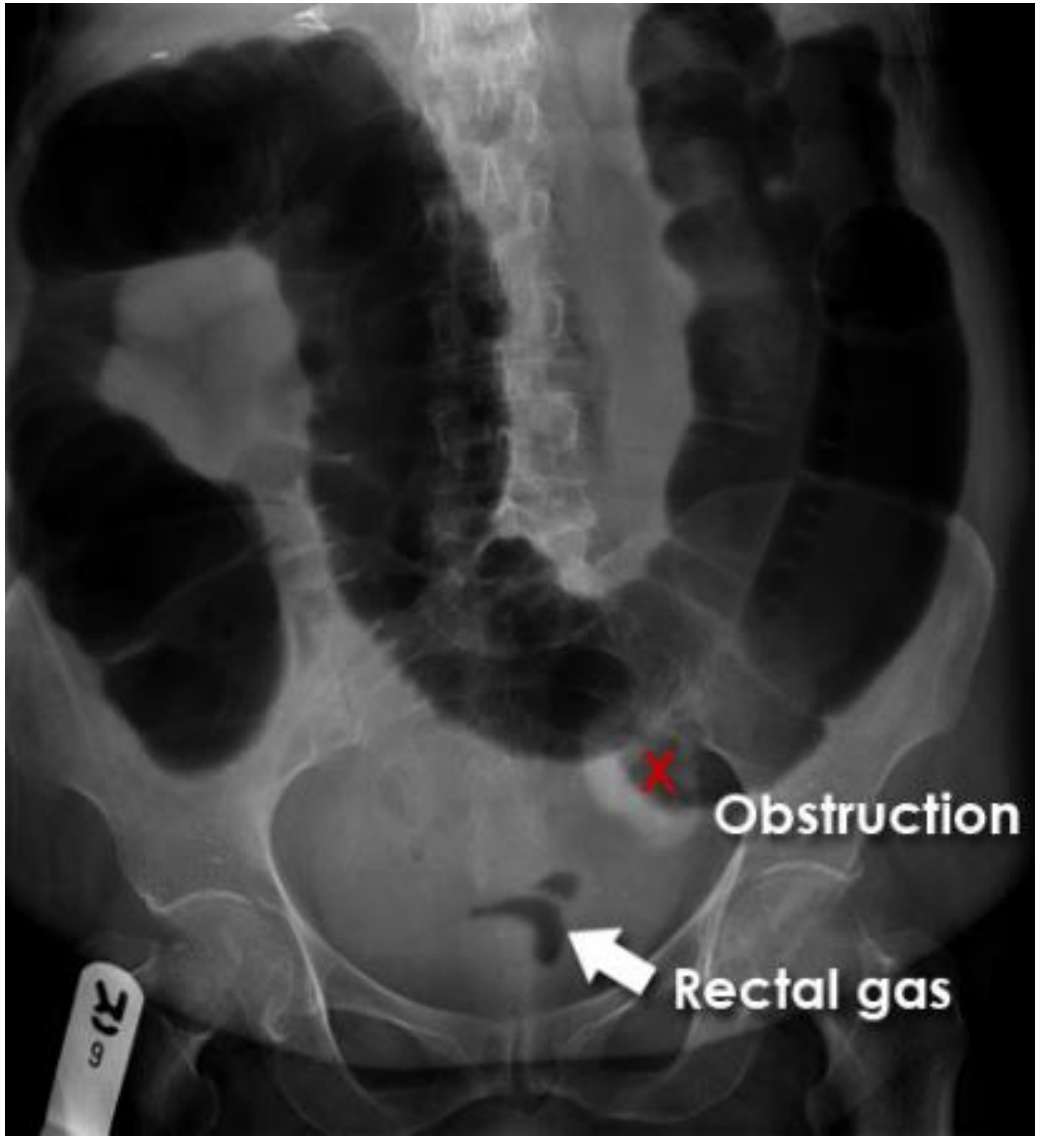
Large bowel obstruction



Key points

- Dilatation of the caecum >9cm is abnormal
- Dilatation of any other part of the colon >6cm is abnormal
- Abdominal X-ray may demonstrate the level of obstruction
- Abdominal X-ray cannot reliably differentiate mechanical obstruction from pseudo-obstruction
- CT is accurate in identifying site and cause
- A barium or water - soluble contrast enema is safe in any suspected obstruction

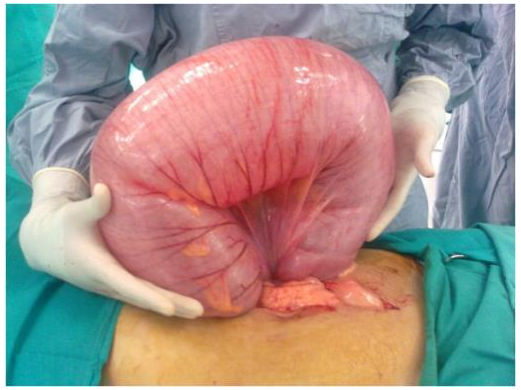
Large bowel obstruction



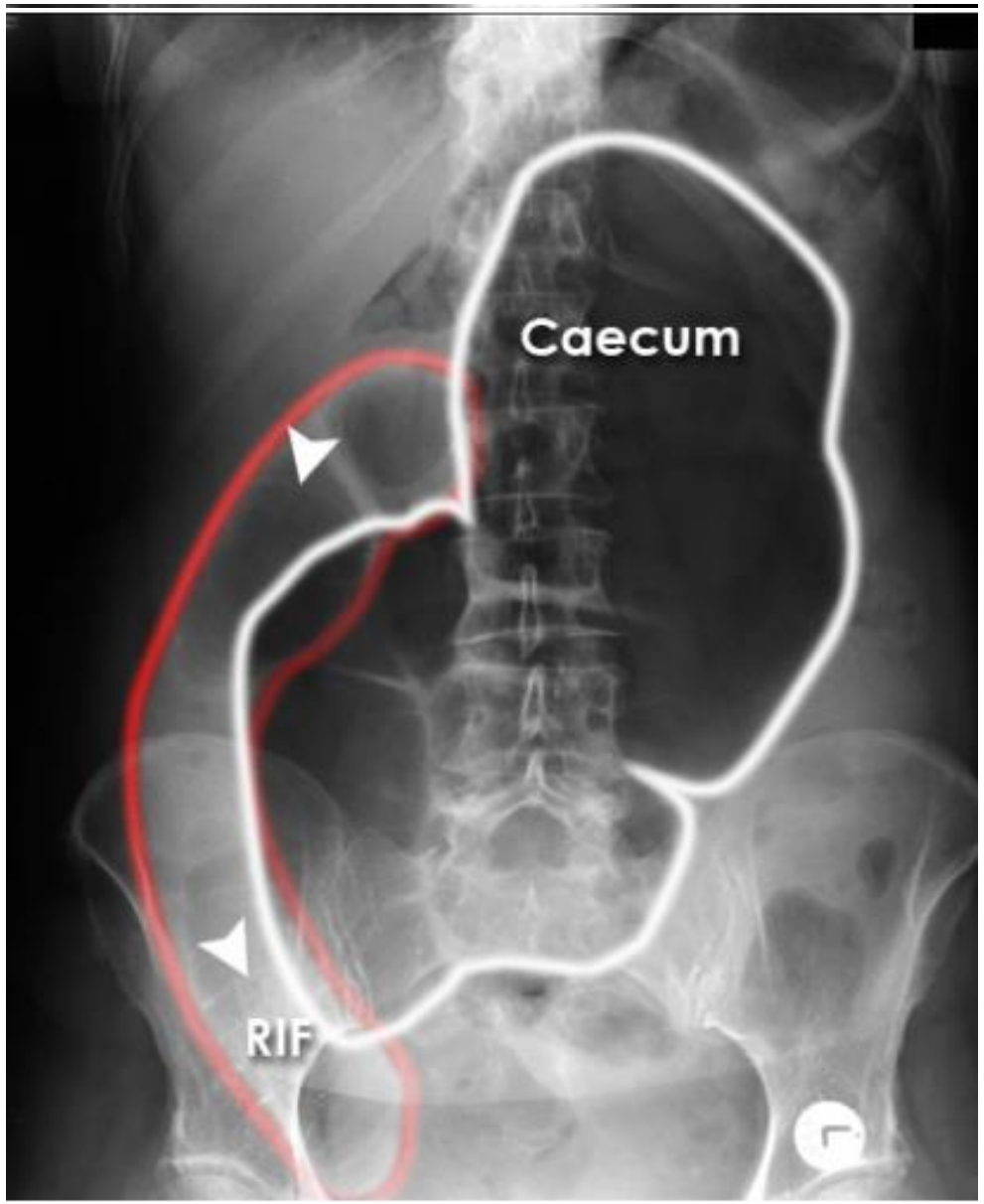
- Here the colon is dilated down to the level of the distal descending colon
- Impression of soft tissue density at the level of obstruction (**X**).
- No gas is seen within the sigmoid colon.
- Obstruction is not absolute in this patient as a small volume of gas has reached the rectum (**arrow**).
- An obstructing colon carcinoma was confirmed on CT and at surgery.

