

SMALL & LARGE INTESTINES

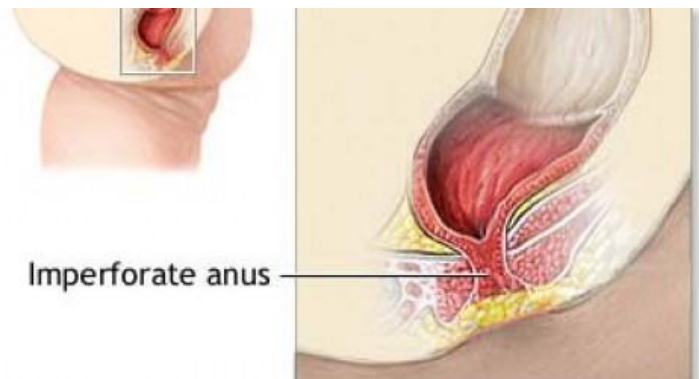
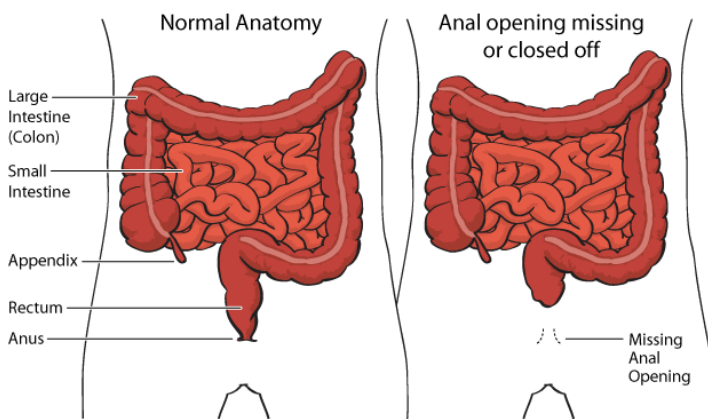
Inflammatory diseases, & tumors, affect both small & large intestines, therefore, the two organs are considered together

DEVELOPMENTAL ANOMALIES

➤ Atresia

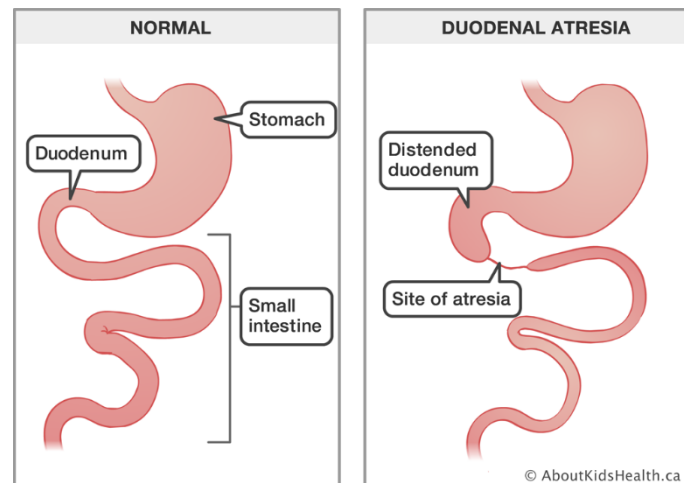
= No lumen = complete failure of development of the intestinal lumen, e.g., imperforated anus.

FORMS OF ANORECTAL MALFORMATION - FRONTAL VIEW



➤ Stenosis,

is incomplete obstruction = narrowing of the intestinal lumen, may affect any segment of the small intestine, but duodenal atresia is the most common.



➤ **Duplication**

usually takes the form of well-formed saccular to tubular cystic structures, which may or may not communicate with the lumen of the small intestine

(Mild smooth mucosal indentation due to the underlying duplication cyst. On the endoscopic ultrasound the duplication cyst classically demonstrates multiple layers of the bowel wall, clearly appreciable in this case.)

