RADIOLOGY (SURGERY)

BY MARYAM MALIK
Rawalpindi Medical College
NORMAL BOWEL GAS PATTERN

• Any part of the bowel may be visible if it contains gas/air within the lumen. Gas/air is of low density and forms a natural contrast against surrounding denser soft tissues. It is often difficult to differentiate between normal small and large bowel, but this often becomes easier when the bowel is abnormally distended.

• The upper limit of normal diameter of the bowel is generally accepted as 3cm for the small bowel, 6cm for the colon and 9cm for the caecum (proximal colon) (3/6/9 rule). Sigmoid= 5cm
Normal small bowel
Identified by -

- Central position in the abdomen
- Valvulae conniventes - mucosal folds that cross the full width of the bowel (arrowheads)
Normal large bowel

Normal large bowel may be identified by -

- Peripheral position in the abdomen (the transverse and sigmoid colon occupy very variable positions)
- Haustra (arrowheads)
- Contains faeces
Small bowel obstruction - features

- Centrally located multiple dilated loops of gas filled bowel (arrowheads)
- Valvulae conniventes (arrow) are visible - confirming this is small bowel
- Evidence of previous surgery - note the anastomosis site (red ring) - this suggests adhesions is the likely cause of obstruction (confirmed at surgery)
Post operative ileus

- Appearances are similar to those of mechanical obstruction.
- There are multiple loops of gas filled bowel projected centrally over the abdomen.
- This patient had prolonged non-colicky abdominal pain following a Caesarian section - recovery was spontaneous.
Sentinel loop

- Intra-abdominal inflammation, such as with pancreatitis, can lead to a localized ileus. This may appear as a single loop of dilated bowel known as a 'sentinel loop.'
 Sentinel loop

- A localized loop of small bowel is dilated in this patient with acute pancreatitis.
- This appearance is not diagnostic of intra-abdominal inflammation, but rather an occasional associated feature.
Rigler sign

The Rigler sign, also known as the double wall sign, is seen on an x-ray of the abdomen when air is present on both sides of the intestine, i.e. when there is air on both the luminal and peritoneal side of the bowel wall.

Pneumoperitoneum may be a result of perforation or, from recent instrumentation or surgery. A false double wall sign can result from two loops of bowel being in contact with one another.
Free intraabdominal air with Rigler’s sign

Rigler’s sign: Bowel wall visualized due to bilateral (intra- & extraluminal) air contrast
SIGMOID VOLVULUS

- **Sigmoid volvulus** is a cause of large bowel obstruction and occurs when the sigmoid colon twists on the sigmoid mesocolon.
- COFFEE BEAN SIGN on X-ray
CAECAL VOLVULUS

• **Caecal volvulus** describes torsion of the **caecum** around its own **mesentery** which often results in **obstruction**. If unrecognised can result in **bowel perforation** and **faecal peritonitis**.
Esophageal atresia

- may show a dilated pharyngeal pouch
- the presence of air in the stomach and bowel in the setting of oesophageal atresia implies that there is a distal fistula.
- if an oesophago-gastric (feeding) tube insertion has been attempted this may show the tube blind looping and turning back at the upper thoracic part of the oesophagus or heading into the trachea and/or bronchial tree.
• Oesophageal atresia without fistula. The Replogle tube (arrow) is coiled in the dilated blind ending oesophageal pouch. AXR demonstrates absence of bowel gas indicating that there is no distal tracheoesophageal fistula
Double bubble sign (duodenal atresia)
Perforated duodenal ulcer

Air under diaphragm clearly visible suggestive of perforated Duodenal Ulcer
Foreign body rectum
Achalasia: bird’s beak appearance on barium swallow
ULCERATIVE COLITIS: barium enema showing a lead pipe colon

Lead pipe appearance of colon is the classical barium enema finding in chronic ulcerative colitis. There is complete loss of haustral markings in the diseased section of colon, and the organ appears smooth walled and cylindrical.
Carcinoma esophagus
Epiphrenic diverticula
Gastric ulcer
Gastric ulcer
Pyloric obstruction

The shoulder sign, the impression of the hypertrophied pyloric muscle on the distended gastric antrum
MRCP