Volvulus -Sigmoid volvulus

- Sigmoid colon -prone to twist
- It is 'mobile' on its own mesentery
- Formation of an enclosed loop of sigmoid
- If untreated -lead to perforation
- Twisted loop of sigmoid colon to resemble a coffee bean.



Caecal volvulus



- Caecum -frequently a retroperitoneal
- Usually not susceptible to twisting.
- Up to 20% -incomplete peritoneal covering causing 'mobile' caecum
- Increased incidence of folding or twisting
- Risk of perforation.

Ulcerative colitis -Mucosal thickening - 'thumbprinting'

- 48Y old patient presented with an exacerbation of symptoms of **ulcerative colitis.**
- Distance between loops of bowel is increased (arrows) due to thickening of the bowel wall.
- Haustral folds are very thick (arrowheads) leading to a sign known as 'thumbprinting.'

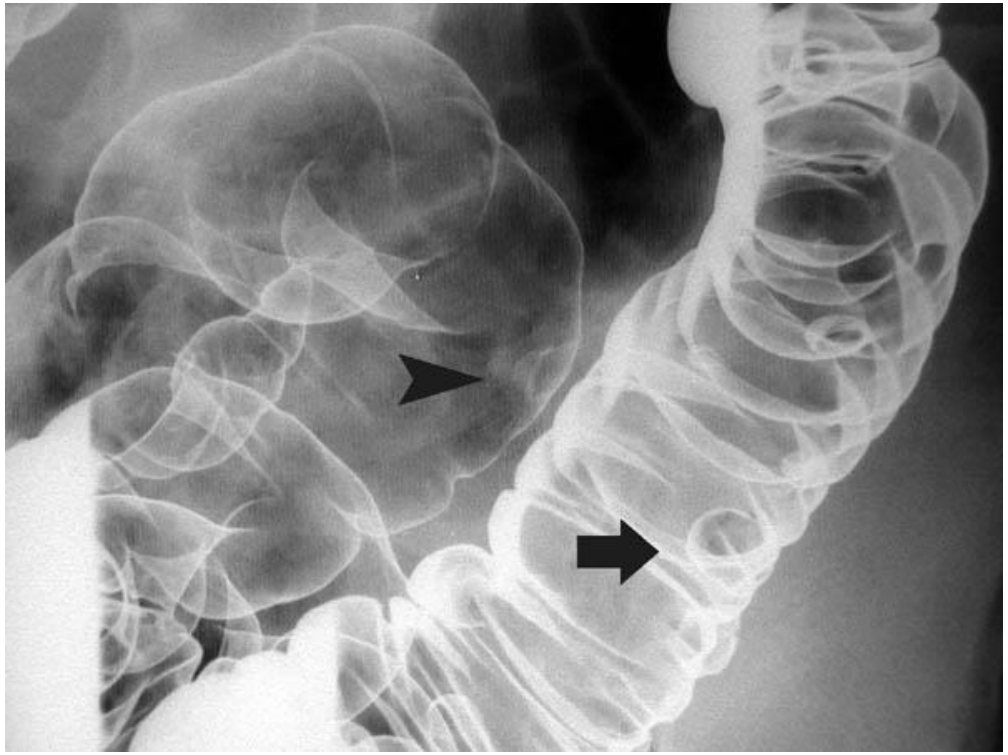
Ulcerative colitis -Lead pipe colon

- 38 Y old patient with ulcerative colitis- featureless segment of transverse colon with loss of the normal haustral markings.
- This 'lead pipe' appearance - associated with longstanding ulcerative colitis.
- Diffuse mucosal ulceration
- Distal bowel is always involved in this disease

Toxic megacolon

- Colon is very dilated in this patient with acute abdominal pain, sepsis, and a known history of ulcerative colitis.
- The clinical features and X-ray appearances are consistent with toxic megacolon.
- There is evidence of bowel wall oedema with 'thumbprinting', and pseudopolyps or 'mucosal islands' (**red-patches**).

Barium enema-Colonic polyps

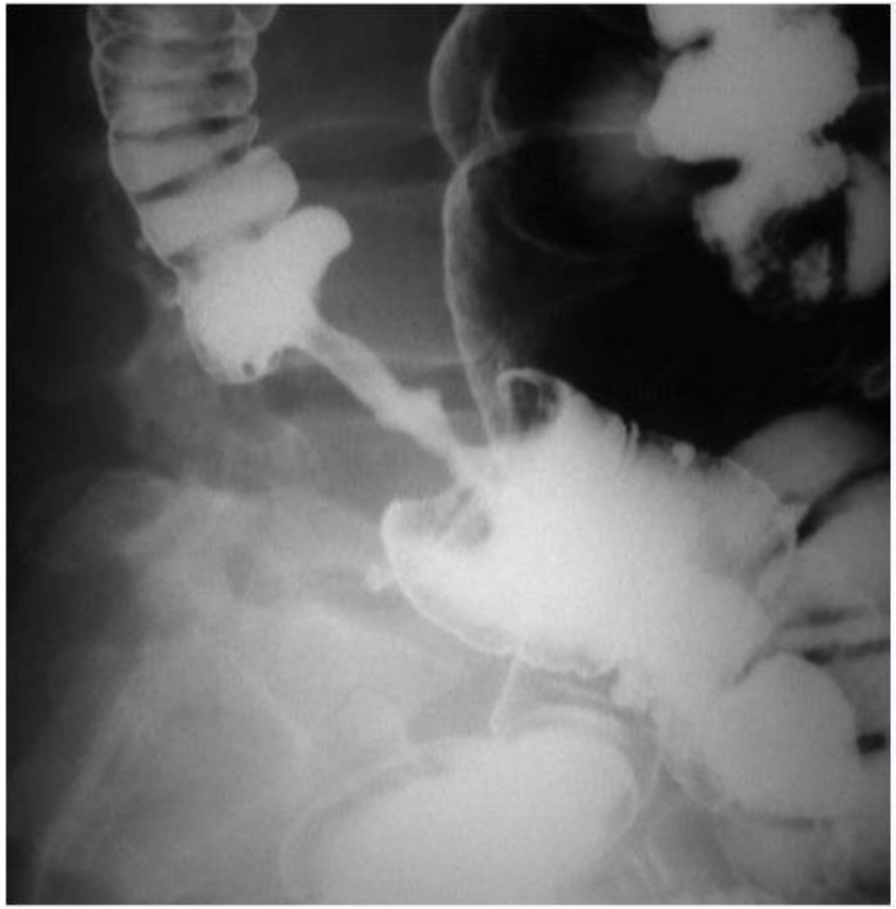


- Mucosal outgrowths.
- Sensitivities for polyps >1 cm
  - single contrast: 77-94%
  - double contrast: 82-98%
- Polyps <1 cm: < 50% detection.
- Seen as filling defects.
- Need to be differentiated from residual faecal matter.
- Typically they appear as exophytic or sessile masses,

