

# Small bowel conditions

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# Intestinal obstruction

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- Dynamic vs Adynamic
- Small bowel vs large bowel
- Partial or Complete
- Simple vs complicated
- Closed loop or not
- Evidence of ischemia or perforation
- Acute or Chronic



# CLASSIFICATION

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**Dynamic**, in which peristalsis is working against a mechanical obstruction. It may occur in an acute or a chronic form.

**Adynamic**, in which there is no mechanical obstruction; peristalsis is absent or inadequate (e.g. paralytic ileus or pseudo-obstruction)



With onset of obstruction , gas and fluid accumulate proximal to the site of obstruction .



The intestinal activity increase to overcome the obstruction accounting for colicky pain .



More gas and fluid accumulation lead to further increase in intraluminal pressure.



Reduction in the intestinal motility  
.Translocation of gut bacteria



If the intraluminal pressure is still high and obstruction not relived this High pressure reduce the intestinal microvascular perfusion leading to ischemia and necrosis ( strangulated bowel obstruction )



# Dehydration and electrolyte loss are therefore

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Reduced oral intake;

Defective intestinal absorption;

Losses as a result of vomiting;

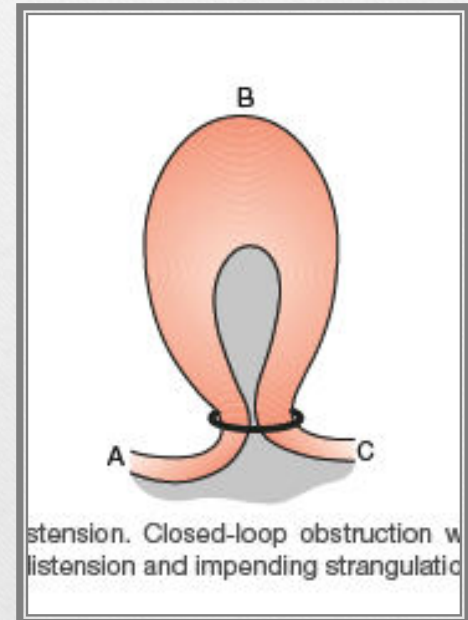
Sequestration in the bowel lumen;

Transudation of fluid into the peritoneal cavity.

# Closed-loop obstruction

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- This occurs when the bowel is obstructed at both the proximal and distal points
- The distension is principally confined to the closed loop; distension proximal to the obstructed segment is not typically marked.
- volvulus or adhesion from two point can cause this



# SBO

Post operative Adhesion is most  
common cause

## Summary box 71.1

### Causes of intestinal obstruction

#### Dynamic

- Intraluminal
  - Faecal impaction
  - Foreign bodies
  - Bezoars
  - Gallstones
- Intramural
  - Stricture
  - Malignancy
  - Intussusception
  - Volvulus
- Extramural
  - Bands/adhesions
  - Hernia

#### Adynamic

- Paralytic ileus
- Pseudo-obstruction

#### Adhesions

#### Neoplasms

- Primary small bowel neoplasms
- Secondary small bowel cancer (e.g., melanoma-derived metastasis)
- Local invasion by intra-abdominal malignancy (e.g., Desmoid tumors)
- Carcinomatosis

#### Hernias

- External (e.g., inguinal and femoral)
- Internal (e.g., following Roux-en-Y gastric bypass surgery)