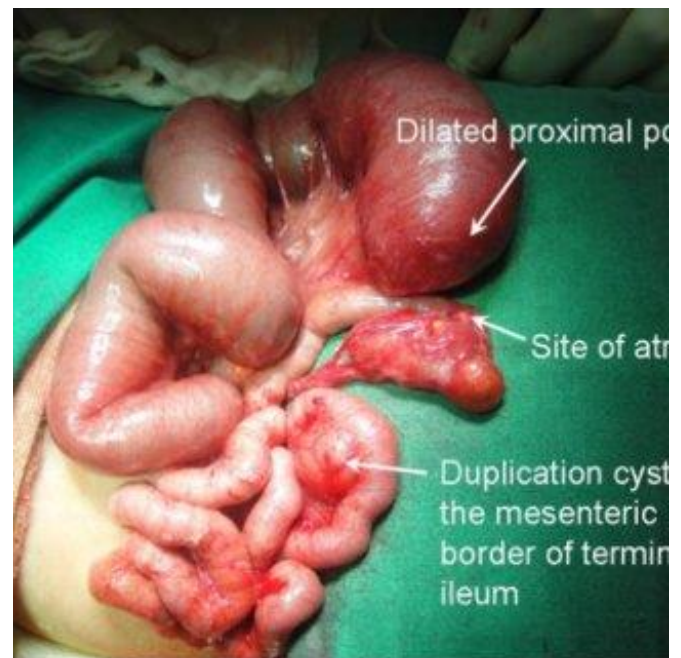
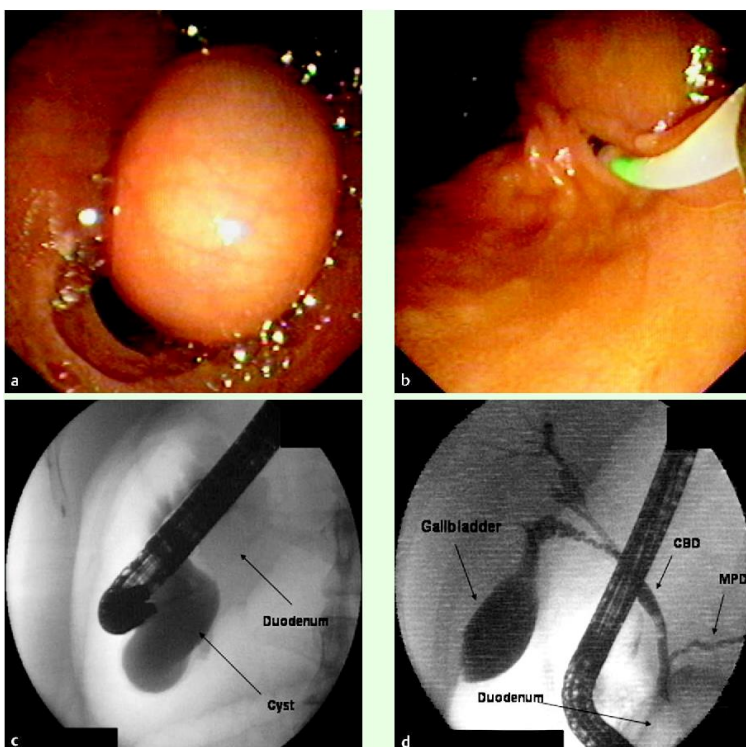
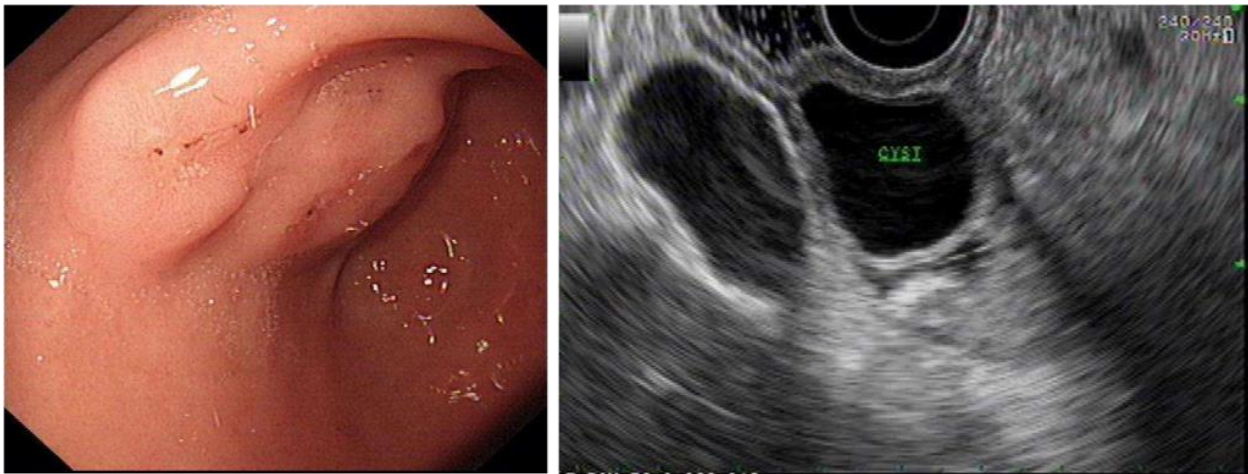


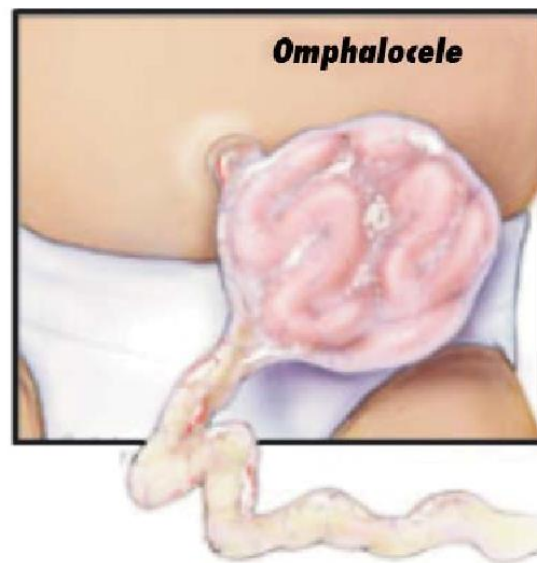
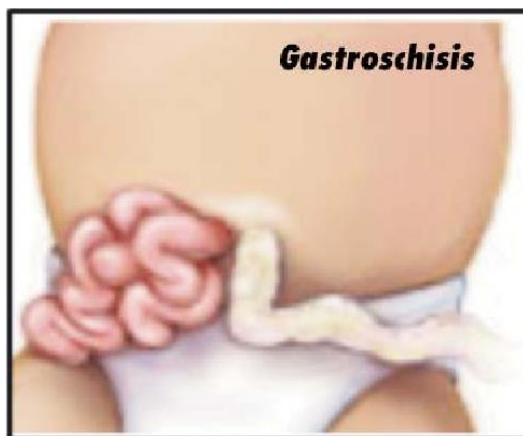
Fig. 1 Duodenoscopy revealed a cystic polypoid lesion protruding inside the duodenal lumen

➤ **Omphalocele**

is a congenital defect of the periumbilical abdominal musculature that creates a membranous sac, into which the intestines herniate.