Colonic carcinoma

- 71-year-old woman with a palpable abdominal mass.
- Contrast-enhanced CT scan shows a large, circumferential soft-tissue mass in the cecum
- Mass extends to involve the anterior abdominal wall (arrow), an appearance compatible with tumor invasion.
- Tumor invasion was confirmed at surge

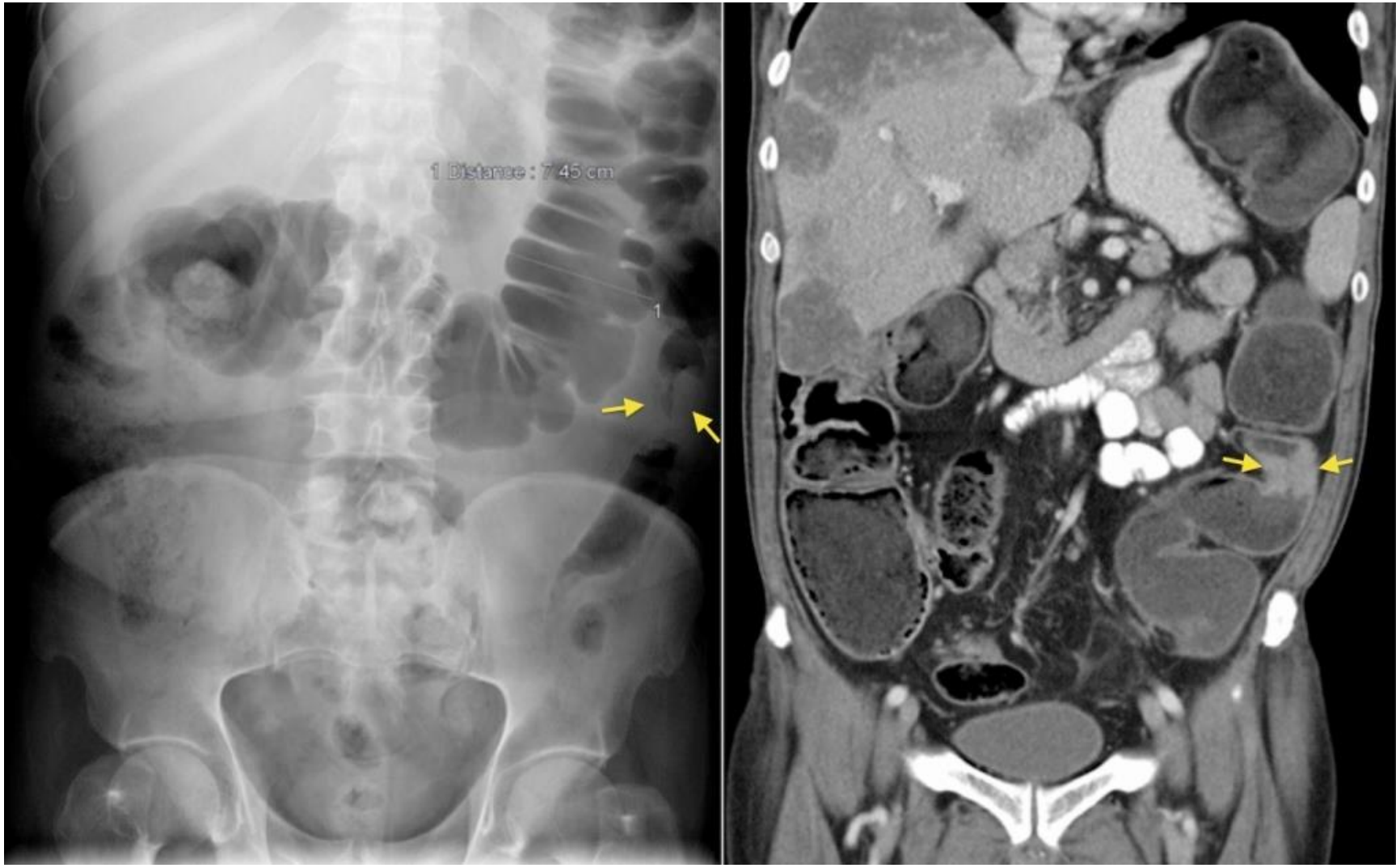
Barium enema-Colonic carcinoma



- Recto-sigmoid: 55%
- Caecum and ascending colon: ~20%
  - ileocaecal valve: 2%
- Transverse colon: ~10%
- Descending colon: ~5%

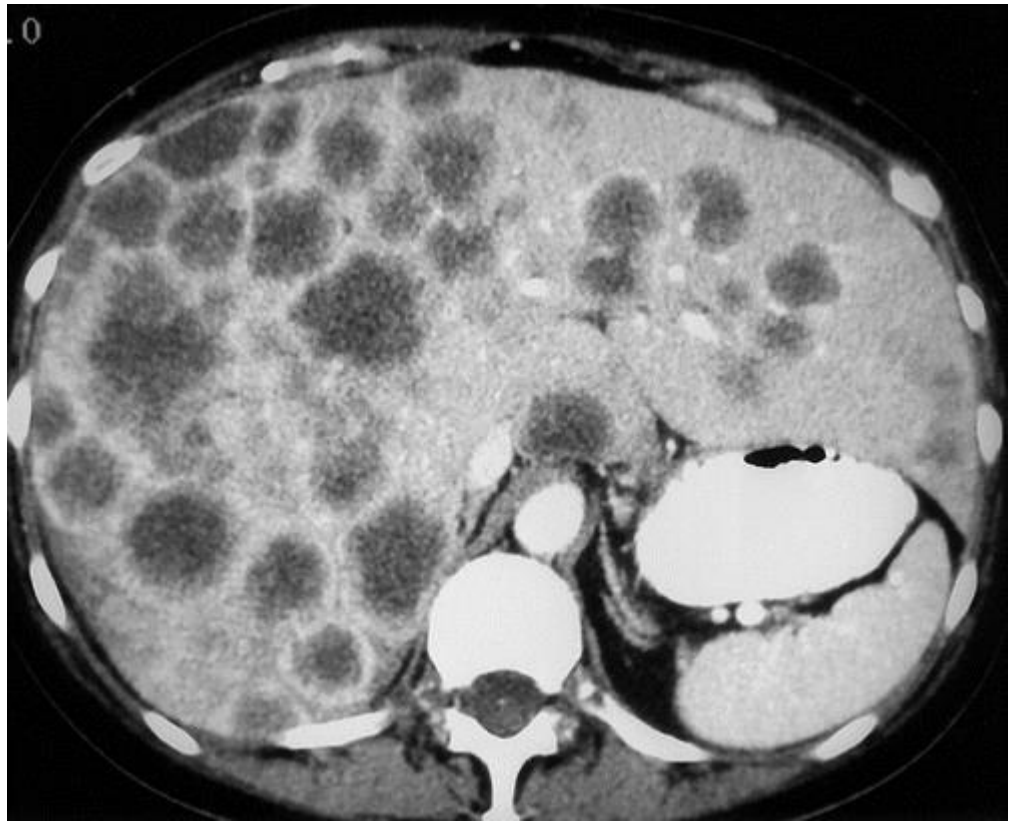
“Apple core appearance”