#### Crohn's disease

#### Volvulus

#### Intussusception

#### Radiation-induced stricture

#### Postischemic stricture

#### Foreign body

#### Gallstone ileus

#### Diverticulitis

#### Meckel's diverticulum



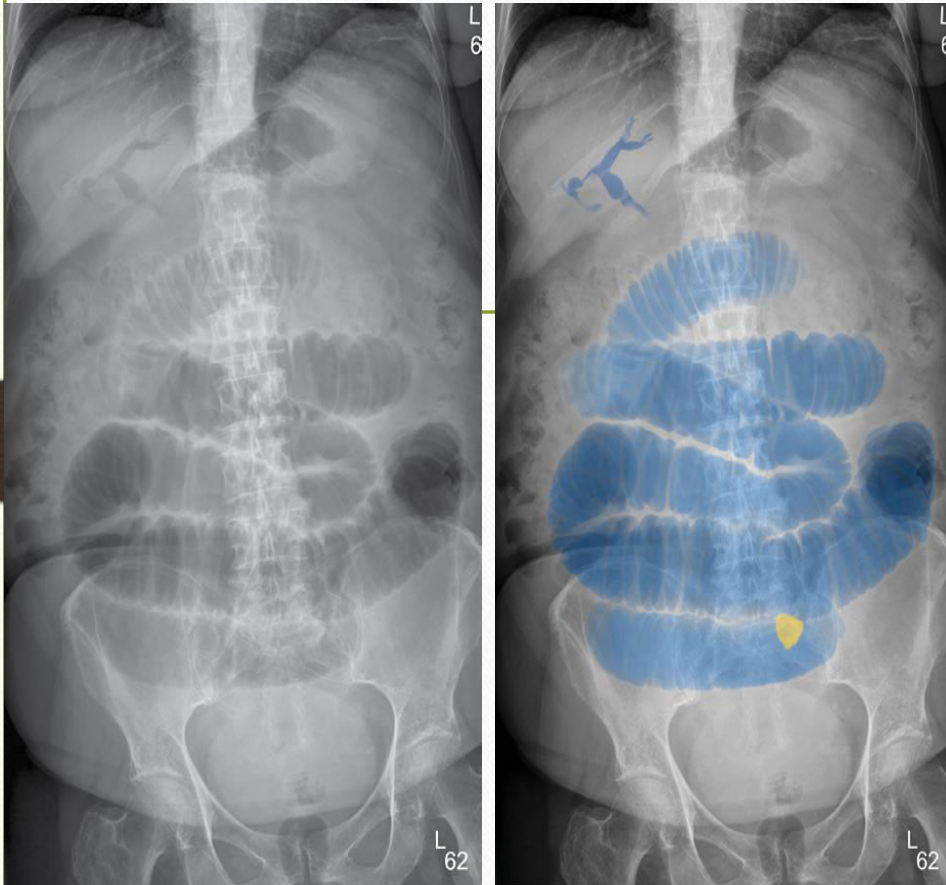
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- **Internal hernia**
  - Internal herniation occurs when a portion of the small intestine becomes entrapped in one of the retroperitoneal fossae or in a congenital mesenteric defect.
  - the foramen of Winslow
  - a defect in the mesentery( post surgery like RYGB)
  - Falciform ligament defect



- Small bowel strictures usually occur secondary to tuberculosis or Crohn's disease. Or Malignant strictures associated with lymphoma are uncommon, whereas carcinoma and sarcoma are rare.
  - Standard surgical management consists of resection and anastomosis
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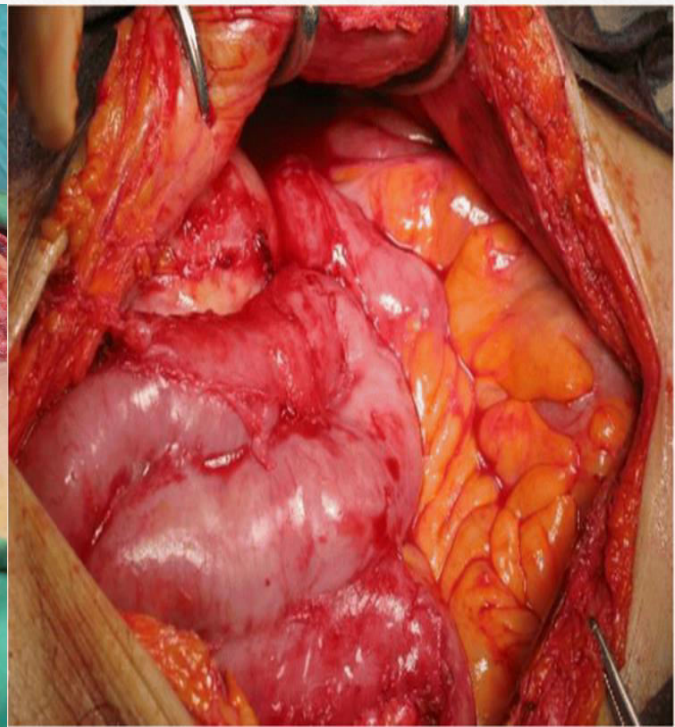
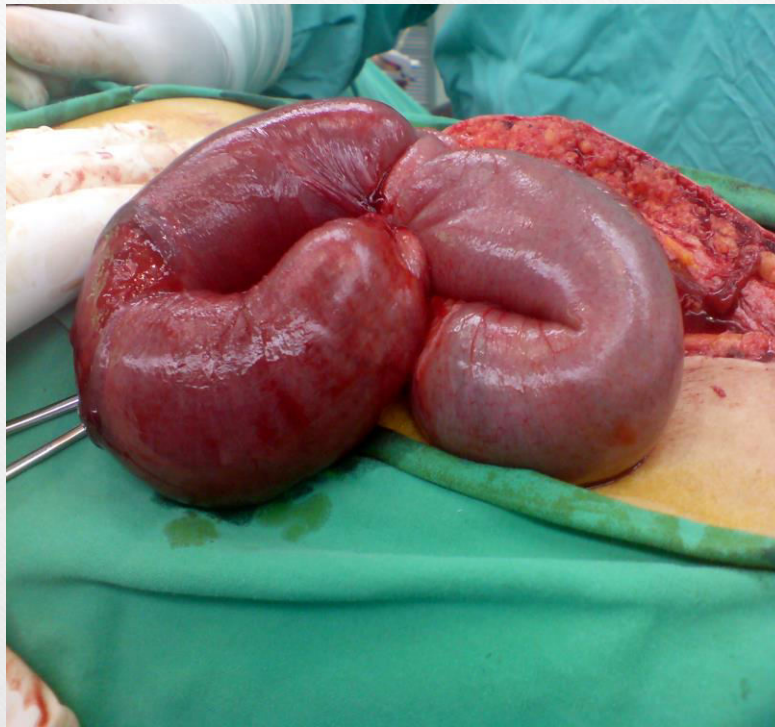
- Gallstone can cause obstruction in Elderly patient mostly secondary to erosion of a large gallstone directly through the gall bladder into the duodenum.
- Classically, there is impaction about 60 cm proximal to the ileocecal valve.
- The characteristic radiological sign of gallstone ileus is Rigler's triad, comprising: small bowel obstruction, pneumobilia and an atypical mineral shadow on radiographs of the abdomen
- Treatment is laparotomy





