

Small & large bowel disease

Ba examination

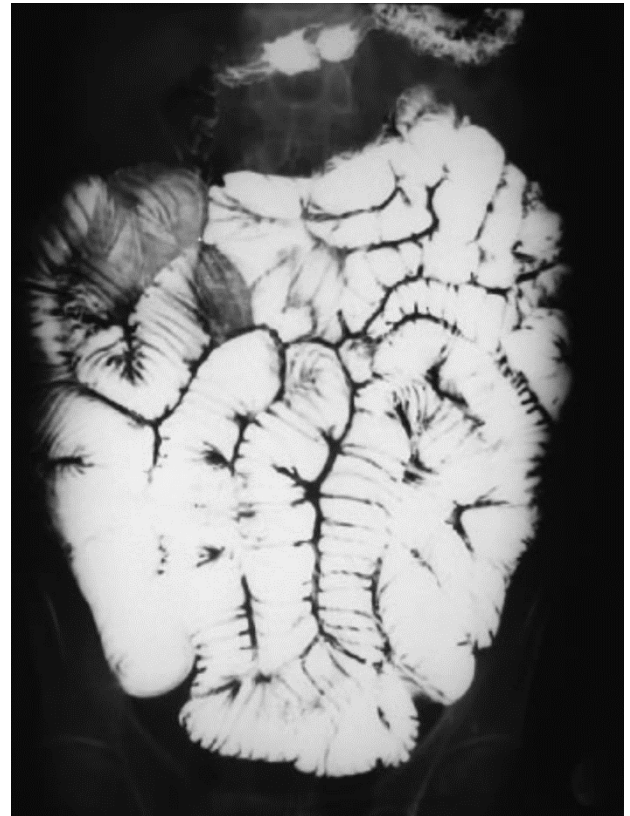
Barium studies of the small intestine

Small bowel follow through (SBFT)

Routine investigation for delineation of all parts of the small bowel done with barium meal after having a quick look at esophagus, stomach, and duodenum.

Radiographic features

On a normal barium study of the small bowel, the jejunum is located in the upper left abdomen and the ileum in the lower right abdomen, to be continued by colon in ileo-caecal region. The mucosa of the small bowel is characterized by the existence of the valvulae conniventes which give the small bowel normal feathery appearance in ba-follow through examination.



Indication of Ba –follow through examination

In the small intestine, a barium exam may reveal:

1. Inflammatory bowel disease (CD & UC).
2. Mal absorption syndromes.
3. Swelling and/or inflammation of the small intestine walls.
4. Tumors.
5. Ulcer.

Contraindications for a barium follow through may include:

1. Suspected bowel perforation.
2. Bowel obstruction.
3. Conditions where aspiration of barium is likely.

Crohn's disease

Crohn's disease remains idiopathic.

Radiographic features

The characteristic of Crohn's disease is the presence of:

- Skip lesions
- Multiple discrete ulcers.

The frequency with which various parts of the gastrointestinal tract are affected varies widely:

- Small bowel: 70-80%
- Small and large bowel: 50%
- Large bowel only: 15-20%

Barium small bowel follow-through findings of CD

- Multiple mucosal ulcers aphthous ulcers
- Longitudinal fissures
- Multiple skip lesions
- When severe leads to cobblestone appearance
- May lead to sinus tracts and fistulae
- Widely separated loops of bowel due to fibro-fatty proliferation
- Thickened folds due to edema
- Pseudo diverticula formation: due to contraction at the site of ulcer with ballooning of the opposite site

Cobblestoning

- Aphthae enlarge, merge
- Interspersed w/ edematous mucosa
- Deep ulcers lead to fistulas



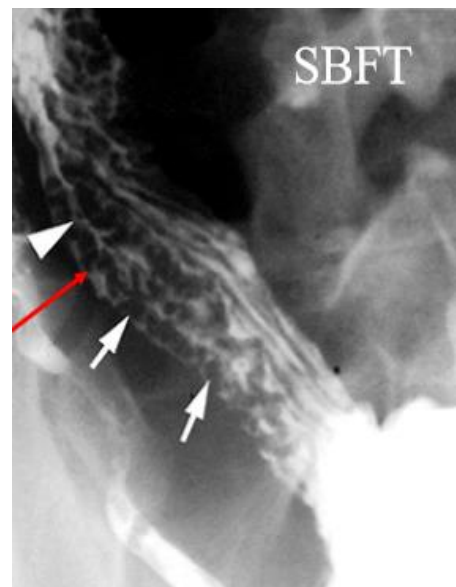
Pseudopolyps

Inflammatory

- Cobblestoning
- nodular filling defects
- edematous mucosa surrounded by ulcerations

Postinflammatory

- mucosal overgrowth during healing process
- filiform



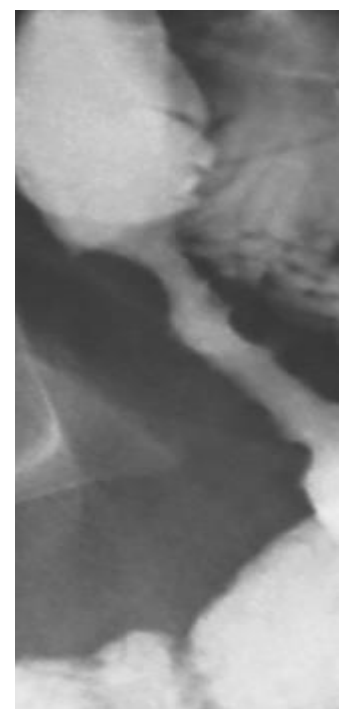
Strictureing

Active disease

- “string sign”
- edema, spasm

Fibrotic disease

- irreversible strictures
- lead to obstruction, fistulas



Ulcerative colitis (UC)

Is an inflammatory bowel disease which predominantly affects the colon, but also has extra intestinal manifestation.

Radiographic features

Involvement of the rectum is almost always present (95%), with the disease involving variable amounts of the more proximal colon, in continuity. The entire colon may be involved, in which case edema of the terminal ileum may also be present (so-called back-wash ileitis).

In very severe cases, the colon becomes atonic, with marked dilatation, worsened by bacterial overgrowth. This leads to toxic mega colon which although uncommon has a poor prognosis.

Plain film

Nonspecific but may show evidence of mural thickening (more common), with thumb printing also seen in more severe cases.

Fluoroscopy - Barium enema

Double contrast barium enema allows for detail of the colonic mucosa, and also allows bowel proximal to strictures to be assessed. It is however contraindicated if acute severe colitis is present due to the risk of perforation.