Plain X Ray and CT - Colonic carcinoma



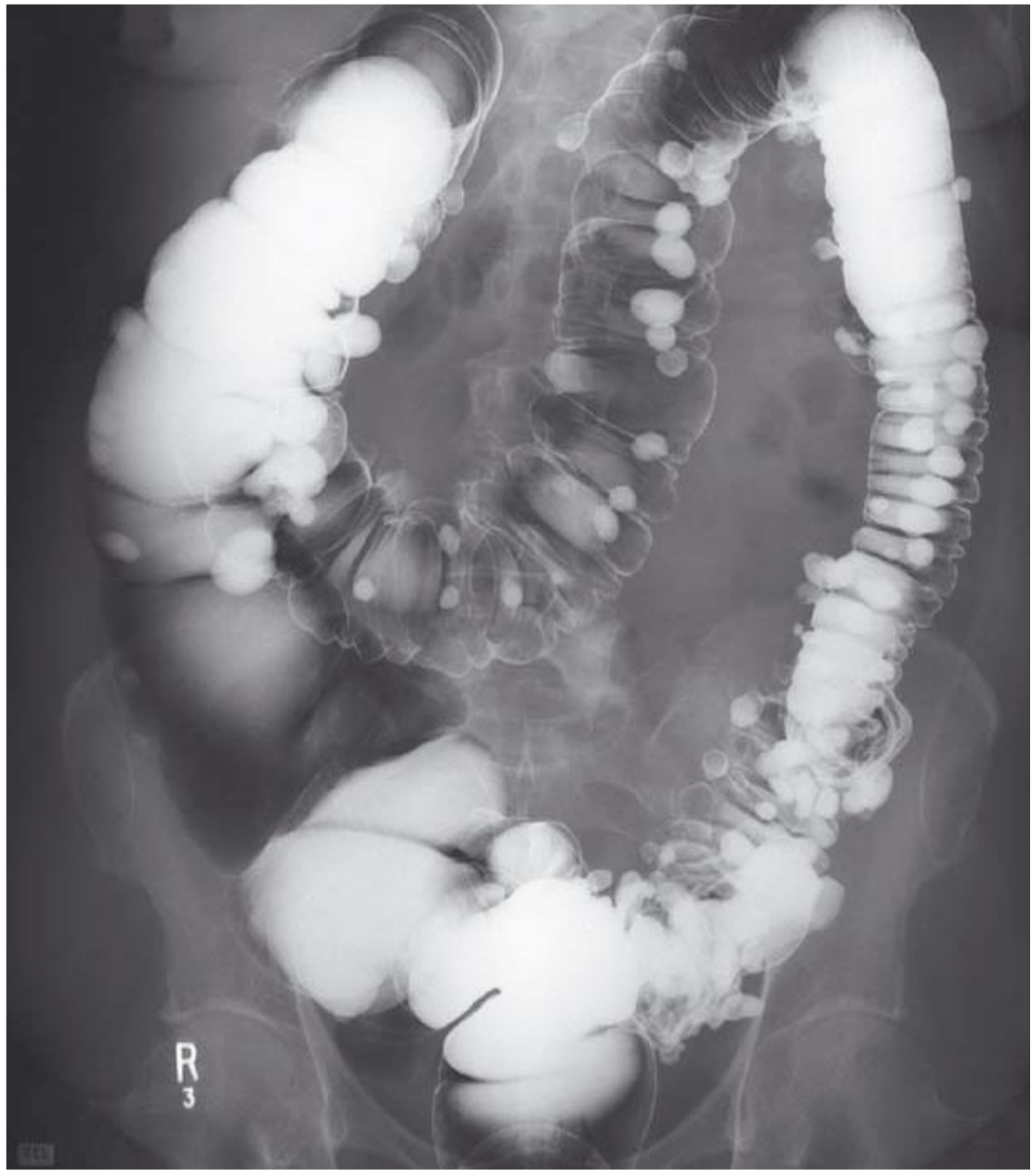
- A soft tissue density causing narrowing of the descending colonic lumen
- carcinoma in the descending colon (arrows).

CT- Liver metastasis-Colonic carcinoma



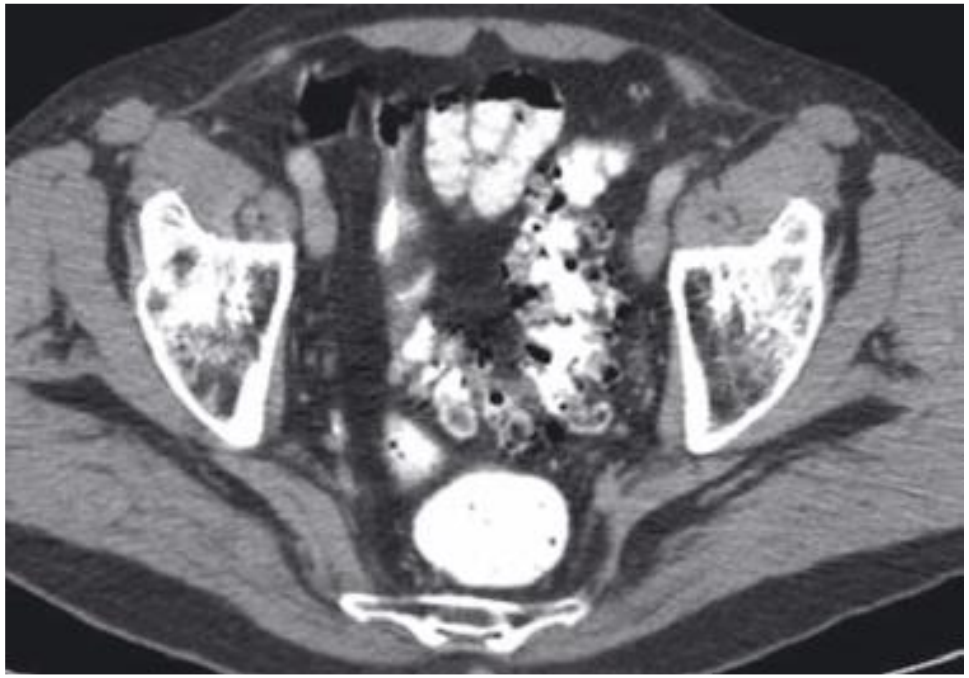
- Multiple rounded low dense poorly enhancing lesion in the liver.

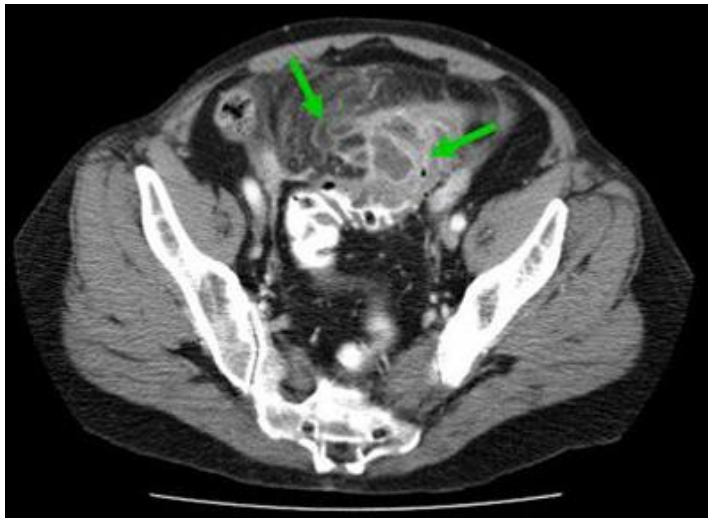
Diverticular disease



- Pouch - like protrusions
- Herniation of the mucosa and submucosa
- Sigmoid - most frequently affected (> 90%)colon.
- A low - fibre diet -one aetiology