- The presence of two of these radiological signs has been considered pathognomonic of gallstone ileus and is encountered in 40–50% of the cases





# Acute intussusception

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- This occurs when one portion of the gut invaginates into an immediately adjacent segment; almost invariably, it is the proximal into the distal.
- Iliocolic more common in children
- In adults, colocolic intussusception is more common.

## Summary box 71.4

### Intussusception

- Most common in children
- Adult cases are secondary to intestinal pathology, e.g. polyp, Meckel's diverticulum
- Ileocolic is the commonest variety
- Can lead to an ischaemic segment
- Radiological reduction is indicated in most paediatric cases
- Adults require surgery





## Clinically

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- **simple** – in which the blood supply is intact
- **strangulating/strangulated** – in which there is interference to blood flow
- Late manifestations of intestinal obstruction that may be encountered include dehydration, oliguria, hypovolemic shock, pyrexia, septicemia, respiratory embarrassment and peritonism.
- In all cases of suspected intestinal obstruction, the hernial orifices must be examined.

### Summary box 71.2

#### Causes of strangulation

##### Direct pressure on the bowel wall

- Hernial orifices
- Adhesions/bands

##### Interrupted mesenteric blood flow

- Volvulus
- Intussusception

##### Increased intraluminal pressure

- Closed-loop obstruction

### Cardinal clinical features of acute obstruction

- Abdominal pain
- Distension
- Vomiting
- Absolute constipation



## Features of obstruction

- In **high small bowel obstruction**, vomiting occurs early, is profuse and causes rapid dehydration. Distension is minimal with little evidence of dilated small bowel loops on abdominal radiography
- In **low small bowel obstruction**, pain is predominant with central distension. Vomiting is delayed. Multiple dilated small bowel loops are seen on radiography
- In **large bowel obstruction**, distension is early and pronounced. Pain is less severe and vomiting and dehydration are later features. The colon proximal to the obstruction is distended on abdominal radiography. The small bowel will be dilated if the ileocaecal valve is incompetent.

# Approach

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- History : cardinal symptoms
- Don't forget to ask about previous abdominal surgery , previous colonoscopy , previous irradiation
- Previous attack of bowel obstruction
- History of hernia
- Changes in the bowel motion , symptoms of anemia
- Tenesmus , change in the stool caliber , blood per rectum , weight loss , medical hx if IBD , family or personal hx of colon cancer

# Physical examination

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General appearance

Vital sign and  
assessment of the  
hydration status

Abdominal exam  
looking for level of  
distention , tenderness  
, skin changes .

Hernia orifice  
examination ( looking  
for strangulated hernia  
sign )

Auscultation.

Don't forget to do  
digital rectal  
examination



# Investigation labs

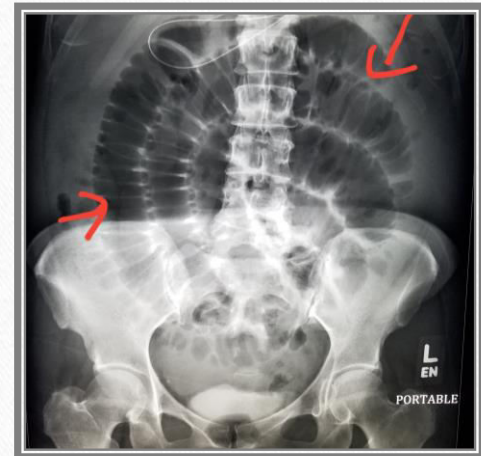
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- CBC
- Serum electrolytes and liver function test
- Serum amylase
- Coagulation test
- Urine analysis

# Images abdominal x ray

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- Two view : supine and standing
- Blood test : looking for high WBC and electrolytes imbalance



# CT scan

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Identification the site and cause of the obstruction, closed loop

It helps to look for ischemia and strangulation , pneumatosis intestinal , free air , abscess.