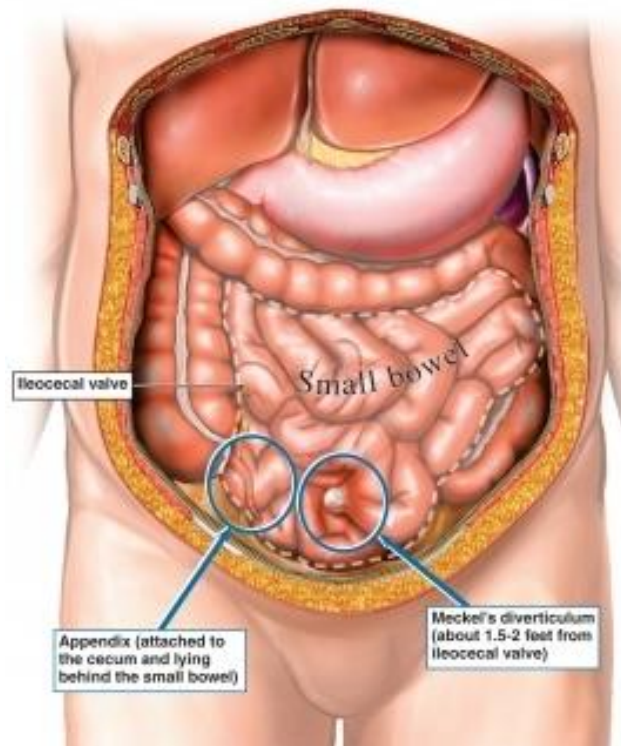
➤ **Gastroschisis**

is extrusion of the intestines caused by lack of formation of a portion of the abdominal wall.



➤ Meckel diverticulum

- Is the most common congenital anomaly {2% of births}



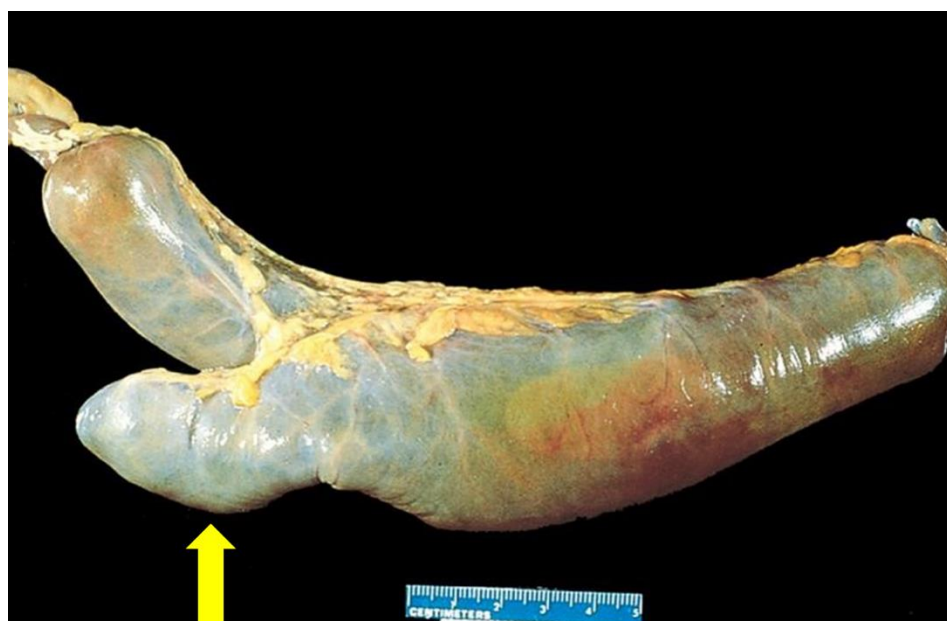
- It results from failure of involution of the omphalomesenteric duct, leaving a persistent blind-ended tubular protrusion as long as 5 to 6 cm (=2 Inches)
- The diameter is variable, sometimes approximating that of the small intestine itself. Located on the antimesenteric side of the small bowel, usually the ileum, about 2 feet proximal to the ileocecal valve & are composed of all layers of the normal small intestine (i.e., Meckel is a true diverticulum).

{ Remember; in 2% of births, 2 Inches in length, & 2 feet proximal to ilio-caecal valve}.

- Generally are asymptomatic,
except when they permit bacterial overgrowth that depletes vitamin B12,
producing a syndrome similar to pernicious anemia.
- Rarely, pancreatic rests are found in it &
- In 50% of cases there are heterotopic islands of functioning gastric mucosa.
Peptic ulceration in the adjacent intestinal mucosa sometimes is responsible
for mysterious intestinal bleeding or symptoms resembling acute appendicitis.
- Malrotation of the developing bowel can prevent the intestines from assuming
their normal intra-abdominal positions,
e.g., the caecum may be found anywhere in the abdomen, including the left
upper quadrant, rather than in its normal position in the right lower quadrant.
- Confusion may arise when appendicitis presents as left upper quadrant pain.
- The large intestine is predisposed to volvulus.

Meckle diverticulum.

The blind pouch is located on
the antimesenteric side of
the small bowel.



➤ Hirschsprung Disease: Congenital Megacolon

- Megacolon is distention of the colon to greater than 6 or 7 cm in $\bar{2}$,
- it occurs either as a congenital or acquired disorder.
- Hirschsprung D (congenital megacolon) results
when, during development, the migration of neural crest-derived cells along the GIT arrests at some point before reaching the anus.
- Hence, an aganglionic segment is formed that lacks both the Meissner submucosal & Auerbach myenteric plexuses.

This causes functional obstruction & progressive distention of the colon proximal to the affected segment.

Ganglia are absent from the muscle wall & submucosa of the constricted segment but may be present in the dilated portion.