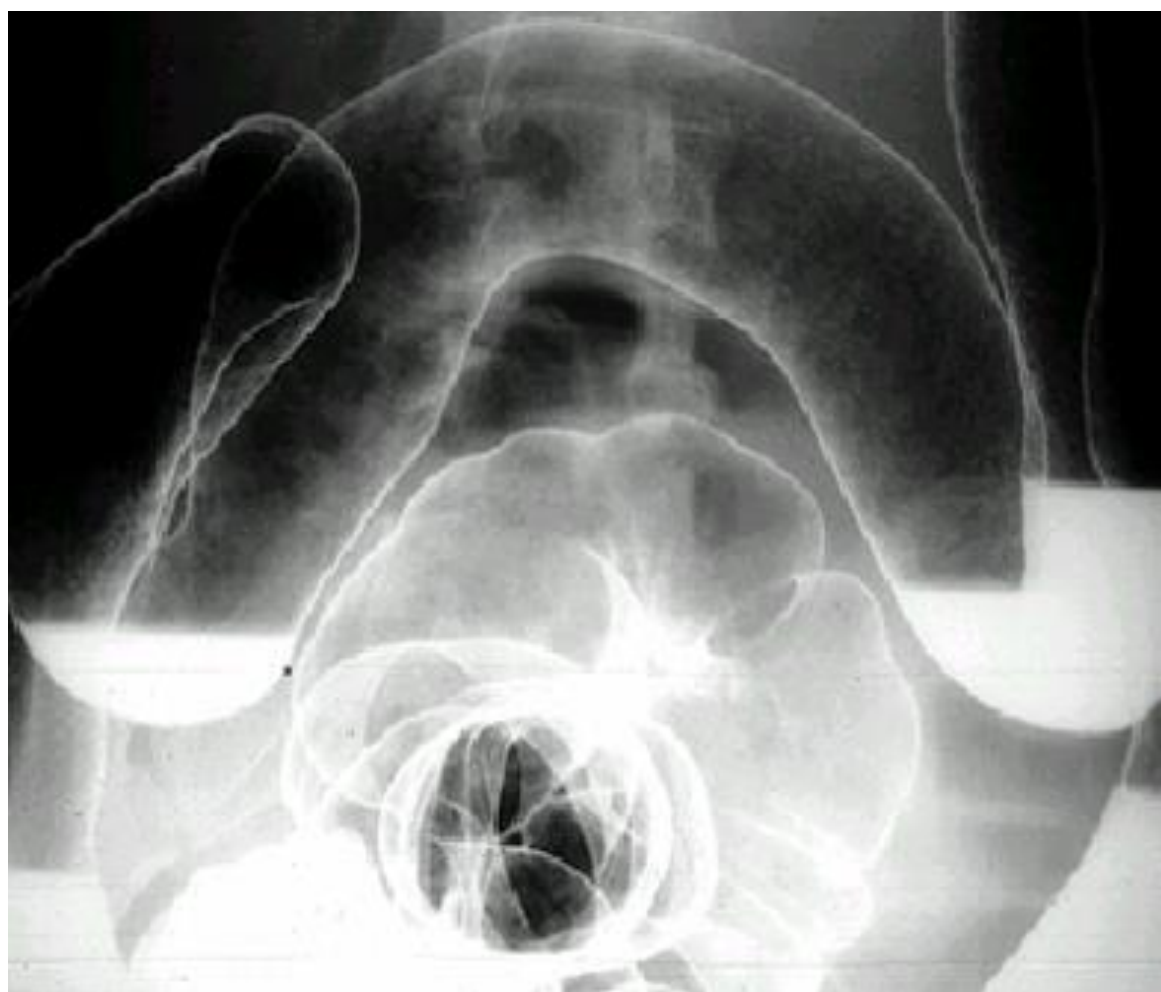
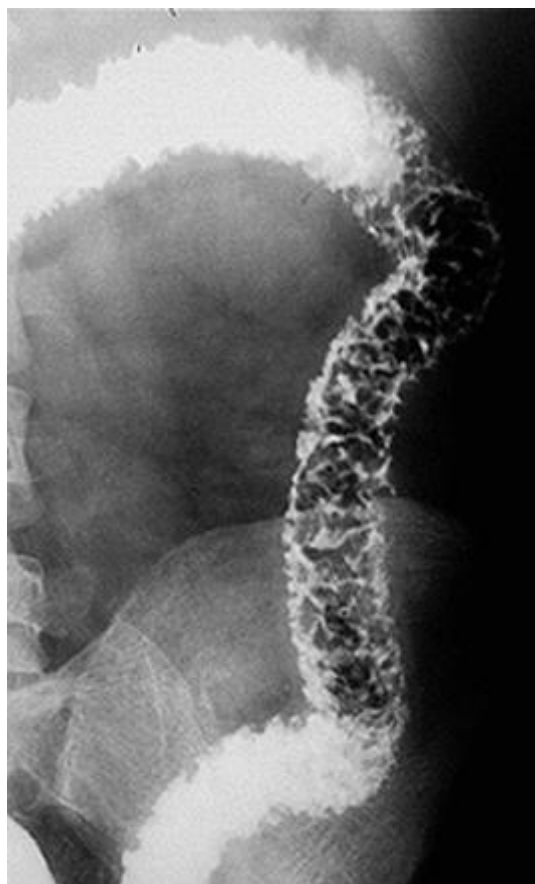
Mucosal inflammation lends a granular appearance to the surface of the bowel. As inflammation increases, the bowel wall and haustra thicken.

Mucosal ulcers are undermined (button-shaped ulcers). When most of the mucosa has been lost, islands of mucosa remain giving it a pseudo-polyp appearance.

In chronic cases the bowel becomes featureless with loss of normal haustral markings, luminal narrowing and bowel shortening (lead pipe sign).



Colorectal carcinoma in the setting of ulcerative colitis is more frequently sessile and may appear to be a simple stricture.



Toxic megacolon (TM)

Is a complication that can be seen in both types of inflammatory bowel disease more in UC, in infectious colitis, as well as in some other types of colitis. It is serious acute abdominal condition, more in UC > CD

Radiographic features OF TOXIC MEGACOLON

The colon (typically transverse colon) becomes dilated to at least 6 cm (usually greater). There is additional loss of haustral markings

Practical points

Barium studies and colonoscopy should be avoided, due to the risk of perforation

Crohn's disease vs. ulcerative colitis

Due to the overlap in clinical presentation of **Crohn's disease (CD)** and **ulcerative colitis (UC)**, imaging often has a role to play in distinguishing the two. Distinguishing features include:

Bowel involved

- CD: small bowel 70-80%, only 15-20% have only colonic involvement
- UC: rectal involvement 95%, with terminal ileum only involved in pancolitis (backwash ileitis)