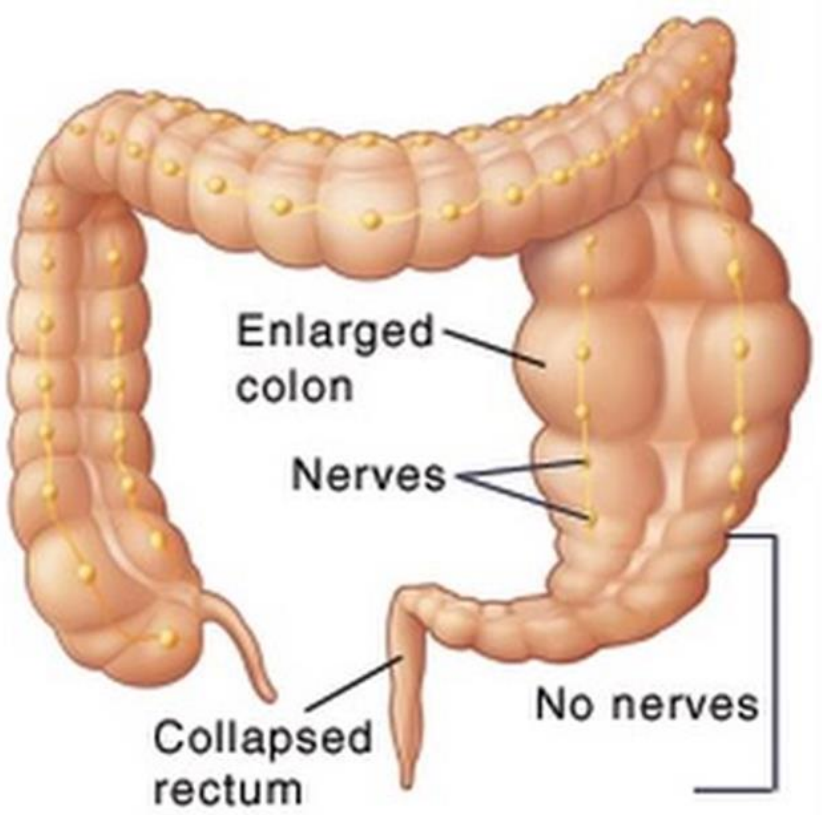
Complications





- Diverticulitis
- Pericolic abscess
- Perforation
- Fistula formation
  - vesicocolic fistula with pneumaturia
- Haemorrhage

Hirschsprung ’s disease



- An aganglionic segment of colon
- Results in a non - distensible section
- proximal large bowel dilating and eventually resulting in a ‘ megacolon ’ .

Presentation

- Failure to pass meconium within 24 hours,
- Constipation - presentation may be in infancy or in later life.

Radiological features

- Plain abdominal films -grossly dilated colon loaded with faecal residue.
- Contrast enema examination- affected segment is usually of a normal calibre
- Proximal segment is dilated
- Retention of contrast for up to 48 hrs after the examination is a typical feature.

Liver and pancreas: investigations

- **Plain films**

  Gall bladder calculi, calcification in the gall bladder wall, gas in the biliary tree and pancreatic calcification.

- **Ultrasound**

  An accurate imaging modality for focal or diffuse disease of the liver, pancreas ,GB

  aid to liver biopsy or interventional procedures.

- **Operative cholangiogram**

  Contrast injected to outline CBD. Exclusion of common bile duct stones
  Avoids the need for surgical exploration.

- **T - tube cholangiogram**

  After surgery to identify any remaining calculi in the CBD

Liver and pancreas: investigations

- **Computed tomography (CT)**

  Demonstrate full range of liver and pancreatic disease, including cirrhosis, tumours,pancreatitis and pancreatic carcinoma

- **MRI**

  Provides excellent cross - sectional imaging without the risk of radiation.

  Blood vessels and bile ducts visualised without injecting contrast

  - Blood vessels –magnetic resonance angiography (MRA)
  - Bile ducts -magnetic resonance cholangiography (MRCP).

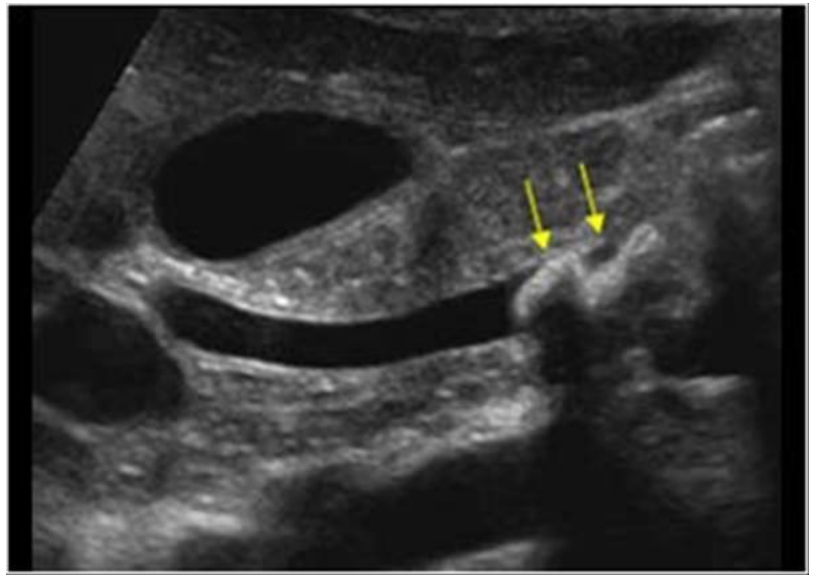
- **Angiography**

  To identify primary liver tumours, TACE

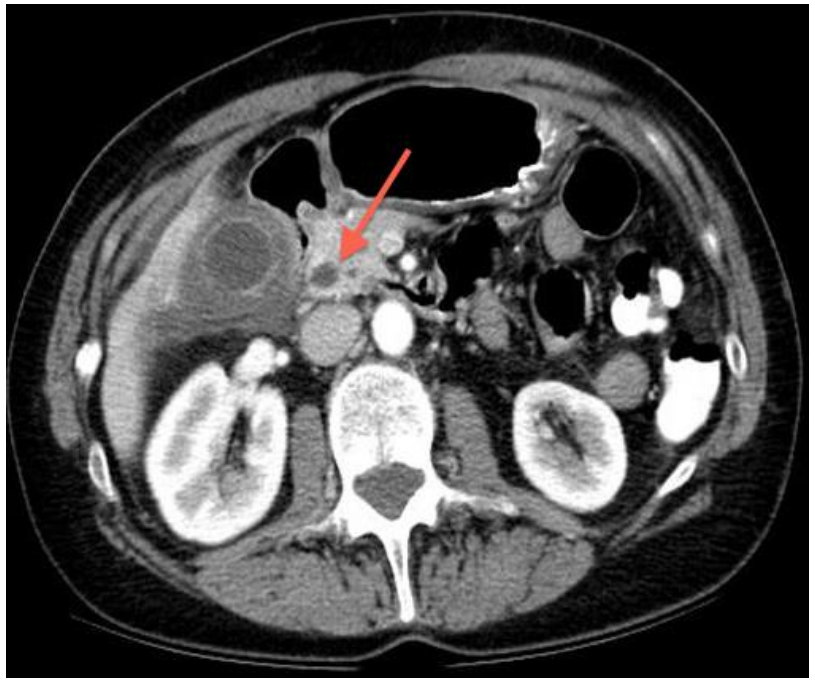
Gallstones

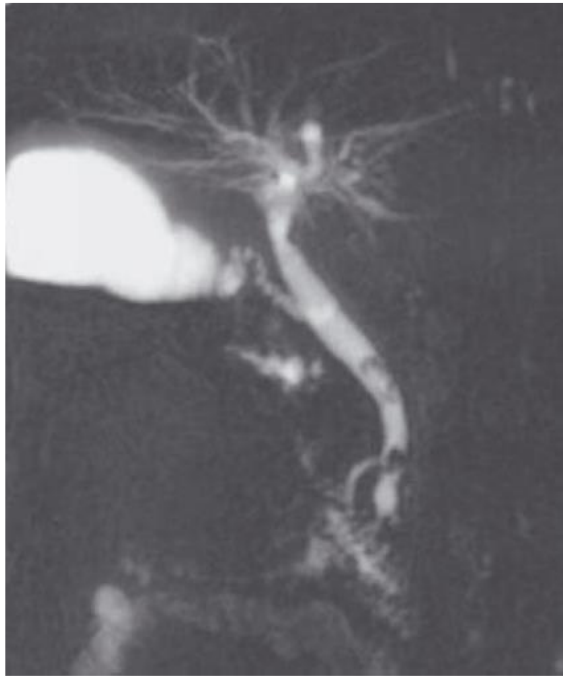
- Approximately 10% of the population with a female preponderance.
- Predisposing causes - obesity, diabetes, Crohn ’ s disease, cirrhosis, pregnancy and haemolytic disease (sickle cell, thalassaemia).