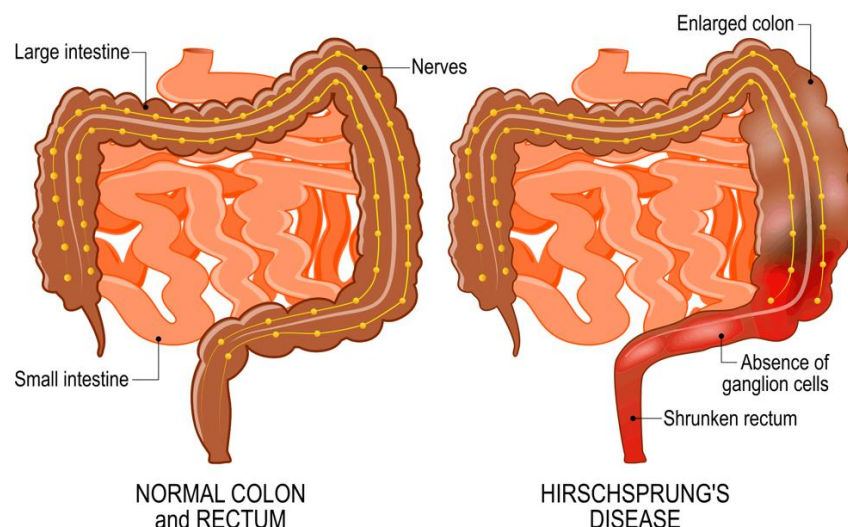
Hirschsprung Disease

Chair Persons : Dr. Aravind K L

Dr. Chandrakanth Madiwal

Department of Pediatric Surgery , MMCRI

Presenter : Dr. Vikas V



► **GROSSLY,**

(1) It is the proximal, properly innervated, ganglionic segment that undergoes dilation.

When only the distal colon is aganglionic, the proximal colon becomes massively distended up to a diameter of 15 to 20 cm.

The dilated wall may be thinned by distention, or, is thickened by compensatory muscle hypertrophy.

(2) The mucosal lining of the distended portion may be intact or have shallow, so-called stercoral ulcers produced by impacted, inspissated feces.

► **Clinically,**

- in most cases a delay occurs in the initial passage of meconium, followed by vomiting in 48 to 72 hours.
- When a very short distal segment of the rectum alone is involved, the obstruction may not be complete & may not produce manifestations until later in infancy, in the form of alternating periods of obstruction & passage of diarrheal stools.
- The principal threat to life is superimposed enterocolitis with fluid & electrolyte disturbances.

► **histologically,**

- the diagnosis is established by documenting the absence of ganglion cells in the nondistended bowel segment.
- H, the critical lesion in Hirschsprung disease
is the lack of ganglion cells, & of ganglia, in the submucosa & muscle wall of the affected collapsed segment (aganglionic segment)

- Hirschsprung D occurs 1 in 5000 to 8000 live births;
- It predominates in males, M/F is 4:1.
- It is much more frequent in those with other congenital anomalies like hydrocephalus, VSD, & Meckel diverticulum.

➤ Acquired megacolon may result from

(1) Chagas disease,
in which the trypanosomes directly invade the bowel wall to destroy the plexuses;

the other forms of megacolon are not associated with any deficiency of mural ganglia, including:

(2) Organic obstruction of the bowel by a tumor or inflammatory stricture,

(3) Toxic megacolon complicating ulcerative colitis or Crohn disease, or

(4) A functional psychosomatic disorder.

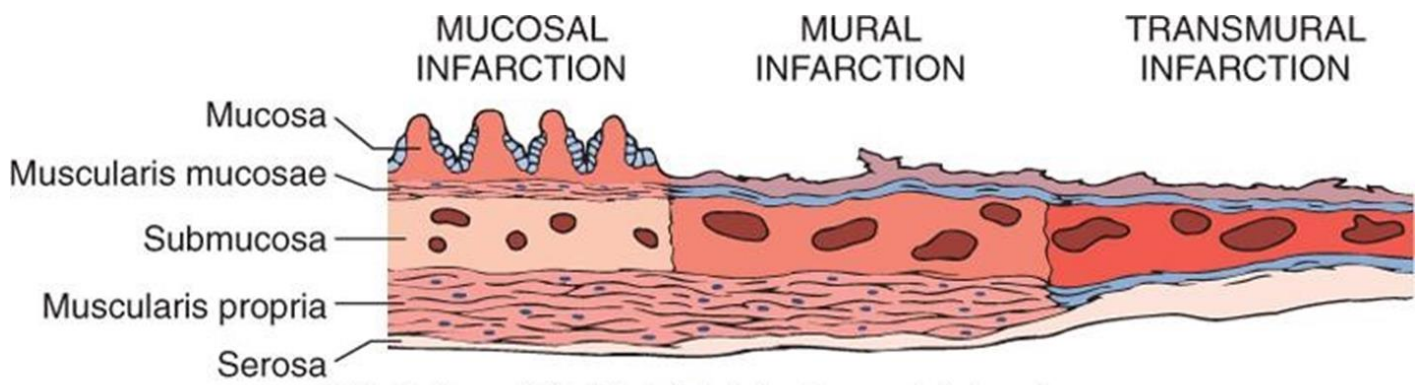
VASCULAR DISORDERS

Ischemic Bowel Disease

- Depending on the vessel or vessels involved, ischemic lesions may be restricted to the small or large intestine or, both.
- Acute occlusion of one of the three major supply trunks of the intestines; celiac, superior & inferior mesenteric arteries, may lead to infarction of extensive segments of intestine.
- However, insidious loss of one vessel may be without effect, Thanks God for the rich vascular anastomoses.
- Lesions within the end-arteries that penetrate the gut wall produce small, focal ischemic lesions.

(Infarcted small bowel, secondary to acute thrombotic occlusion of the superior mesenteric artery.)





(Acute ischemic bowel disease.

Note the three levels of severity, represented for the small intestine)

- the severity ranges from:

(1) Transmural infarction

- involving all gut layers,
- always caused by acute occlusion of a major mesenteric artery, to

(2) Mural infarction

- of the mucosa & submucosa,
- sparing the muscular wall, to

(3) Mucosal infarction,

- if the lesion extends not deeper than the muscularis mucosae,

- Both mural & mucosal infarctions are more often results from either

- physiologic hypoperfusion
- or more localized anatomic defects,
- & may be acute or chronic.

- Mesenteric venous thrombosis is a less frequent cause of vascular compromise.

► **GROSSLY,**

(1) Transmural intestinal infarction

- may involve a short or long segment, depending on the
 - particular vessel affected
 - & the patency of the anastomotic supply.