Distribution

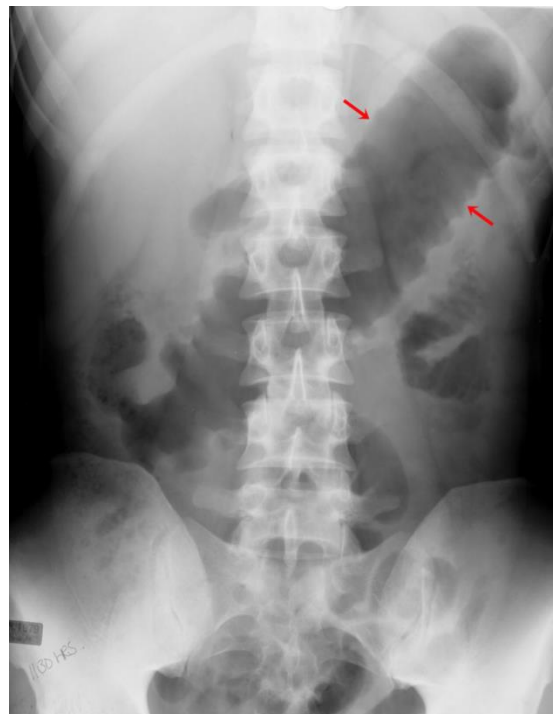
- CD: skip lesions typical
- UC: continuous disease from rectum up

Gender

- CD: no gender preference
- UC: male predilection

Colonic wall ((Terminal ileum involvement))

- CD: involved (terminal ileitis)
- UC: uncommon, backwash ileitis



Inflammatory Bowel Disease (IBD):

Crohn's vs. Ulcerative Colitis (UC)

Crohn's

- transmural
- skip areas
- Rectal sparing
- may involve any region of GI tract

UC

- Mucosal
- Continuous
- involves rectum
- Usually limited to colon

Lymphoma of small bowel

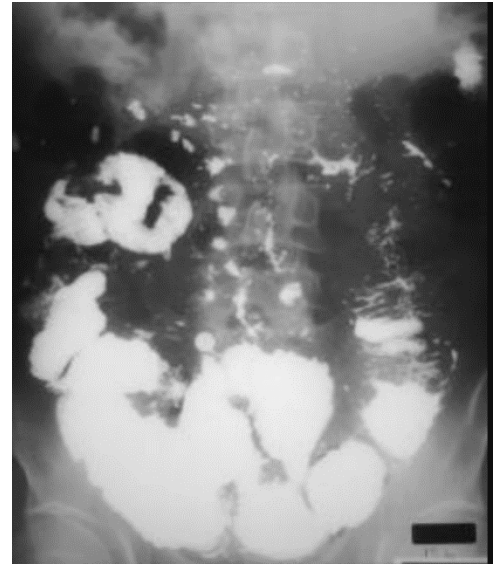
- Splaying & separation of the bowel loops due to enlarged LN
- Thickening of the mucosa, irregular in outline (saw tooth pattern).
- LATER stage could be present as sign of Mal absorption syndrome (flocculation & segmentation of the Ba).



Malabsorption syndrome

Ba follow through findings

- Loss of normal small bowel feathery appearance.
- Dilated small bowel loops > 3.5 cm
- Splaying & increase the distance between small bowels loops
- Flocculation & segmentation of the Ba



Small bowel obstruction

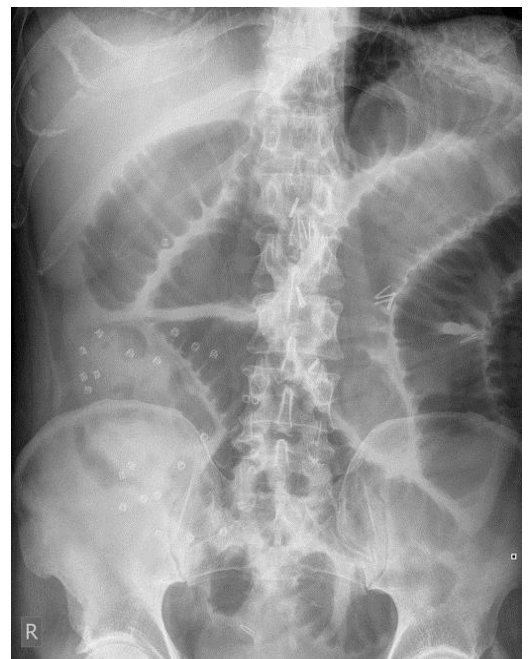
Accounts for 80% all mechanical intestinal obstruction; the remaining 20% result from large bowel obstruction