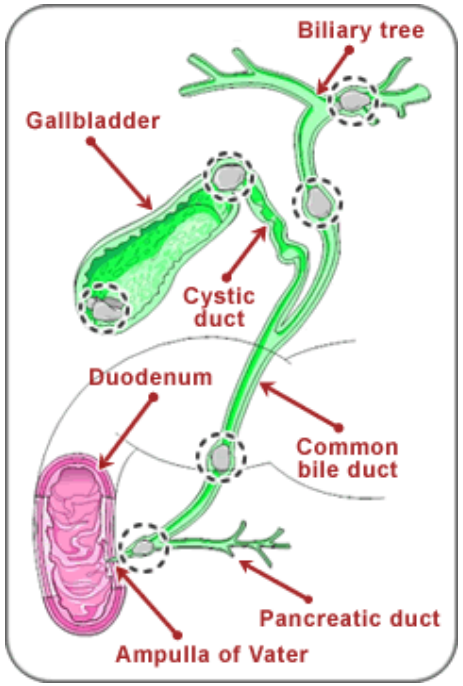
Common bile duct calculus



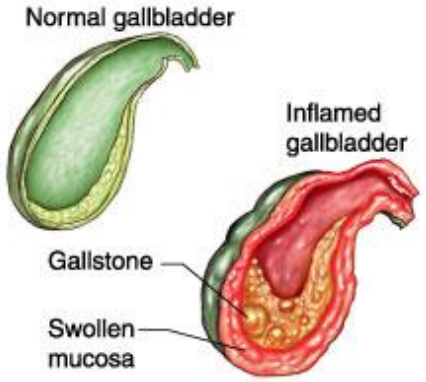
- Calculus from the gall bladder into the CBD
- Severe pain and obstructive jaundice.
- Ultrasound - initial investigation of choice
- CT and especially MRI (MRCP) helpful in equivocal cases



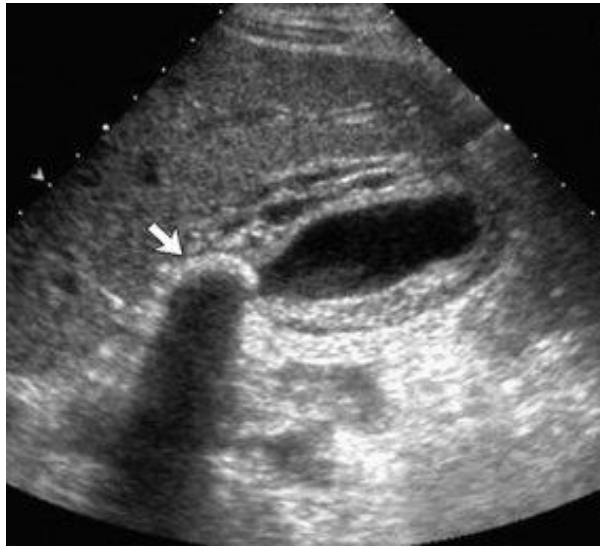




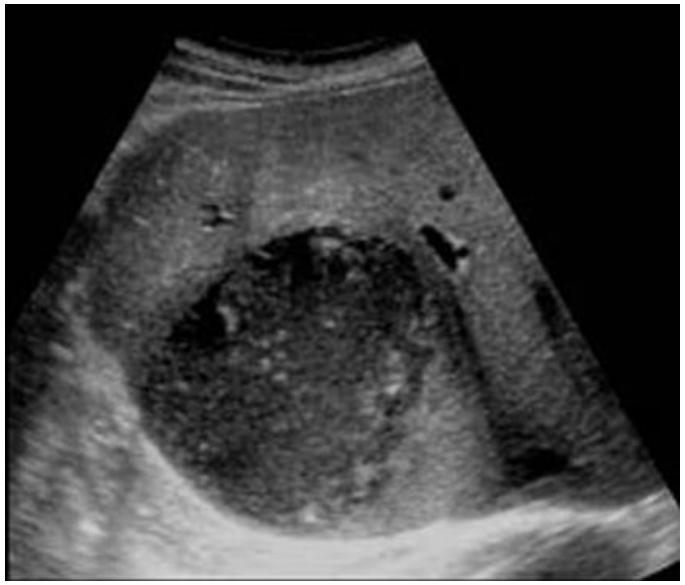
Acute cholecystitis

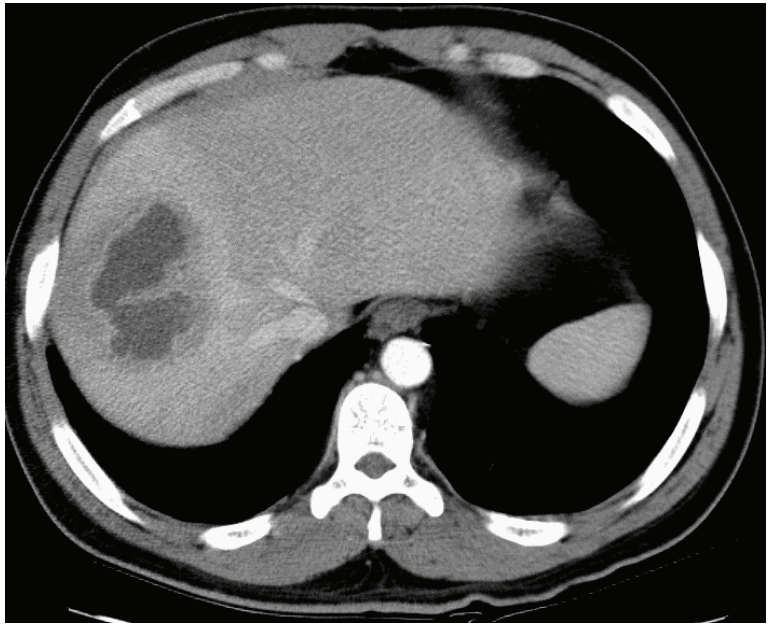


- The most sensitive US finding in acute cholecystitis -presence of cholelithiasis in combination with the sonographic murphy sign.
- Both gallbladder wall thickening (>3 mm) and pericholecystic fluid are secondary findings.

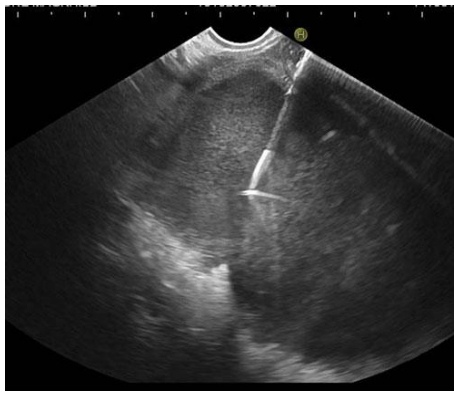


Liver abscess-Radiological features





- Ultrasound -single or multiple cavities.
- More common in right
- CT -low density lesions
- Peripheral ring enhancement with contrast.
- Occasionally, gas bubbles
- Hepatomegaly, elevation of the right diaphragm,
- Pleural effusion and lower - lobe atelectasis may all be associated