To rule out other causes of acute abdomen

With oral and IV contrast

Oral contrast diagnostic and therapeutic in cases of adhesive bowel obstruction

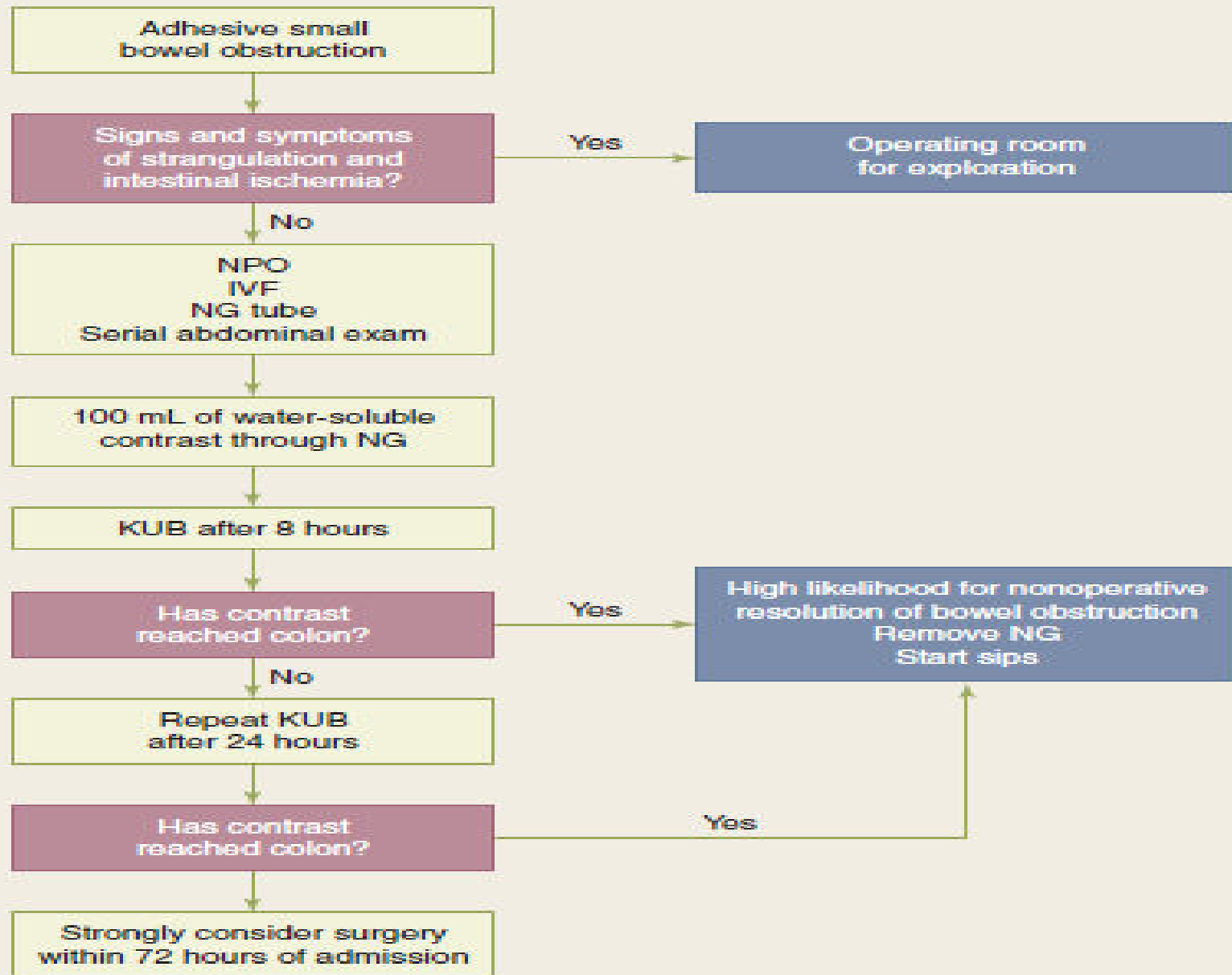


# CT

- the presence of a combination of these findings increases the reliability of diagnosing ischemia :
- Poor or absent segmental bowel wall enhancement
- Delayed hyperenhancement Bowel wall thickening
- Air in the bowel wall (pneumatosis intestinalis)
- Edematous, thickened mesentery
- Engorgement of mesenteric vessels
- Portal or mesenteric venous gas



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- Gastrografin draws fluid into the lumen of the bowel due to its hypertonicity, decreasing intestinal wall edema and stimulating intestinal peristalsis.
  - Antibiotics are warranted for patients with suspected bowel compromise (ie, ischemia, necrosis, or perforation), and standard perioperative prophylactic antibiotics should be administered to those who undergo operative exploration, depending upon the expected wound classification