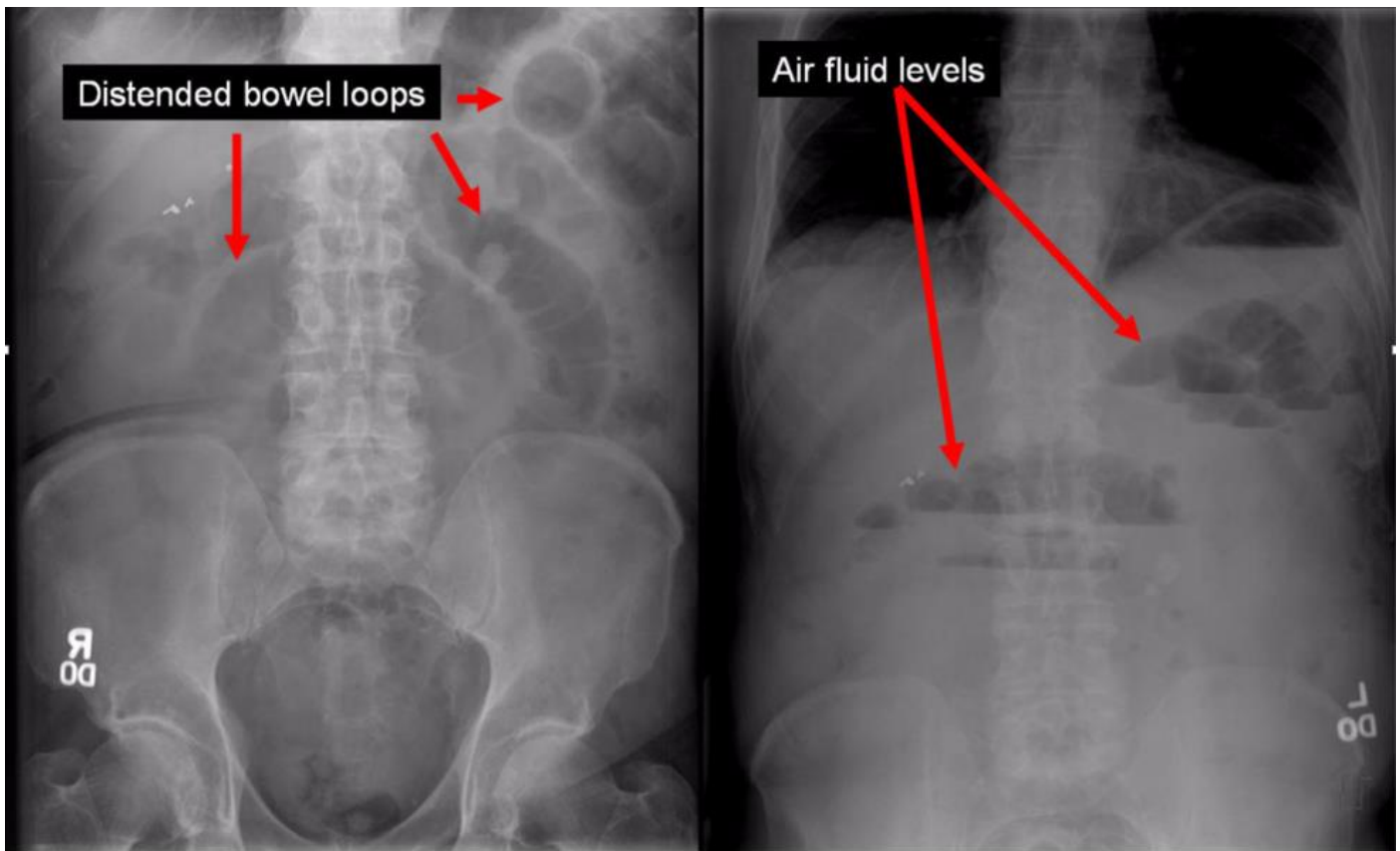
Radiographic features

Abdominal radiograph

Abdominal radiographs are only 50-60% sensitive for small bowel obstruction. In most cases, the abdominal radiograph will have the following features:

- Dilated loops of small bowel proximal to the obstruction
- Predominantly central dilated loops
- Three instances of dilatation over 3 cm
- valvulae conniventes are visible
- Fluid levels if the study in erect position





Large bowel obstruction (LBO)

Are often impressive on imaging, on account of the ability of the large bowel to massively distend. This condition requires prompt diagnosis and treatment

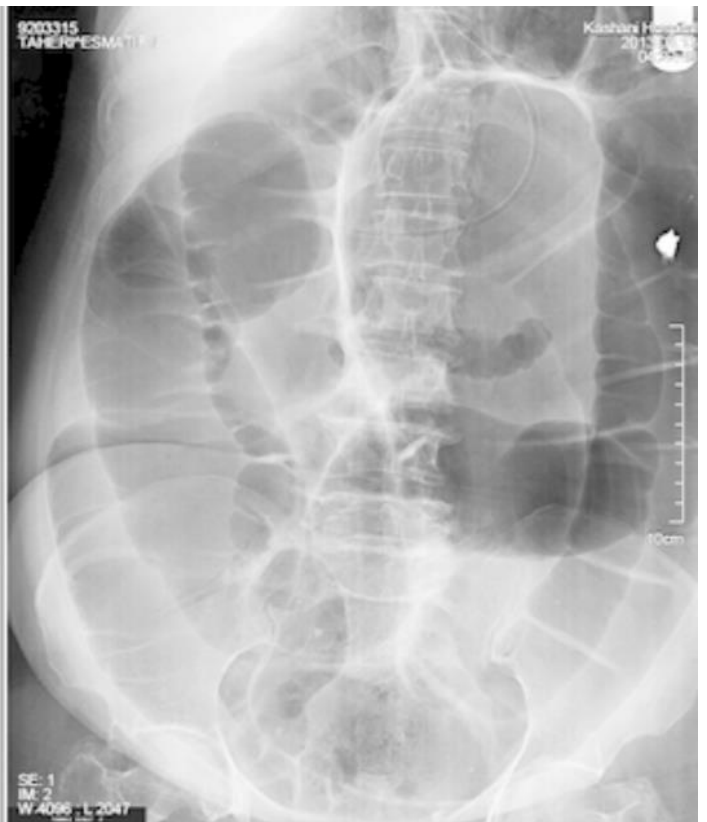
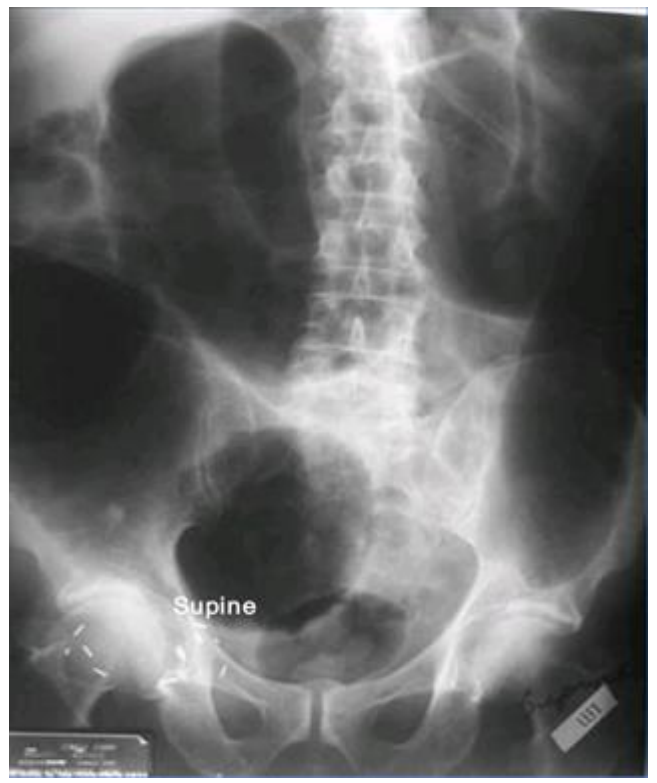
Radiographic features

- Colonic distension > small bowel.
- Peripherally located.
- Dilated loops less in no. than SBO.
- Presence of haustra.

1. Dilated Colon > 6 CM
2. Effacement of haustrae peripherally located
3. Multiple Air Fluid Levels

DX: Small Bowel Obstruction





Large Bowel	Small Bowel
1- Peripheral	1- Central
2- Maximum diameter is 8 Cm.	2- Maximum diameter is 5 Cm.
3- Presence of haustration.	3- Vulvulae conivetae.
4- Colon is filled with feces which has bubbly apperance	
5- Air fluid levels are few and large.	4- Air fluid levels are many and small.

Ba –enema examination

A barium enema is an x-ray examination of the colon and rectum that helps a doctor identify inflammation, polyps, or cancer.

Before a barium enema, you will need to empty your colon by following a restricted diet and using a laxative or enema.

During the examination, a liquid called barium is delivered into the colon through the anus and x-rays are taken.

After the procedure, you will go to the restroom to push out the barium; you may be asked to take a laxative at home to get rid of any barium still in your body.



Colorectal carcinoma (CRC): is the most common cancer of the gastrointestinal tract and the second most frequently diagnosed malignancy in adults.