- Whether the occlusion is arterial or venous, the infarction always has a dark red hemorrhagic appearance because of reflow of blood into the damaged area (F15-23).

- The ischemic injury usually begins in the mucosa & extends outward; within 18 to 24 hours there is a thin, fibrinous exudate over the serosa.

- With arterial occlusion the demarcation from adjacent normal bowel is fairly sharply defined,
but with venous occlusion the margins are less distinct.

Histology,

- the Transmural infarction changes are typical of ischemic coagulative necrosis with marked edema, interstitial hemorrhage, & sloughing of the mucosa.
- Within 24 hours intestinal bacteria produce gangrene & sometimes perforation of the bowel.

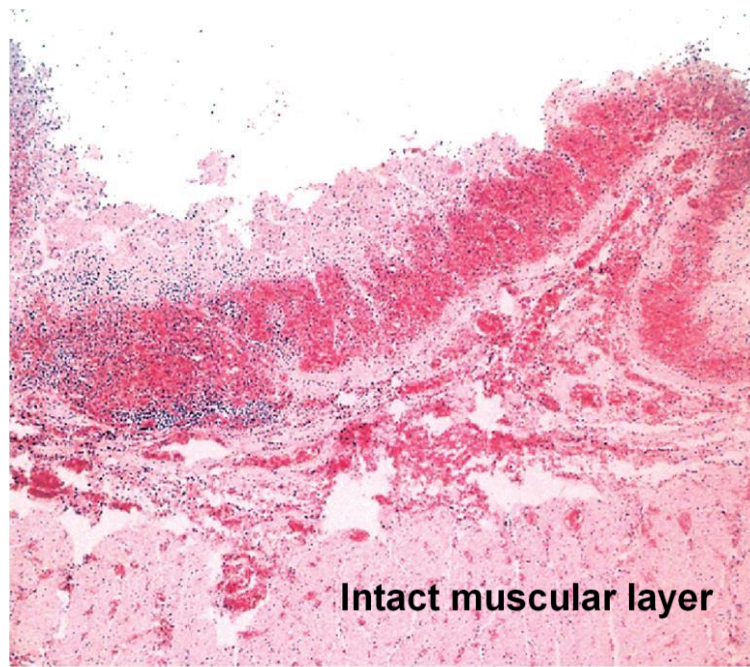
(2)Mural & (3) Mucosal infarctions

- are recognized by multi-focal lesions interspersed with spared areas.
- Their location depends in part on the extent of preexisting atherosclerotic narrowing of the arterial supply;
lesions can be scattered over large regions of the small or large intestines.
- Affected foci may or may not be visible from the serosal surface,
because by definition the ischemia does not affect the entire thickness of the bowel.
- When the bowel is opened, hemorrhagic edematous thickening of the mucosa, sometimes with superficial ulcerations, is seen

Histology,

- in mural & mucosal infarction there is hemorrhage, edema, & outright necrosis of the affected tissue layers
- Inflammation develops at the margins of the lesions,
- & an inflammatory fibrin-containing exudate (pseudomembrane), usually secondary to bacterial superinfection, may coat the affected mucosa.
- Alternatively, chronic vascular insufficiency may produce a chronic inflammatory & ulcerative condition, mimicking IBD.





(Mucosal infarction of the small bowel.

The mucosa is hemorrhagic, & there is no epithelial layer, The remaining layers of the bowel are intact.)

Clinical Features

- Ischemic bowel injury is most common seen in the elderly.
- With the transmural lesions, there is sudden severe abdominal pain, sometimes accompanied by bloody diarrhea.
- Because this condition may progress to shock & vascular collapse within hours, the diagnosis must be made promptly, & making it requires a high index of suspicion in the appropriate context (e.g., recent major abdominal surgery, atrial fibrillation, or vegetative endocarditis or recent MI).

Prognosis:

- The mortality rate with transmural infarction of the bowel approaches 90%, largely because of the short time between onset of symptoms & perforation caused by gangrene.
- By contrast, mural & mucosal ischemia may appear only as unexplained abdominal distention or GIT bleeding, sometimes accompanied by the gradual onset of abdominal pain or discomfort.
- Suspicion is raised if the individual has experienced conditions that favor acute hypoperfusion of the bowel,
i.e., episode of cardiac failure or shock.
- Mucosal & mural infarctions are not by themselves fatal, & indeed, if the cause of hypoperfusion can be corrected, the lesions may heal

- The predisposing conditions for all three infarctions are:

(1) Arterial thrombosis:

- severe atherosclerosis (usually at the origin of the mesenteric vessel),
- systemic vasculitis,
- dissecting aneurysm,
- angiographic procedures,
- aortic reconstructive surgery,
- surgical accidents,
- hypercoagulable states,
- & oral contraceptives

(2) Arterial embolism:

- cardiac vegetations (as with endocarditis),
- or MI with mural thrombosis,
- angiographic procedures,
- & aortic Atheroembolism.

(3) Venous thrombosis:

- hypercoagulable states induced, for example, by oral contraceptives or antithrombin III deficiency,
- intraperitoneal sepsis,
- the postoperative state,
- cancerous invasion of veins (particularly hepatocellular ca),
- cirrhosis,
- & abdominal trauma

(4) Nonocclusive ischemia:

-cardiac failure,

-shock,

dehydration,

-vasoconstrictive drugs (e.g., digitalis, vasopressin, propranolol),

(5) Miscellaneous:

- radiation injury,

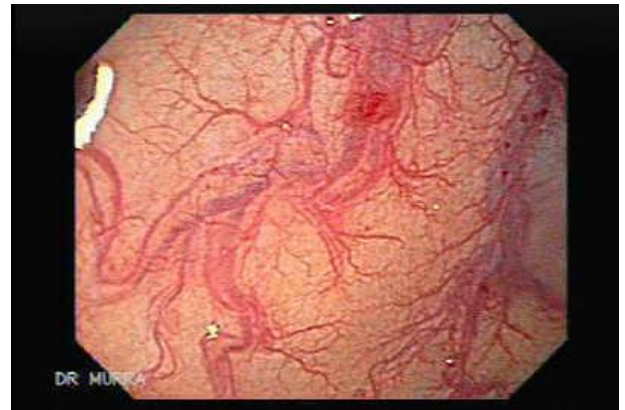
-volvulus,

-stricture,

- & internal or external herniation

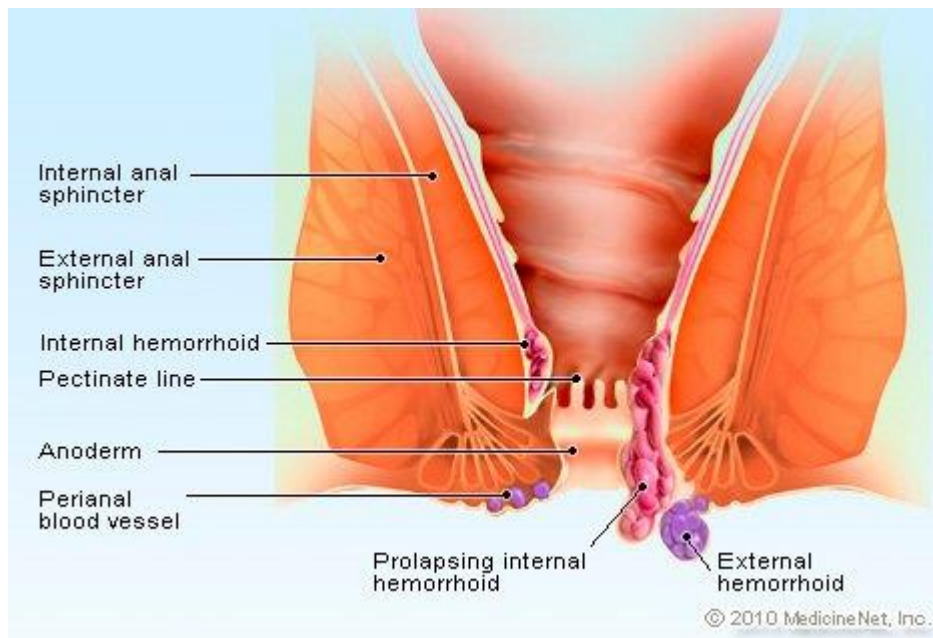
Angiodysplasia

- Tortuous dilations of mucosal & submucosal BV
- seen most often in the cecum or right colon,
- usually only after the 6th decade of life.
- They are prone to rupture & bleed into the lumen, accounting for 20% of significant lower intestinal bleeding.
- The hemorrhage may be chronic & intermittent & only, causing severe anemia; but rarely is it acute & massive.
- Most often, these lesions are isolated, but sometimes they are part of a systemic disorder such as hereditary hemorrhagic telangiectasia (Osler-Weber-Rendu syndrome).



Hemorrhoids

- Hemorrhoids are variceal dilations of the anal & perianal submucosal venous plexuses.
- They are common after age 50
- & develop in the setting of persistently elevated venous pressure within the hemorrhoidal plexus.
- Common predisposing conditions are:
 - straining at stool in the setting of chronic constipation
 - & the venous stasis of pregnancy in younger women.
- More rarely, hemorrhoids may reflect portal hypertension, usually resulting from liver cirrhosis.



- Hemorrhoids 2 types are:

(1) Internal hemorrhoids :

- are varicosities in the superior & middle hemorrhoidal veins,
- appearing above the anorectal line
- & are covered by rectal mucosa.

(2) External hemorrhoids

- are those that appear below the anorectal line,
- representing dilations of the inferior hemorrhoidal plexus
- & are covered by anal mucosa.

- Prolapse with strangulation of the internal hemorrhoids may occur during straining at stool & then become trapped by the compressive anal sphincter, leading to sudden, extremely painful, edematous hemorrhagic enlargement.

- Both 1 & 2 are thin-walled, dilated vessels that

-commonly Bleed,

{sometimes masking bleeding from far more serious malignant proximal lesions}.

- Sometimes they may become Thrombosed,

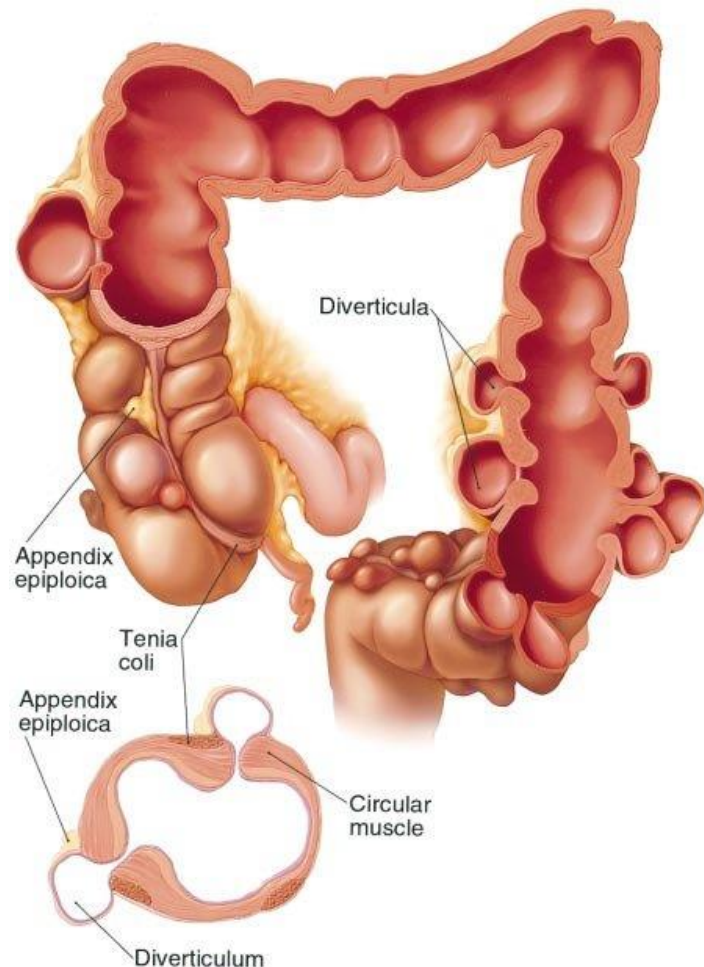
particularly when subject to trauma from passage of stool.