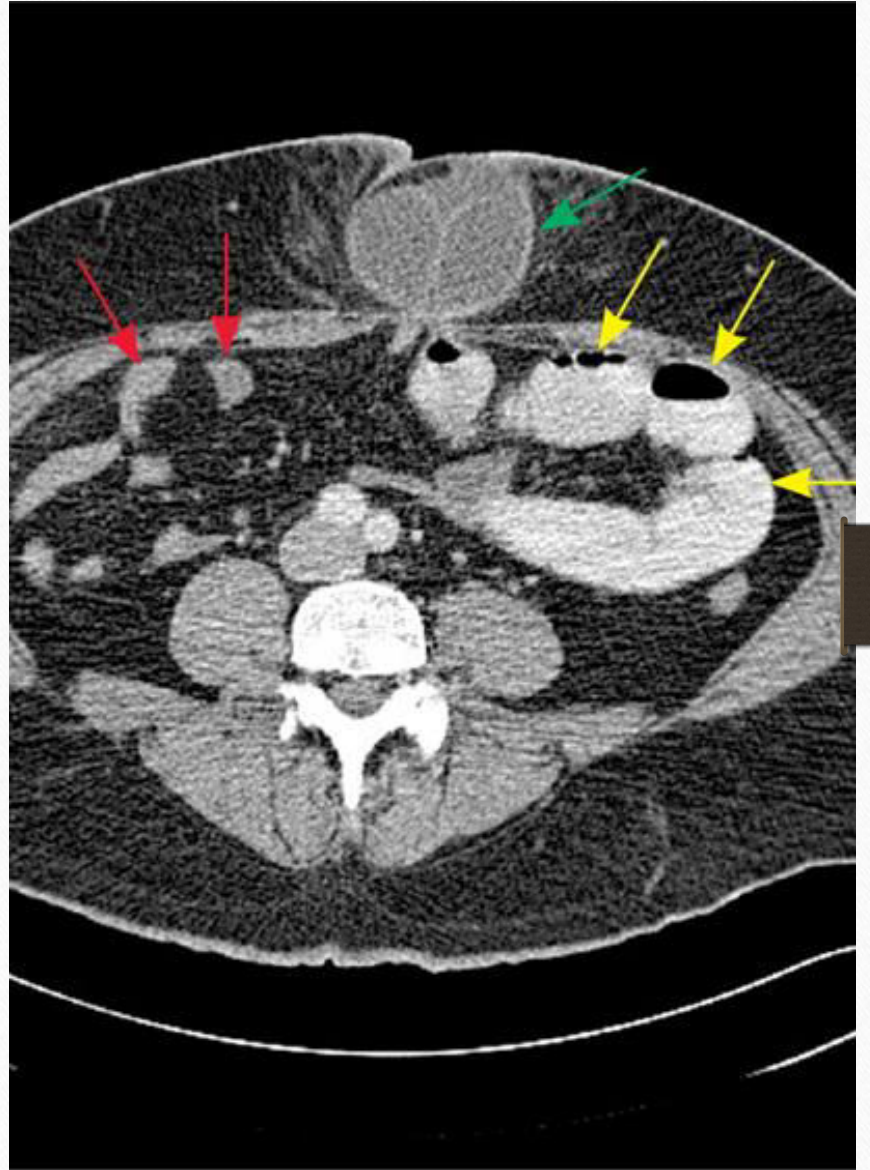
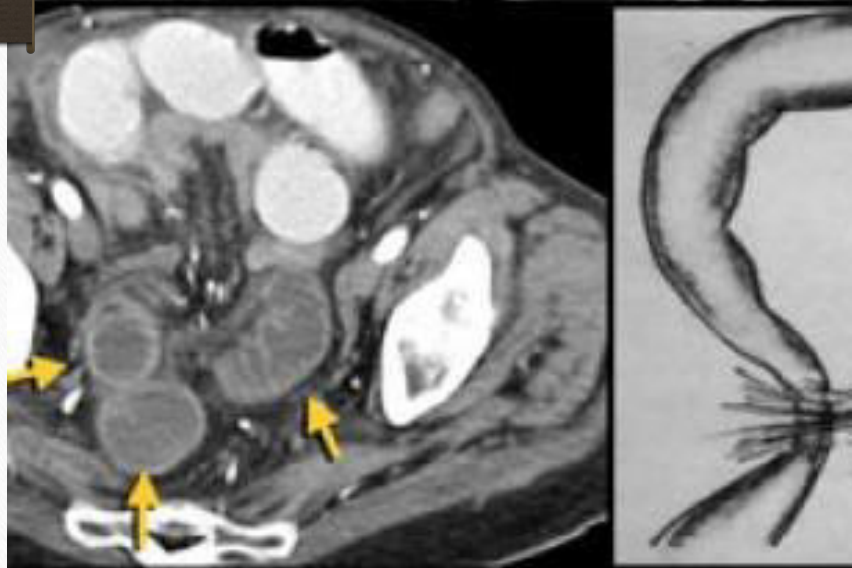
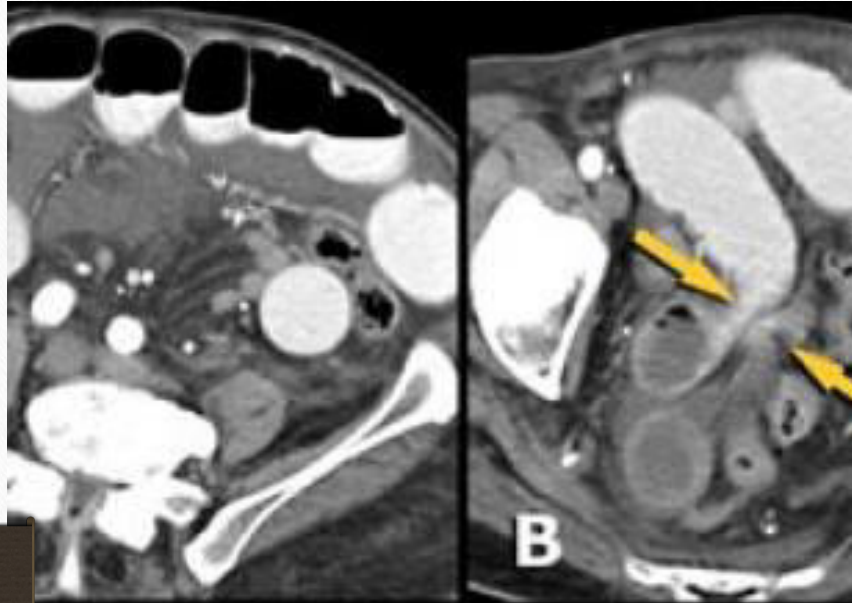
## Treatment of acute intestinal obstruction