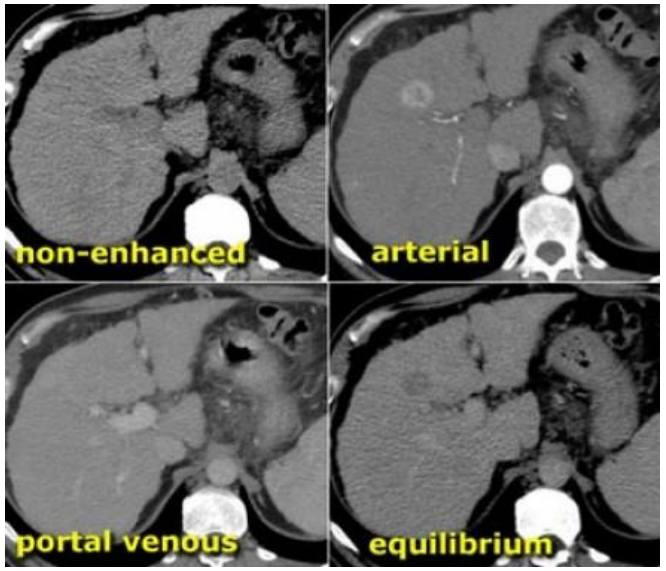


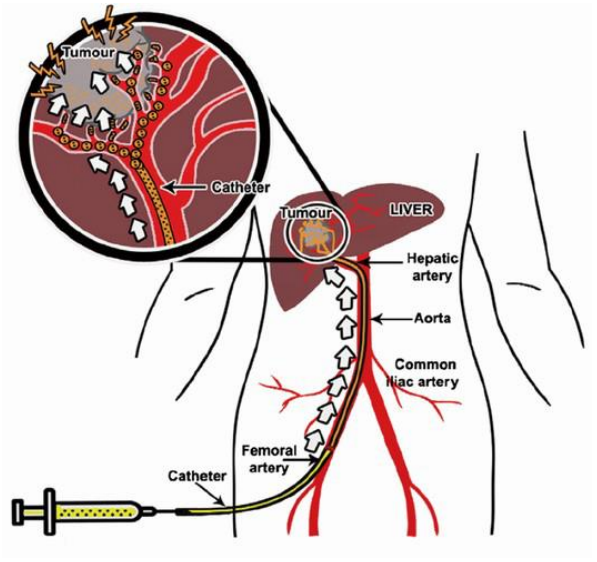
Hepatocellular carcinoma

- A common tumour in some parts of the world

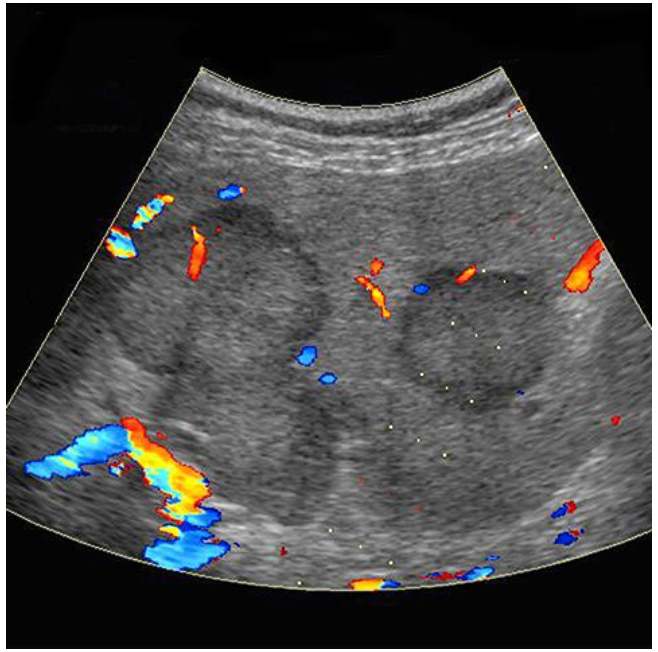
Increased incidence in:

- Chronic hepatitis B carriers, liver cirrhosis, haemochromatosis and fungal aflatoxin food contamination
- USS, CT, MRI, Angiogram with TACE help in diagnosis and management.

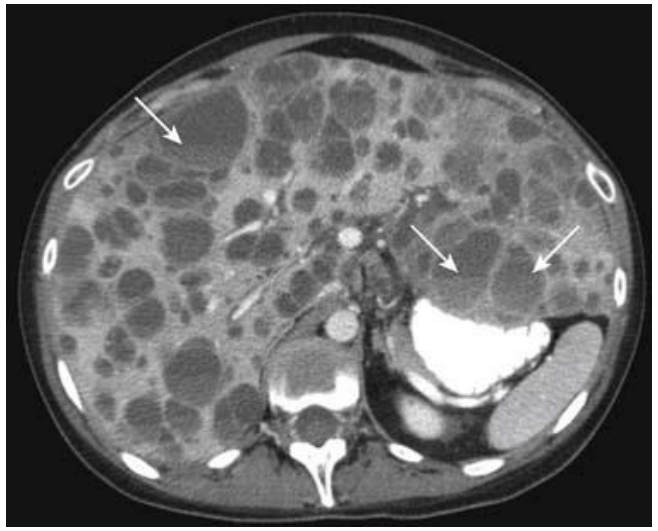


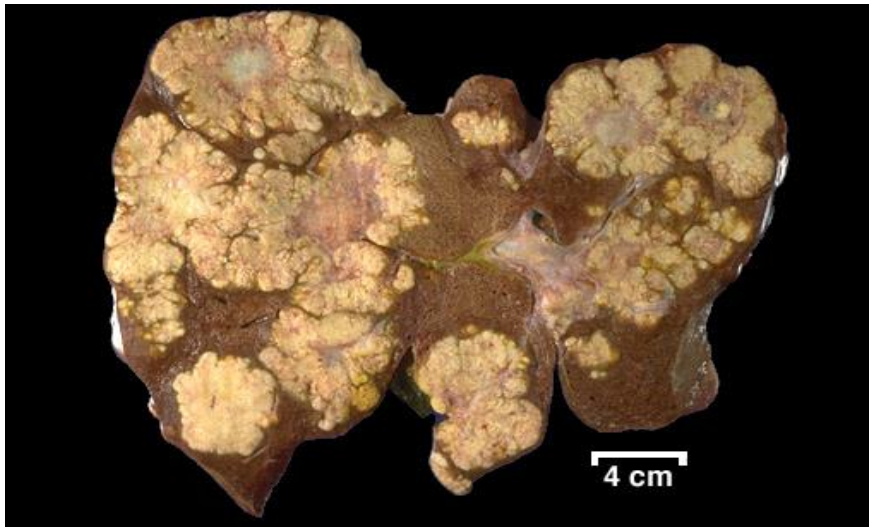


Liver metastases



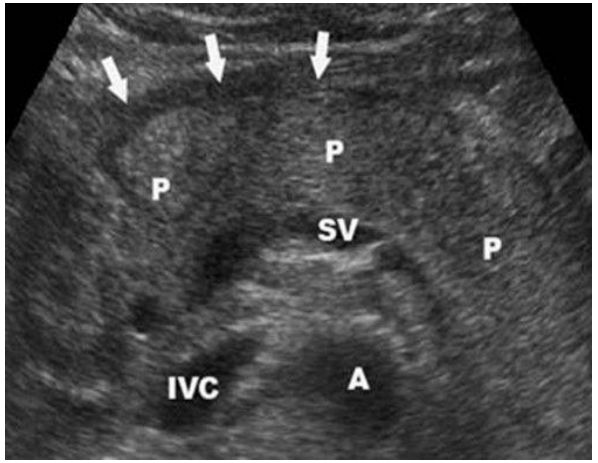
- Liver is the most common organ as a site of secondary deposits.
- Frequent primary neoplasms are –
  - colon, stomach, pancreas, breast and lung.
- Secondary deposits are much more common than primary liver tumours