Radiographic features

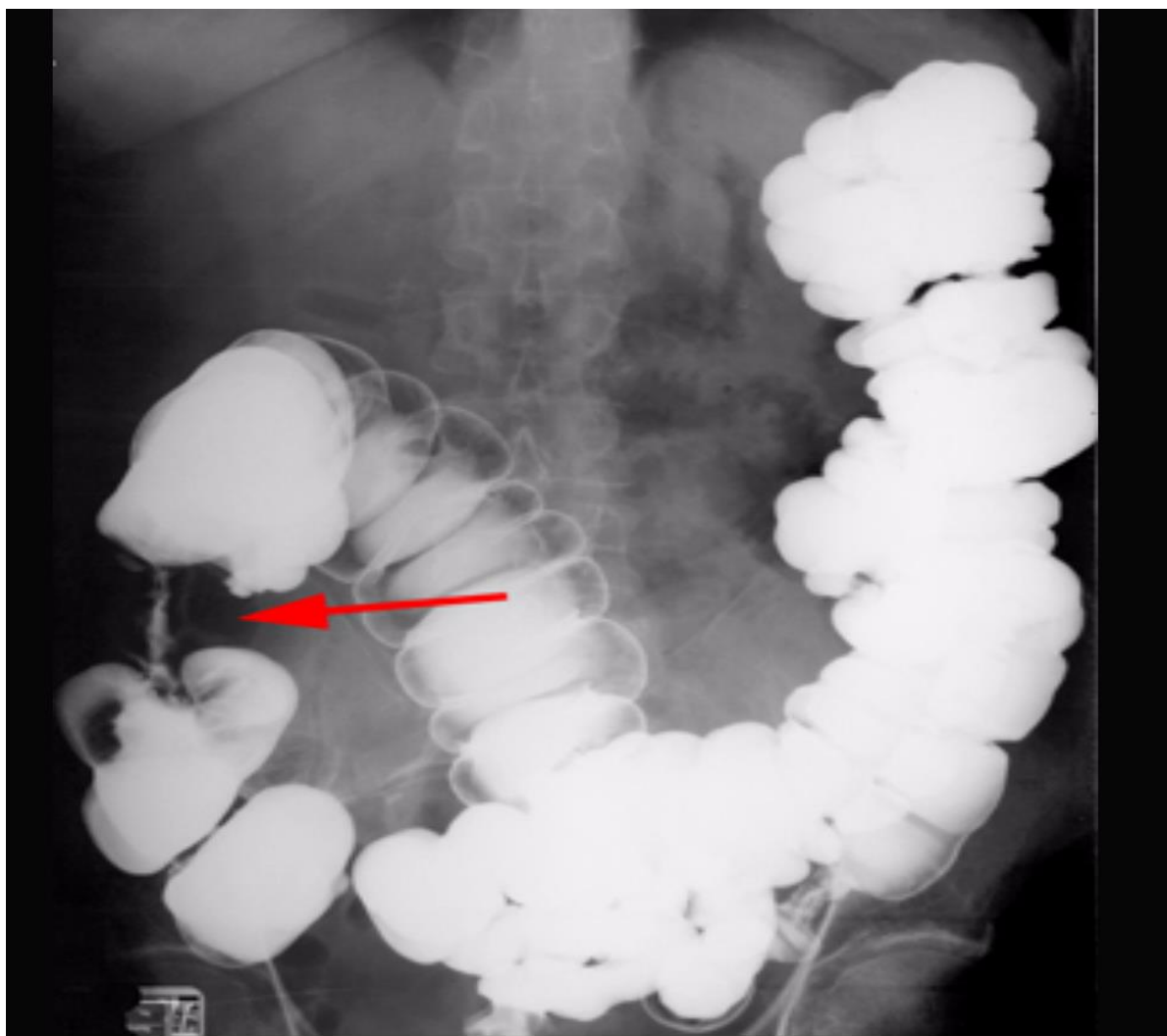
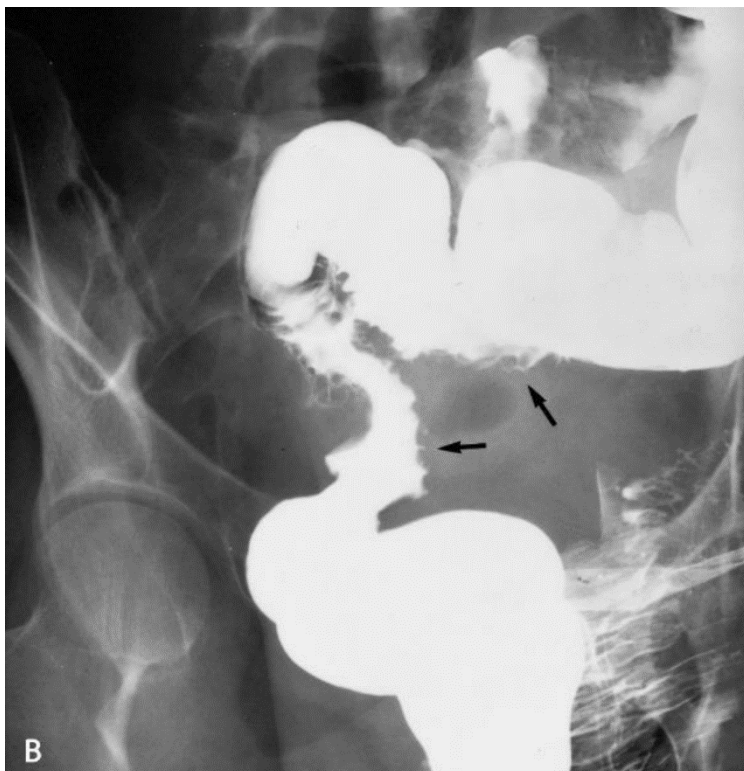
Colorectal cancers can be found anywhere from the caecum to the rectum, in the following distribution:

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

Barium enema 3 presentation:

- 1- Infiltrative (Apple core sign) lesion infiltrate bowel wall from outside
- 2- Ill-defined filling defect within the lumen of the bowel
- 3- Could be ulcerative nodule or ulcerative lesion.





Intussusceptions

occurs when one segment of bowel is pulled into itself (or a neighboring loop of bowel) it is an important cause of an acute abdomen in children.

Intussusceptions may also occur in the adult population where it is usually caused by a focal lesion acting as a lead point.

Radiographic features

Intussusceptions can occur essentially anywhere, in children there is a strong predilection for the ileo colic region

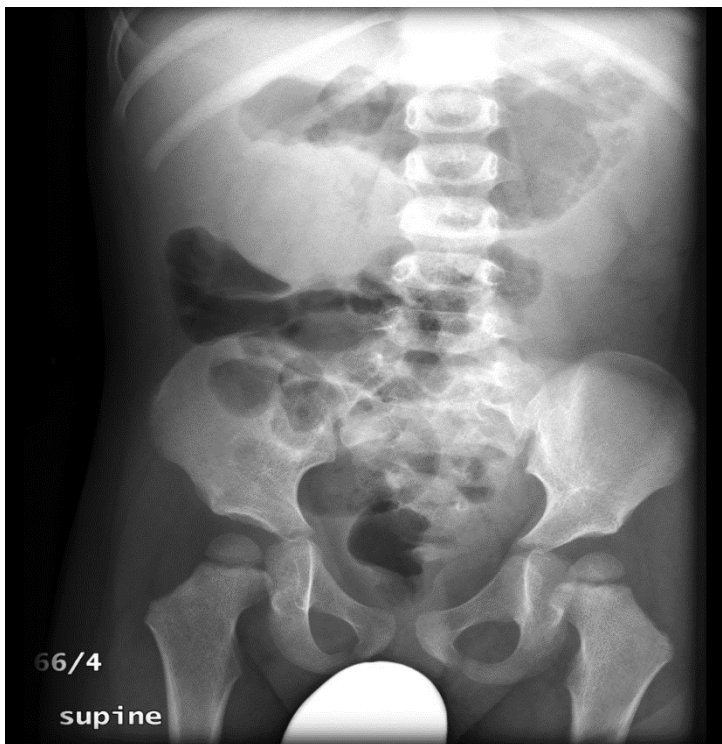
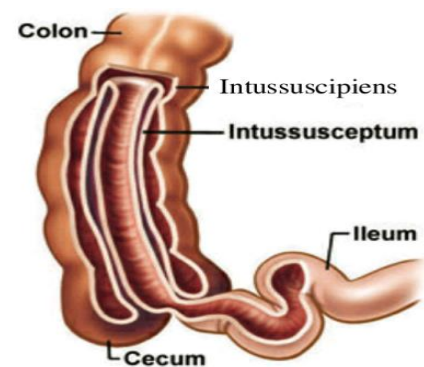
Abdominal plain film