COLONIC DIVERTICULOSIS

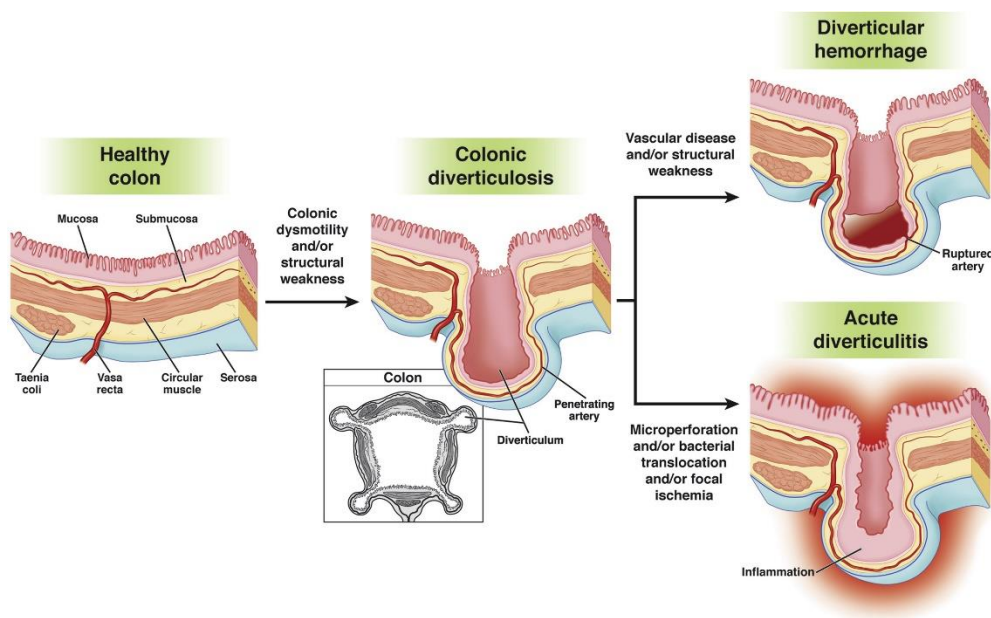
- A diverticulum is a blind pouch that communicates with the lumen of the gut.
- Congenital {Meckel} diverticula have all three layers of the bowel wall (mucosa, submucosa, & muscularis propria) & are distinctly uncommon.
- Virtually all other diverticula are acquired & either without, or, having an attenuated muscularis propria.
- Acquired diverticula may occur anywhere in the GIT, but by far, the most common location is the colon, giving rise to diverticular disease of the colon (diverticulosis); 95% of which are in the sigmoid colon.

- The colon is unique in that the outer longitudinal muscle coat is not complete, but is gathered into three equidistant bands (the taeniae coli).
- Focal defects in the muscle wall are created where nerves & arterial vasa recta penetrate the inner circular muscle coat alongside the taeniae.

The connective tissue sheaths accompanying these penetrating vessels provide potential sites for herniations.



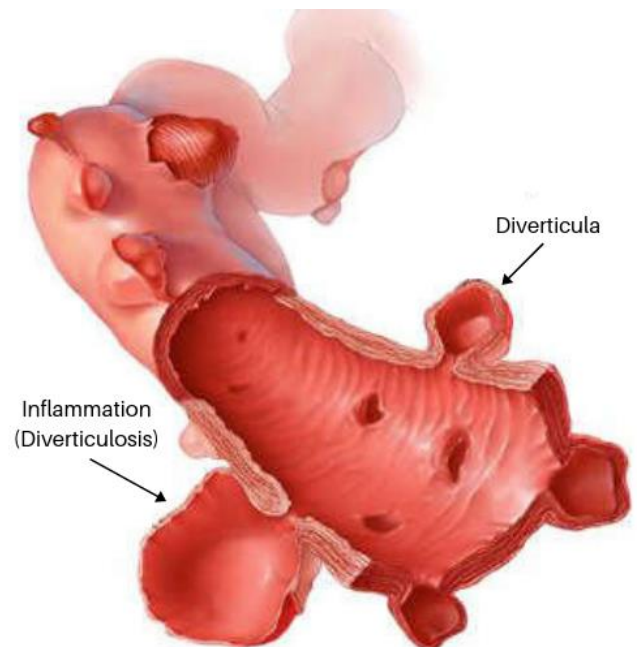
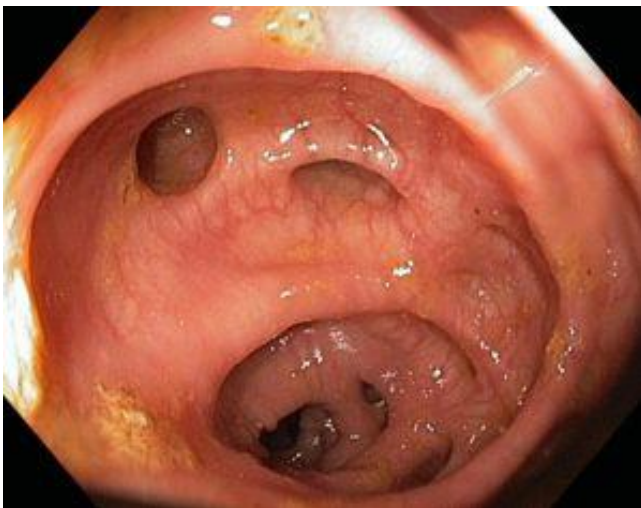
- Colonic diverticulosis is relatively infrequent in native populations of non-Western countries.
- Although unusual in Western adults younger than 30 years of age, in those older than the age of 60 the prevalence approaches 50%.
- This high prevalence is attributed to the consumption of a refined, low-fiber diet in Western societies, resulting in reduced stool bulk with increased difficulty in passage of intestinal contents.
- Exaggerated spastic contractions of the colon result in segmentation (isolate segments of the colon in which the intraluminal pressure becomes markedly elevated), with consequent herniation of the bowel wall through the anatomic points of weakness.



