Gastrointestinal tract imaging
Large intestine

- single contrast enema
- double contrast enema
Normal enema

- Calibre decrease from caecum to the sigmoid colon.
- Lips of ilio-caecal valves
- Haustra can usually be recognised in the whole of the colon but may be absent in the descending and sigmoid regions.
- Spasm often seen in normal patient mimic narrowing and can be resolved by IV smooth muscle relaxant eg: Buscopan, glucagon.
The abnormal barium enema

- Narrowing of the lumen or stricture: main causes:
  - carcinoma
  - diverticular disease
  - Crohn’s disease
  - Ischaemic colitis
Different types of stricture

- **Neoplastic stricture**
  Shouldered edges, an irregular lumen and usually short

- **Benign stricture** have tapered ends, relatively smooth outline and may be any length.

- Site of stricture can help limiting to the D/D.

- **Diverticular disease** are almost always confined to the sigmoid colon.

- **Ischaemic strictures** are usually confined between splenic flexure and the sigmoid colon.

- **Crohn’s disease and tuberculosis** have predilection for the caecum.
Filling defects
- polyps.
- neoplasm
- faeces (surrounded by barium and freely moveable) so all enema should be done to clean the colon.

- Ulceration
  Two major causes of the Ulcers of the colonic mucosa
  - ulcerative colitis
  - Crohn's disease
Abnormal enema

diffuses narrow lumen  
polyps  
diverticulum
Ulcerative colitis

- Unknown aetiology characterised by inflammation and ulceration of the colon.
- The disease always involves the rectum.
- When more extensive it extends in continuity around the colon.
- The cardinal radiological sign is widespread ulceration usually shallow.
- Loss of normal colonic haustra in the affected potions of the colon.
- Narrowing and shortening of the colon (a rigid tube)
- Pseudo-polyps (swollen mucosa in between ulceration)
- Strictures rarely when present are likely to be due to carcinoma.
- Dilated terminal ileum when all colon involved.
- Toxic dilation (toxic megacolon), no barium enema because of risk of perforation.
Crohn’s disease of the colon

- Chronic granulomatous condition of unknown aetiology which may affect any part of the GIT (but most frequently involves the lower ileum and colon)
- The disease it may be involve only one portion of circumference of the bowel (ulcerative colitis circumference)
- The diseased areas intervening with normal bowel (skip lesion)
Early stage:
- loss of haustration
- narrowing of the lumen of the bowel and shallow skip ulceration, combined with mucosal edema may give rise to a ‘cobble-stone’ appearance of the mucosa.

Later stage:
- ulcers may be very deep, penetrating into the muscle layer and become deep fissures.
- The deep ulceration in Crohn’s disease may lead to the formation of intra-and extra mural abscesses, Fistulae and Stricture
Diverticular disease

- Diverticula are sac-like and out-pouching of the mucosa through the muscular layer of the bowel wall.
- Herniated of the mucosa through weakness areas where blood vessels penetrate the muscle.
- Diverticula common in the elderly.
- Commonest in the sigmoid colon.
- A diverticulum may complicating by
  - perforate; resulting in a pericolic abscess or fistula.
  - stricture.
Diverticular disease
Ischaemic colitis

- Common from the splenic flexure to the sigmoid colon since this region with the most vulnerable blood supply in the colon.

- Complications:
  - strictures
  - sacculations
Volvulus

- In volvulus a loop of bowel twists on its mesentery.
- Frequent place in the sigmoid colon
- Less frequent place in the caecum.
- The twisted loop becomes greatly distended.
Intussusceptions

- It is the invagination of one segment of the bowel into another:
  - Ileo-colic (commonest type)
  - Colo-colic
  - Ileo-ileal.
- Infant are much more liable to intussusception than adult.
At barium enema the flow of barium is obstructed by the leading edge of the intussusception, which causes a convex filling defect.

In infant and young children, an intussusception can sometimes be reduced with barium enema, the child should have no signs of peritonitis.

In adult, surgical treatment is invariable as an intussusceptions is usually caused by a tumor.
Ba. Enema shows filling defect at hepatic flexure

Plain abdomen x-ray intussusception
Intussusception occurs when one segment of bowel is pulled into itself or a neighboring loop of bowel by peristalsis.
Tumours

- Polyps:
  - small mass of tissue arising form the wall of the bowel projecting into the lumen.
  - polyps may be sessile or on a stalk.
  - polyps may be single or multiple.
  - The features that suggest malignancy are:
    - a diameter of more than 2 cm.
    - irregular surface, short thick stalk.
    - rapid rate of the growth.
Carcinoma colon

- Common recto-sigmoid region and the caecum
- Recto-sigmoid carcinoma often has annular stricture and presents with alteration in bowel habit and obstruction.
- Caecal carcinoma tumour can become very large without obstructing the bowel, so anaemia and weight loss are the common presenting features.
- The annular carcinoma as apple core appearance or an irregular stricture with shouldered edges. (rarely more than 6 cm)
- The polypoid or fungating carcinoma causes an irregular filling defect projecting into the lumen of the bowel.
CT and MRI of rectal carcinoma

- The main value of CT and MRI is to demonstrate any tumour that has spread through the wall of the rectum and also to diagnose post-operative recurrence.
- Pelvic fat surrounded the rectum, and tumour infiltrating this fat can be readily recognised.
- Invasion into the pelvic wall, sacrum, lymph nodes, metastases.
Hirschsprung’s disease
(congenital aganglionosis)

- Absence of ganglion cells beyond a certain level in the colon, usually in the sigmoid or recto-sigmoid region.
- Diagnosis depends on recognising the transition from the normal or reduced calibre colon to the dilated colon.
- The colon is not washed out before the barium enema, to prevent the danger of water intoxication from the dilated colon.
Acute appendicitis

- Blind end non compressible tubular structure
- Thickened wall and more than 6mm transverse axis
- Appendicolith shadowing
- Hyperechoic changes of the surrounding fatty tissue
Uss evaluation of GIT disease

- Ultrasound of the GI-tract has become a routine procedure in many emergency rooms after the physical examination.
- Acute conditions such as appendicitis, diverticulitis, or bowel obstruction can be detected by ultrasound than normal gas filled bowel structures.
- Unlike the examination of liver, the gall bladder biliary system or the pancreas, the ultrasound has easier and excellent evaluation for them.
- Use conventional curved abdominal probes (2-5 MHz).
- High-frequency linear probe (5 to 15 MHz), can identify different layers of the bowel wall.
CT of GIT

- CT is an excellent imaging method for evaluating the liver, pancreas, spleen, and even most portions of the digestive tract.
- Using water or oral water soluble iodine contrast media which serves to outline the digestive tract [not using barium].
- An intravenous injection of water soluble iodine contrast media is usually administered during the examination to outline the blood vessels, enhancing bowel wall, and other abd. Organs.
CT study was most helpful in cases of extrinsic lesions, lymphoma, and smooth-muscle tumors bowel wall, extension of inflammatory disease.

Less helpful than barium study for mucosal abnormality of the bowel like ulceration or adenocarcinoma.

CT scan using for evaluating acute abdomen like acute pancreatitis, Appendicitis, diverticulitis, obstruction, intussusception, malrotation, volvulus, perforations, abd. Collection .....
MRI has become an important tool in the management of patients with diseases of the gastrointestinal tract, such as rectal cancer and inflammatory bowel diseases.

- Better assessment for liver, biliary disease