Abdominal x-rays may demonstrate an elongated soft tissue mass (typically in the right upper quadrant in children) with a bowel obstruction proximal to it.

The Anatomy of Intussusception

Intussusception occurs when a segment of the bowel, the intussusceptum, telescopes into a more distant segment of bowel, the intussusciens.

The most common type is ileo-colic ((in the picture)) followed by ileoileocolic, ileoileas and colocolic.



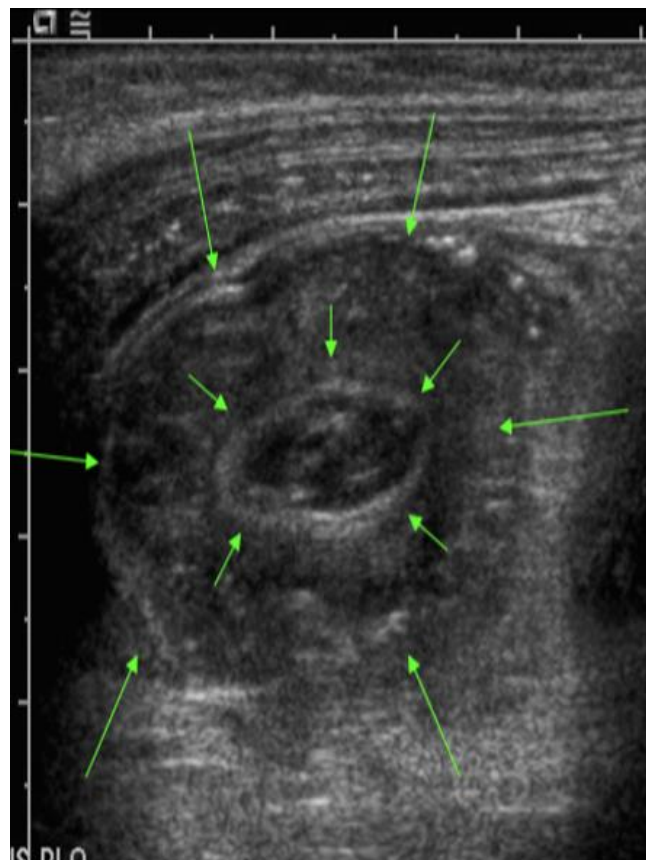
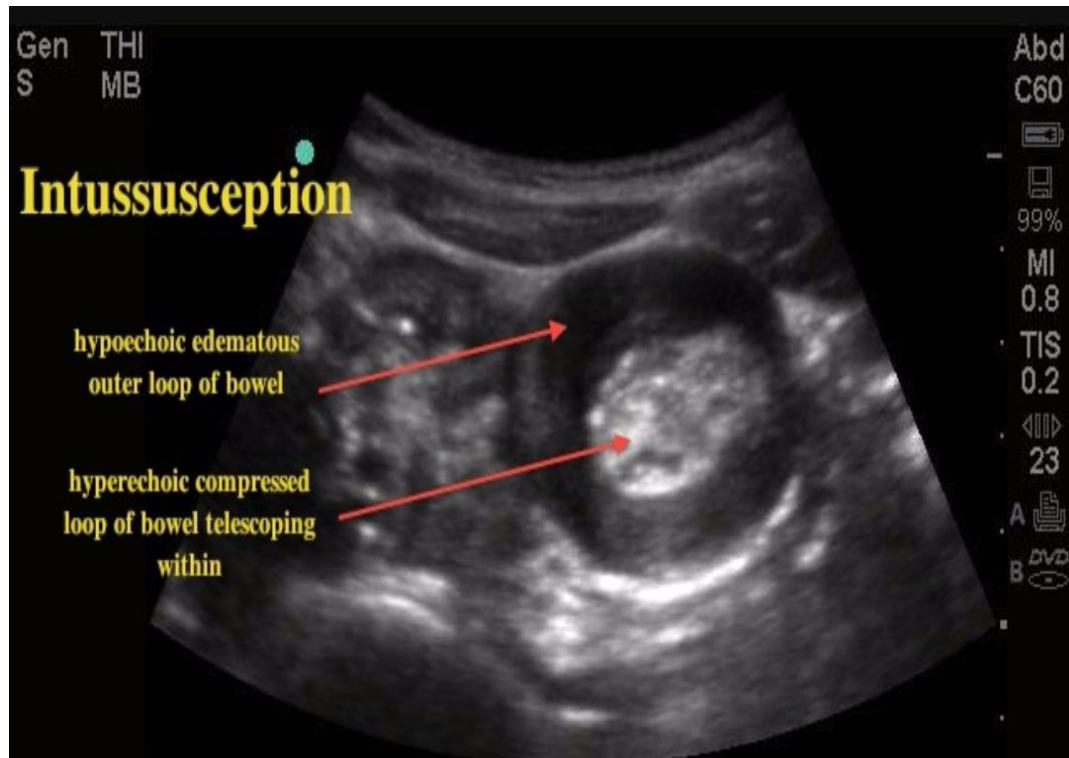
Paucity of gas on the right side of the abdomen

Ultrasound

A reliable screening tool for children at low risk for intussusceptions.