- Gastrointestinal drainage via a nasogastric tube
- Fluid and electrolyte replacement
- Relief of obstruction
- Surgical treatment is necessary for most cases of intestinal obstruction but should be delayed until resuscitation is complete, provided there is no sign of strangulation or evidence of closed-loop obstruction

# Indication for surgical management

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- IO with peritonitis
- Intestinal ischemia , perforation , pneumatosis
- Closed loop obstruction
- Complicated sigmoid volvulus + cecal volvulus
- Failure of conservative management .
- Post op ( if you suspect a technical problem as a cause of the obstruction ) .





# ADYNAMIC OBSTRUCTION

## Paralytic ileus

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- state in which there is failure of transmission of peristaltic waves secondary to neuromuscular failure
- The resultant stasis leads to accumulation of fluid and gas within the bowel, with associated distension, vomiting, absence of bowel sounds and absolute constipation.
- Colicky pain is not a feature
- Distention , effortless vomiting
- gas-filled loops of intestine with multiple fluid Levels on abdominal x ray
- Post operative ileus take clinical significance if persist more than 72 h

**Table 28-4**

**Ileus: common etiologies**

Abdominal surgery
Infection
Sepsis
Intra-abdominal abscess
Peritonitis
Pneumonia
Electrolyte abnormalities
Hypokalemia
Hypomagnesemia
Hypermagnesemia
Hyponatremia
Medications
Anticholinergics
Opiates
Phenothiazines
Calcium channel blockers
Tricyclic antidepressants
Hypothyroidism
Ureteral colic
Retroperitoneal hemorrhage
Spinal cord injury
Myocardial infarction
Mesenteric ischemia

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- NPO , NG tube , correction of electrolytes abnormality
  - restriction of oral intake until bowel sounds and the passage of flatus return.
  - If paralytic ileus is prolonged CT scanning is the most effective investigation; it will demonstrate any intraabdominal sepsis or mechanical obstruction and therefore guide any requirement for laparotomy.
  - The need for a laparotomy becomes increasingly likely the longer the bowel inactivity persists, particularly if it lasts for more than seven days



# Meckel's Diverticulum

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- Most commonly encountered congenital anomaly of the small intestine , 2% of general population
- True diverticulum Located on the antimesenteric border of the ileum 2 feet proximal to the ileocecal valve
- Results from incomplete closure of omphalomesenteric or vitellointestinal duct
- 2 type of mucosa ( gastric –MC & pancreatic )
- Asymptomatic and discovered incidentally
- MC clinical presentation is GI bleeding (25-50%), painless
- intussusception and subsequent obstruction could be one of the manifestation
- rarely, incarceration of the diverticulum in an inguinal hernia (Littre's hernia)