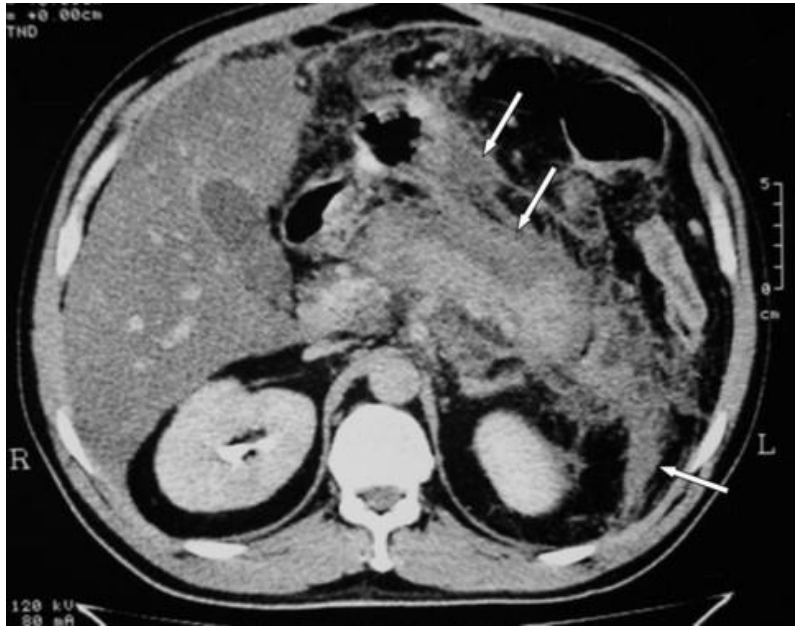


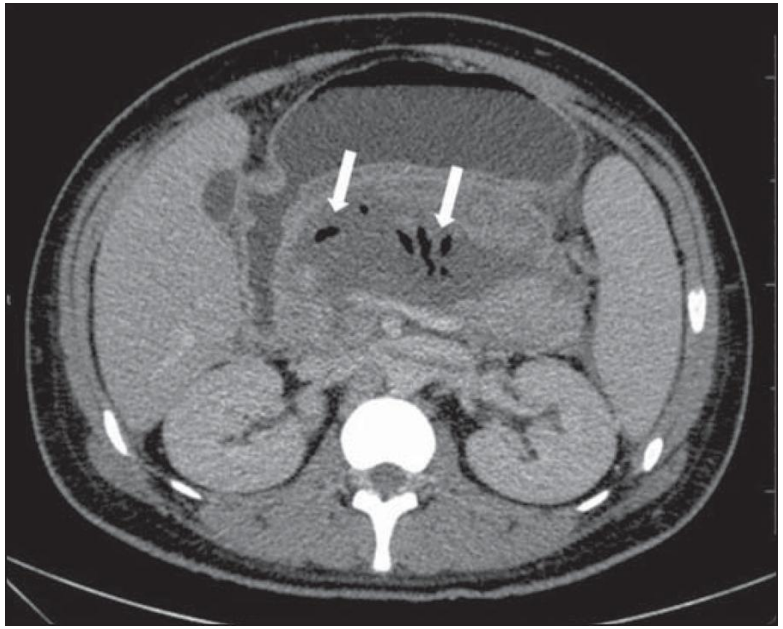


Acute pancreatitis

- An inflammatory condition of the pancreas
- Has many aetiologies
- Gallstones and alcohol abuse most common
- Mumps, certain drugs, surgical trauma and pancreatic carcinoma are some other causes





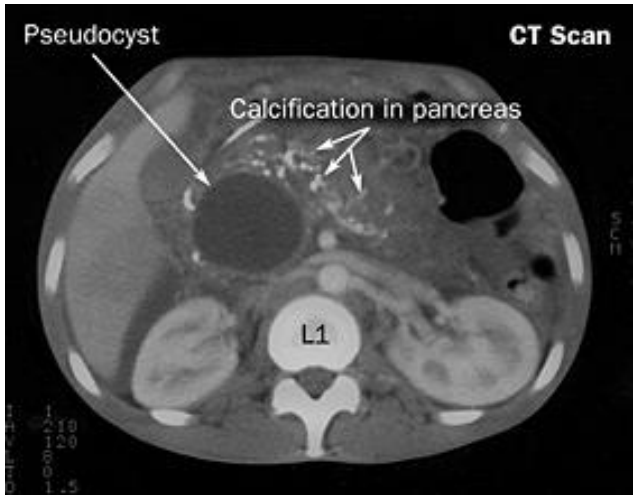


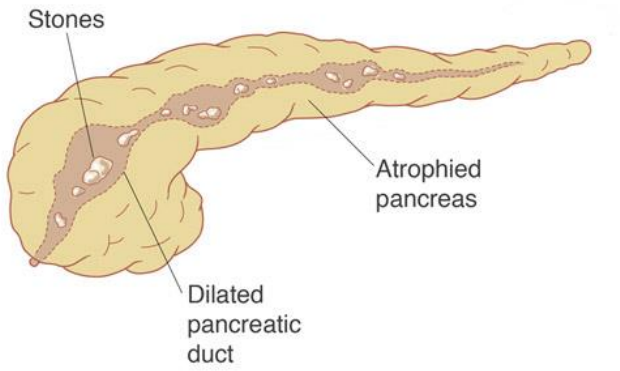
Chronic pancreatitis

- Most commonly caused by alcohol abuse.
- Ductal stenosis and obstruction - atrophy and fibrosis of the pancreas; irreversible
- Pancreatic calcification is virtually pathognomonic of chronic pancreatitis

Presentation

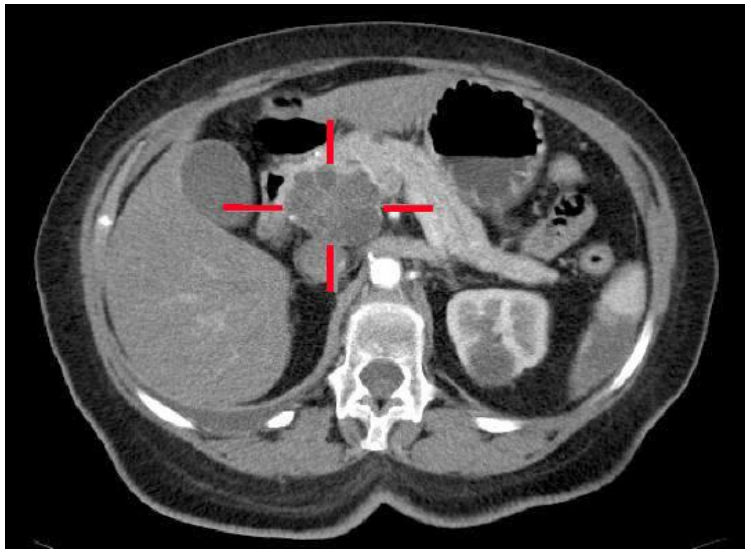
- Intermittent abdominal pain; weight loss; diarrhoea; steatorrhoea; jaundice; diabetes.



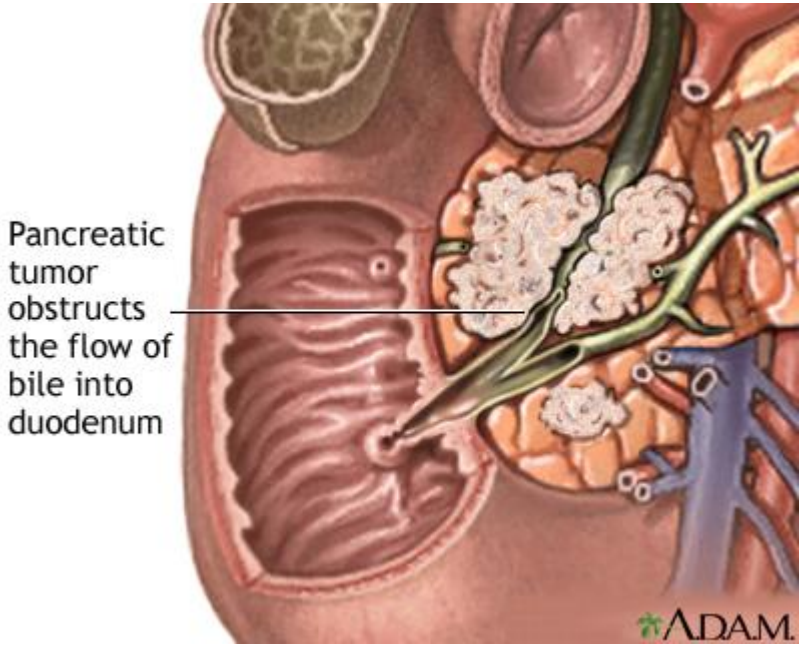


Chronic pancreatitis

Pancreatic carcinoma



- Pancreatic carcinoma is the fourth commonest malignant tumour after lung, colon and breast tumours.



Thank You !!