Ultrasound signs include:

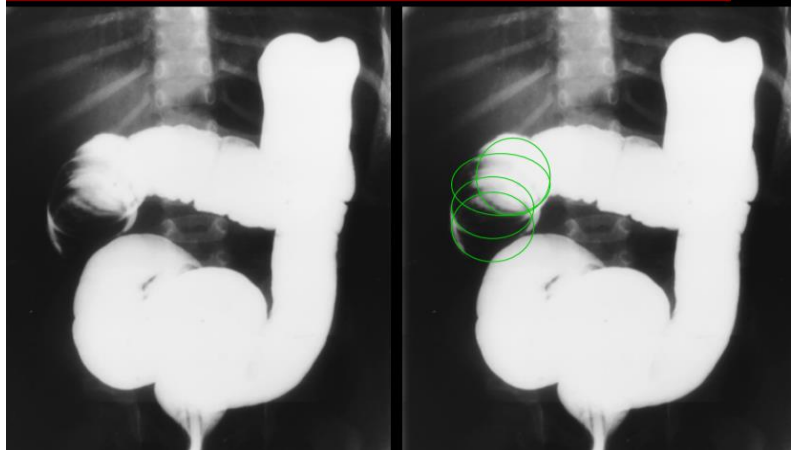
- Target sign (also known as the doughnut sign)
- Pseudo kidney shape sign



Contrast enema

- A contrast enema remains the gold standard, demonstrating the intussusceptions as an occluding mass prolapsing into the lumen, giving the "coiled spring" appearance.
- The main contra-indication for an enema is a perforation
- Contrast enema is diagnostic & therapeutic

Meniscus & Coiled Spring Signs



Colonic diverticulosis

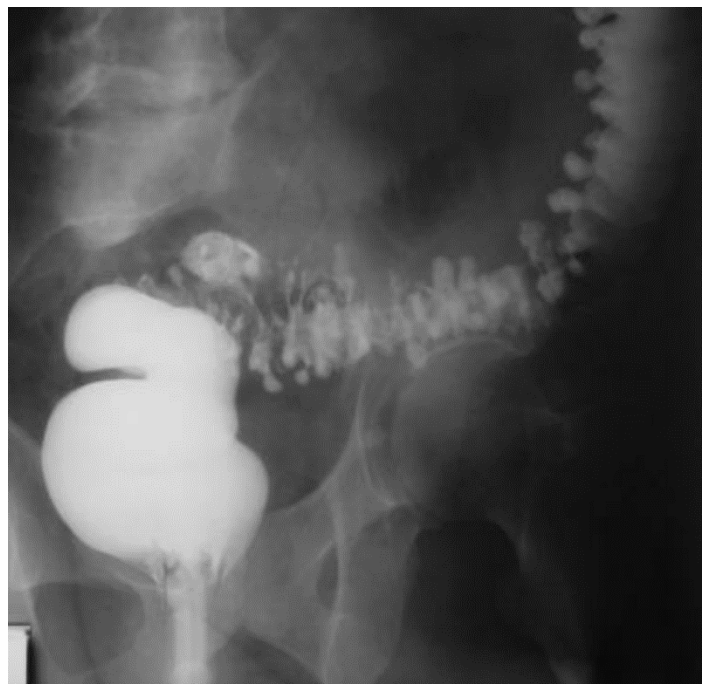
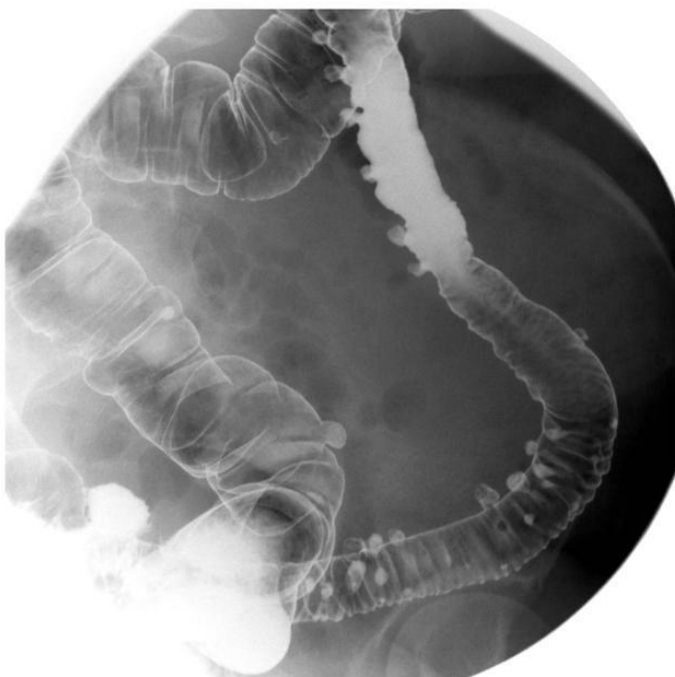
Refers to the presence of multiple diverticula. It is quite distinct from diverticulitis which describes inflammation and infection of one or multiple diverticula.

Radiographic features

Diverticula range in size from a few millimeters to a few centimeters

Barium enema

Both single and double contrast barium enemas are able to demonstrate diverticula as barium-filled out-pouchings.



Familial adenomatous polyposis syndrome

(FAPS) is characterized by the presence of hundreds of adenomatous polyps in the colon. It is the most common of the polyposis syndromes.

Radiographic features

FAPS has a varied imaging appearance and demonstrate innumerable polyps. Imaging usually underestimates the number of polyps because most are <5mm in size.

It is a predisposition to colorectal carcinoma (CRC)



Pneumoperitoneum

Describes as gas within the peritoneal cavity, and is often of a critical illness