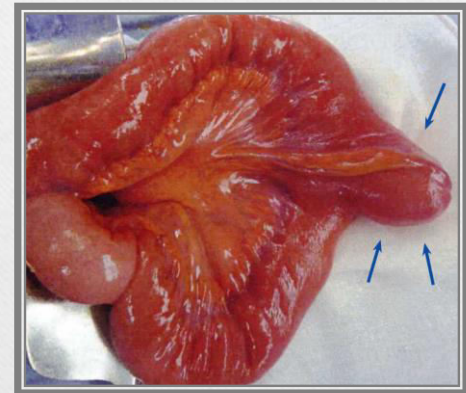
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- Diverticulitis (10-20%) is more common in adult patients and may lead to perforation
  - When the appendix is found to be normal during exploration for suspected appendicitis, the distal ileum should be inspected for the presence of an inflamed Meckel's diverticulum
  - Diagnosis Scintigraphy with sodium  $^{99m}\text{Tc}$ -pertechnetate (Meckel's scan) Is the most sensitive and specific diagnostic test injecting technetium-99m, which is absorbed by the ectopic gastric mucosa allowing for visualization of the Meckel diverticulum
  - Angiography in case of bleeding



# Treatment

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- No treatment if asymptomatic
- Surgical resection with the adjacent ileum in complicated cases
- Controversy when discovered incidentally during the surgery for other reason – most surgeon recommend resection





# SMALL-BOWEL NEOPLAS

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- MC malignant neoplasms of the small bowel:  
Adenocarcinoma mostly in proximal SB
- Others include GIST carcinoid , lymphoma usually in the distal SB
- Usually symptomatic (abd pain , SBO , weight loss )
- Obstruction develops in 15-35% of patients
- Leiomyoma is the most common benign neoplasm of the SI and arises from mesenchymal cells. These tumors grow submucosally and project into the bowel lumen

# Adenocarcinoma

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- most common malignant SI tumor, with 40% in the duodenum and then with decreasing frequency distally through the SI.
- Risk factors for development of adenocarcinoma include villous adenomas, polyposis syndromes, CD, and hereditary nonpolyposis colorectal cancer (HNPCC).
- Presenting symptoms depend on the location of the primary tumor.
- Periampullary tumors present with painless jaundice, duodenal obstruction, or bleeding.
- Distal tumors tend to present with abdominal pain and weight loss from progressive obstruction.



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- Diagnosis usually made on the CT scan and endoscopy
  - Treatment is surgical and the extent of the surgery depend on location of the tumour
  - Lymphadenectomy is routine during the surgery for proper staging
  - Post op chemotherapy



# Gastrointestinal stromal tumors (GISTs)

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- arise from mesodermal-derived components of the bowel and are equally distributed along the length of the intestine
- grow extraluminally, Mutations of c-kit (CD117, a tyrosine kinase) allow diagnosis by immunohistochemistry
- Can cause bleeding obstruction
- treatment for GIST requires wide en bloc resection with tumor-free margins.
- Extensive lymphadenectomy is unnecessary as these tumors have low potential for lymphatic spread.
- chemo/radiation therapy is not the effective treatment for GIST
- tyrosine kinase inhibitor imatinib mesylate (Gleevec) effectively inhibits the overactive tyrosine receptor c-kit found on all GIST cells and prolong the recurrence free survival , additionally it can cause regression in metastatic disease

# Primary small-bowel lymphomas

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- most common in the ileum
- non-Hodgkin, B-cell lymphomas (NHL)
- May arise from a preexisting systemic condition such as celiac disease, CD, or immunosuppression (iatrogenic, HIV) or de novo
- Imaging can help make a diagnosis, but operation is frequently required for histologic confirmation



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- Treatment based on the stage but usually bowel resection and chemotherapy



# Neuroendocrine tumors (NET)

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- arise from enterochromaffin cells of intestinal crypts.
- Most intestinal NETs occur within 2 feet of the ileocecal valve.
- Small-bowel NETs tend to be more aggressive than their appendiceal or rectal counterparts.
- Patients typically remain asymptomatic until advanced disease causes local complications of GI obstruction, pain, or bleeding, or the systemic carcinoid syndrome.

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- Carcinoid syndrome implies hepatic metastatic spread.  
Hormones released by carcinoid tumors
  - diarrhea and flushing of the face, neck, and upper chest.  
Tachycardia, hypotension, bronchospasm, and coma may be observed.
  - In long-standing carcinoid syndrome, patients develop right heart endocardial and valvular fibrosis
  - Octreotide or Lanreotide (SSA) are used in symptomatic management of carcinoid syndrome



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- Dx :
  - 24-hour urinary 5-hydroxyindoleacetic acid (5-HIAA)
  - Chromogranin A
  - CT
  - Octreotide scan



# Treatment

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- Depend on site of the tumour
- Surgical resection
- Hepatic metastasis resection
- SSA in advance un resectable tumor
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- Several primary cancers are known to metastasize to the small bowel including melanoma, colorectal, gynaecologic, breast, stomach, lung, prostate, and renal cancers.