Magnetic Resonance Cholangiopancreatography
"Normal hepatic ductal anatomy". Coronal oblique MIP reformat image reveals the confluence (circle) between the right posterior duct (RPD) and the right anterior duct (RAD), originating the right hepatic duct (RHD). Note that the RPD has a more horizontal route while the RAD is more vertical. By its turn the RHD joins the left hepatic duct (LHD), originating the common hepatic duct. The LHD results from the confluence of the ducts of the left hepatic lobe segments, here only represented by segments II (S2) and III (S3). Cystic duct (CD), common bile duct (CBD), main pancreatic duct (MPD), gallbladder (GB).
Normal pancreatic ductal anatomy”. Coronal oblique reformat shows the main pancreatic duct (MPD) crossing the whole pancreas and continuing as the duct of Wirsung (DW) at the pancreatic head. At its distal portion the DW joins the common bile duct (CBD), draining into the major papilla (pointing triangle). The duct of Santorini is not demonstrated.
Normal MRCP image showing the common bile duct (curved arrow) and the pancreatic duct (arrow). Note the fluid filled duodenum.
MRCP showing stone in lower part of CBD

MRCP image shows a dilated bile duct with a dark stone (arrow) in its distal end.
ERCP

Endoscopic Retrograde Cholangiopancreatography
ERCP showing normal CBD & pancreatic duct
These two fluoroscopy images taken during an ERCP demonstrate stones in the common bile duct on the left radiograph, and cystic duct on the right radiograph.
PTC (Percutaneous transhepatic cholangiography) is a radiologic technique used to visualize the anatomy of the biliary tract.
T-tube cholangiograms are a fluoroscopic study performed in the setting of hepatobiliary disease.
Peroperative cholangiogram during cholecystectomy

Intraoperative cholangiogram

Normal intra- and extrahepatic biliary tree without filling defects, normal flow into the duodenum
XRAY KUB showing radio-opaque shadows consistent with renal stones
XRAY KUB showing staghorn (phosphate) stones
XRAY KUB showing bladder stone

A plain KUB showing a large smooth oval radio-opaque mass suggesting a calcified bladder stone.
Normal intravenous urograms
IVU showing bilateral double ureters
Ascending cystography showing urinary bladder diverticuli

A cystogram showing marked diverticulation with a large superior diverticulum.
Retrograde Urethrogram showing urethral stricture
Normal mammogram
Mammographic images showing well-circumscribed masses with features of fibroadenoma/cyst
Mammography showing cancer
Xray showing right clavicular fracture
X-ray showing right shoulder dislocation
Xray showing mid shaft fracture of humerus
Xray showing posterior elbow dislocation
Xray showing the fracture of lower end of radius & ulna
Xray showing Undisplaced Inter-Trochanteric Femoral Fracture
X-ray showing neck of left femur fracture
Xray showing left hip dislocation
Xray showing Austin Moore Prosthesis for femur neck fracture
Xray showing total hip replacement
Xray showing dynamic hip screw transfixing an inter-trochanteric fracture of right femur
Xray showing knee dislocation
Xray showing fracture of lower part of tibia & fibula
Xray showing lateral malleolar fracture
X-ray showing bi-malleolar fracture (pott fracture) with distortion of ankle joint

Bimalleolar fracture and right ankle dislocation on X-ray (anteroposterior). Both the end of the fibula (1) and the tibia (2) are broken and the malleolar fragments (arrow: medial malleolus, arrowhead: lateral malleolus) are displaced.
Xray showing fracture of 1\textsuperscript{st} metatarsal bone

Preoperative radiographs showing the dorsal dislocation at the MTP joint and fracture of the base of the metatarsal bone.
CT Scan showing multiple metastasis in brain
NORMAL CT-SCAN BRAIN
CT Scan showing subdural hematoma
CT Scan showing epidural hematoma
CT Scan showing hydrocephalus
CT Scan showing multiple fractures in frontal part of skull
MRI showing intramedullary tumor of spinal cord
Magnetic resonance angiogram (MRA) showing normal anatomy
CT angiogram of abdomen & lower limb showing normal vasculature
Angiogram showing abdominal aortic aneurysm
This magnetic resonance angiogram (MRA) of the lower extremities was obtained by using the bolus-chase technique. A short-segment high-grade stenosis is present in the middle of the left superficial femoral artery. Note the collateral arterial supply.
Magnetic resonance angiogram showing narrowing of left popliteal artery

Patient with left-sided peripheral arterial occlusive disease, Fontaine stage IIb. The contrast-enhanced MRA shows a high-grade stenosis of the popliteal artery. (Provided by S. Miller)
CT scan showing tumor in head of pancreas

The arrow indicates the superior mesenteric artery.
CT scan showing tumor in tail of pancreas
CT scan showing tumor in right kidney
CT SCAN showing bilateral kidney cysts
CT scan showing normal liver
Liver metastasis

Multiple hypodense lesions seen in the liver with no significant contrast enhancement.
LIVER CYST

- Oval, well defined
- Imperceptible or thin wall
- Water density
CT scan showing tumor in right lobe of liver (arrowheads)