Plain film

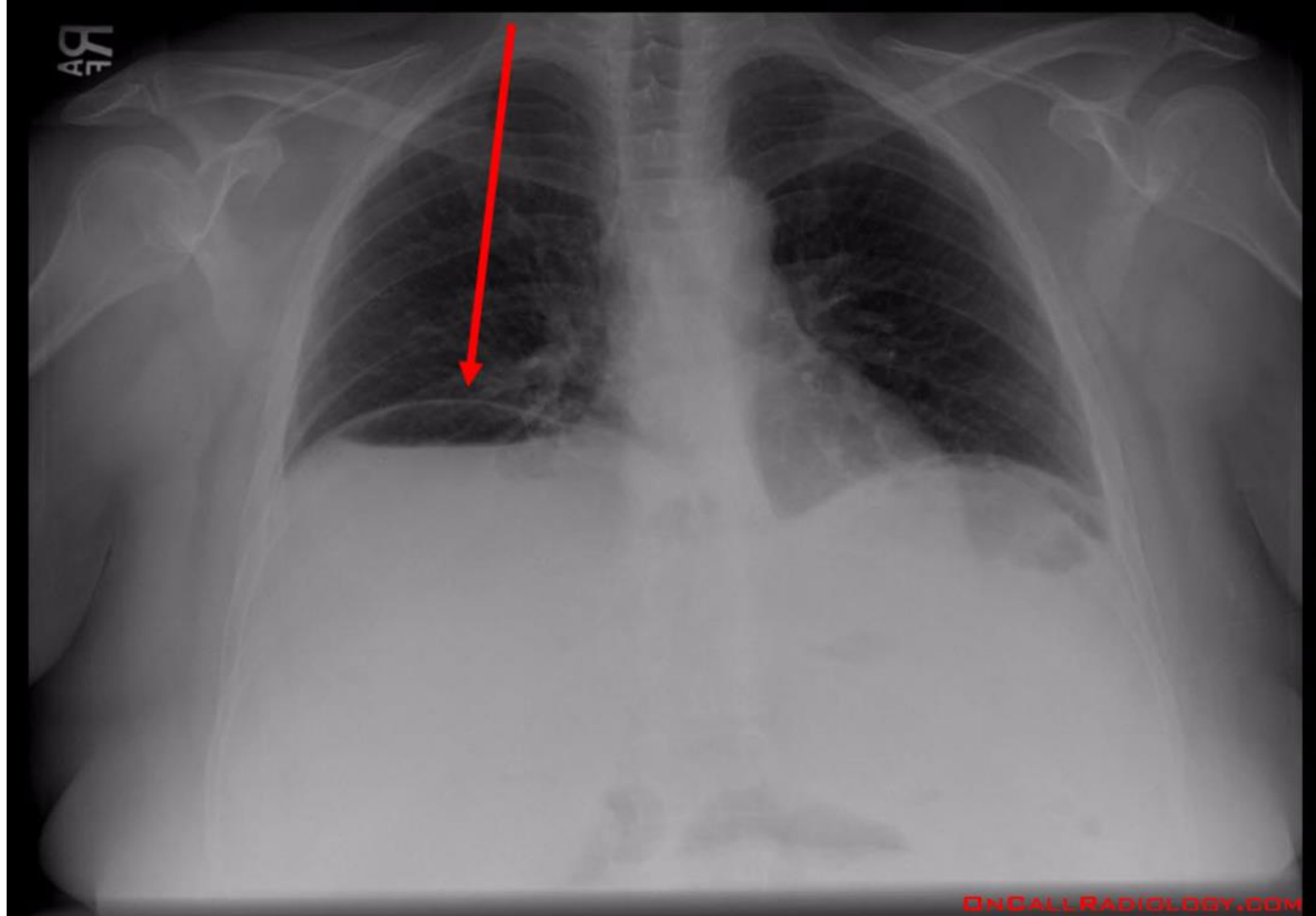
Chest radiograph

An erect chest x-ray is probably the most sensitive plain radiograph for the detection of free intra peritoneal gas as crescent shape of lucency below diaphragm, more in the RT sided aspect.

Described as sub diaphragmatic free gas



Free intraabdominal air



Hirschprung disease

The most common cause of neonatal colonic obstruction (~15-20%). It is commonly characterized by a short segment of colonic aganglionosis affecting term neonates, especially boys.

Contrast enema

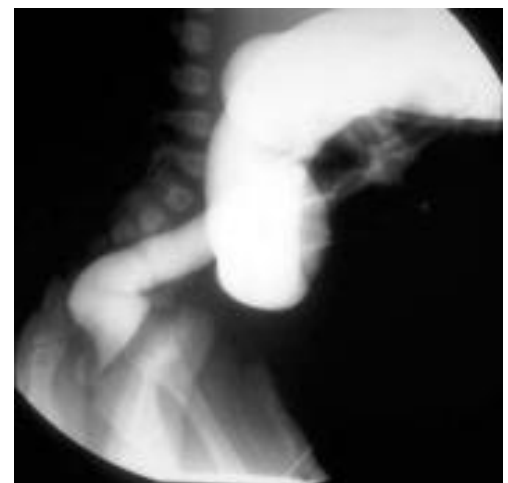
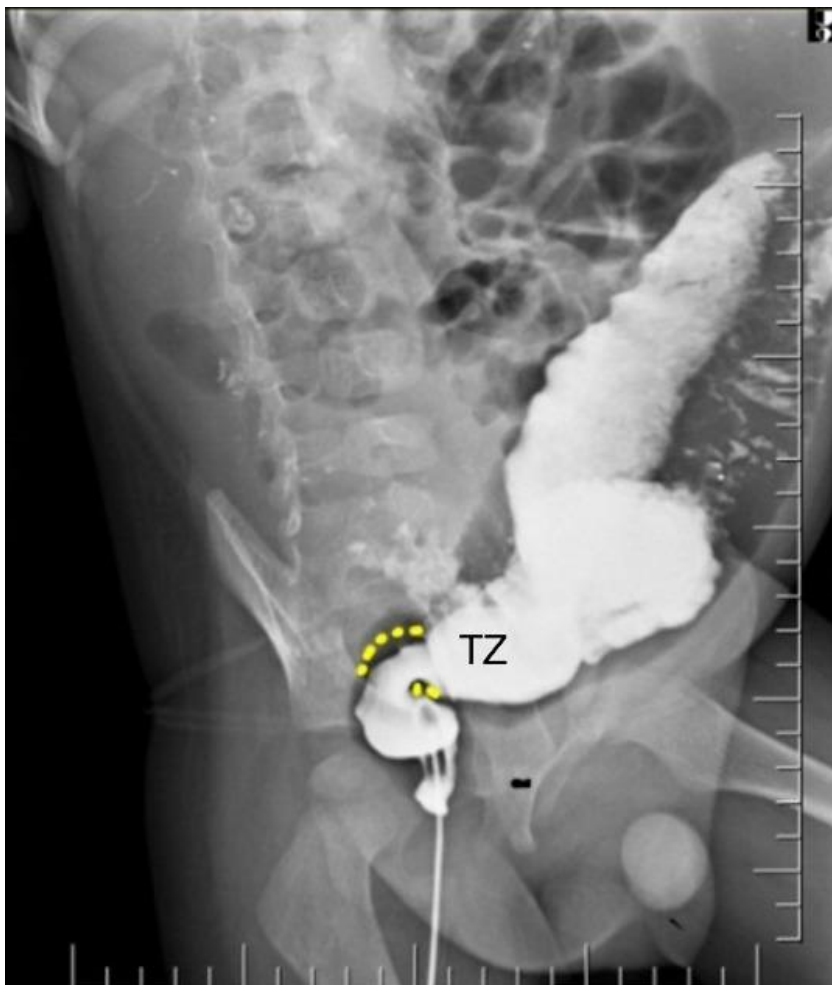
A carefully performed contrast enema is indispensable in both the diagnosis of Hirschprung disease but also in assessing the length of involvement. It should be noted however that the depicted transition zone on the contrast enema is not accurate at determining the transition between absent and present ganglion cells.

The affected segment is of small caliber with proximal dilatation. Fasciculation/saw-tooth irregularity of the aganglion segment is frequently seen.

Views of particular importance include:

Early filling views that include rectum and sigmoid colon allowing for rectosigmoid ratio to be determined.

Transition zone



Anal atresia (or imperforate anus)

Refers to a spectrum of ano rectal abnormalities ranging from a membranous separation to complete absence of the anus.

Abdominal radiograph

Can be variable depending on the site of atresia (e.g high or low), level of impaction with meconium and physiological effects such as straining

May show multiple dilated bowel loops with with absence of rectal gas

Invertogram

A coin/metal piece is placed over the expected anus and the baby is turned upside down (for a minimum 3 minutes).

Distance of gas bubble in rectum from the metal piece is noted:

>3 cm: denotes high type

<3 cm: denotes low type