# IBD -CROHN DISEASE

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- CD is an idiopathic, chronic, granulomatous IBD that can affect any part of the GI tract from mouth to anus.
- CD is incurable, slowly progressive, and characterized by episodes of exacerbation and remission.
- The incidence is 4/100,000 with a bimodal age distribution at 15 to 29 and 55 to 70 years old.



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- the exact etiology of inflammatory bowel disease (IBD) is not known.
  - believed to involve both genetic and environmental factors
  - inappropriate immune response in the bowel to situations from environmental factors such as drugs, toxins, infections, or intestinal microbes in a genetically susceptible host.

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- defective mucosal barrier and/or dysregulated intestinal immunity leading to chronic inflammation within the intestinal wall.
  - More common in smokers
  - Strong familial association

- Involvement of **both large & small intestine: 55%<sup>Q</sup>**
- Involvement of **only small intestine: 30%<sup>Q</sup>**
- Involvement of **only large intestine: 15%<sup>Q</sup>**



# Involvement

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- The terminal ileum is the most common site of disease , MC site of fistula (enterocutaneous & enterovesical), MC site of perforation and MC site of carcinoma
- Ileocolic disease affecting the terminal ileum and/or cecum is the most common form
- Perianal involvement commonly coexists with more proximal forms, especially when the colon is affected. Isolated anorectal disease is rare
- In patients with colonic disease, rectal sparing is characteristic
- Upper GI Crohn's disease is most frequently found in gastric antrum & duodenum



# Gross appearance

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- Thickened, firm, rubbery, & almost incompressible bowel wall
- Involved segments may be adherent to adjacent intestinal loops or other viscera with fistula formation
- creeping fat, corkscrew vessels, and a shortened fibrotic mesentery with lymphadenopathy

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- Fat creeping and thickening of the mesentery





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- transmural and skip lesion are characteristic
  - noncaseating granulomas with Langerhans' giant cells
  - Granulomas are found in the wall of bowel or in regional lymph nodes in 60-70% of patient
  - Mucosal changes include pinpoint hemorrhages, aphthous ulcers, deep linear fissures, crypt abscesses, and cobblestoning
  - Earliest gross pathologic lesion is a superficial aphthous ulcer noted in the mucosa.





# Clinical presentation

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- MC symptom is intermittent & colicky abdominal pain, most commonly noted in lower abdomen
- Diarrhea is the next most frequent symptom and is present, at least intermittently, in about 85% of patients.
- In contrast to ulcerative colitis, patients with Crohn's disease typically have fewer bowel movements, & stools rarely contain mucus, pus, or blood



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- Weight loss occurs as a result of decreased oral intake, malabsorption, protein-losing enteropathy, and/or steatorrhea
  - malaise and fever are common
  - Anorectal ( abscess , fistula )
  - Extra intestinal manifestation include uveitis, pyoderma gangrenosum, erythema nodosum multiforme, arthritis, ankylosing spondylitis
  - Others like sepsis in case of bowel perforation or sepsis
  - IO in case of stricture
  - Recurrent UTI , pneumaturia or fecalourea in case of enterovesical fistula

# Diagnosis

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- Symptoms in presence of family history are suggestive
- Abd x ray in case of bowel obstruction
- CT scan : first imaging assessment of those patients in the setting of an acute abdomen, or it can be also applied to the reassessment of complications in patients with known Crohn disease.



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- CT Enteroclysis is superior to standard CT studies when assessing for small bowel Crohn disease and is equivalent to MR enterography
  - MR enterography (MRE) segmental mural hyperenhancement, oedema , bowel thickening , stricture
  - IOC for diagnosis of Crohn's disease: CT Enteroclysis

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- Long-standing Crohn's disease predisposes to cancer of small intestine & colon so surveillance are recommended
  - Endoscopy is crucial for determination of location and severity of disease as well as diagnostic biopsies



# Complication

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- Stricture
- Fistula – perianal , entero-enteric, entero-vesical and entero-cutaneous fistula
- IO
- Perforation
- Intra abdominal abscess
- Malignancy

# Treatment

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- Challenging
- Medical management is important to palliate symptoms, correct nutritional disturbances, and reduce inflammation.
- Including aminosalicylates, steroid , antibiotic
- infliximab (in sever cases )
- The choice based on the disease severity



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- . Inpatient treatment includes bowel rest, TPN, and IV glucocorticoids in case of fulminant disease .
  - Others azathioprine, 6- mercaptopurine, and methotrexate

# Surgical treatment

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- To treat the complication or in case of failure of the medical management



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# Question