- Thus, two influences are important in the genesis of diverticular protrusions:
- (1) Exaggerated peristaltic contractions with abnormal elevation of intraluminal pressure &
 - (2) Focal defects of the normal muscular colonic wall.

► GROSSLY

- Most colonic diverticula are small, flasklike or spherical outpouchings, usually 0.5 to 1 cm
- located in the sigmoid colon in 95% of patients.
- The exaggerated peristalsis often induces taenia coli & circular muscular hypertrophy in the affected segments.
- Diverticula frequently dissect into the appendices epiploicae & therefore may be inapparent on external inspection
- In the uninflamed state the walls are usually very thin, made up largely of mucosa & submucosa enclosed within fat or an intact peritoneal covering
- Inflammatory changes may supervene to produce both diverticulitis & peridiverticulitis; perforation of which may lead to localized peritonitis or abscess formation.
- When many closely adjacent diverticula become inflamed, the bowel wall may be encased by fibrous tissue, with narrowing of the lumen, producing a remarkable resemblance to a malignant stricture.

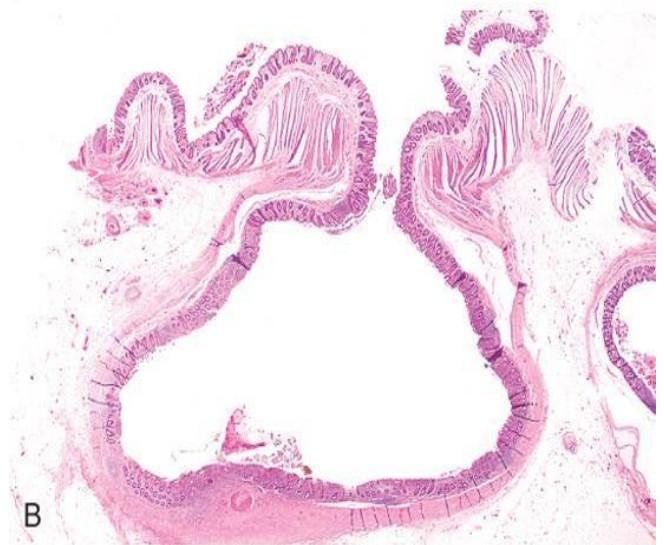


Diverticulosis.

A, Sigmoid colon section showing multiple saclike diverticula protruding through the muscle wall into the mesentery. The muscularis between the diverticular protrusions is markedly thickened.



B, LP of colonic diverticulum showing protrusion of the mucosa & submucosa through the muscular wall. A dilated blood vessel (arrow) at the base of the diverticulum was a source of bleeding



Clinically,

diverticular disease is mostly, asymptomatic.

In 20% of patients there is intermittent cramping or discomfort.

Complications:

(1) superimposed diverticulitis accentuates the symptoms & produces left lower quadrant tenderness & fever.

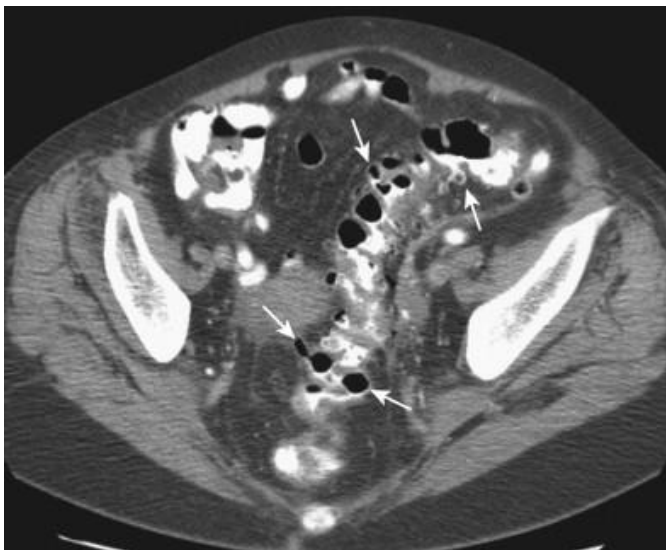
Other rare complications include brisk

(2) hemorrhage,

(3) perforation with pericolic abscess, or fistula formation.

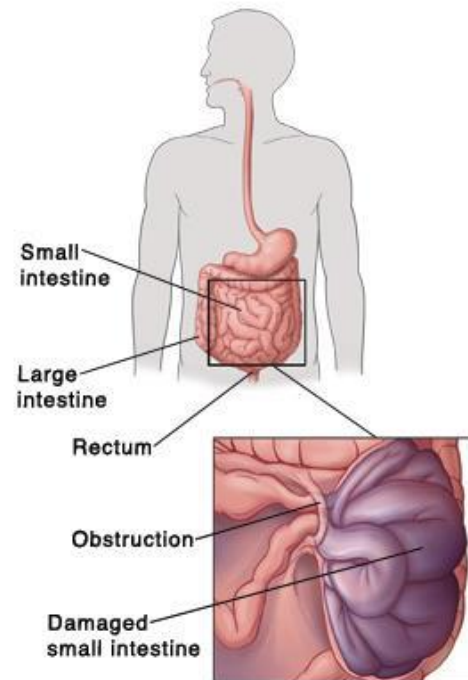
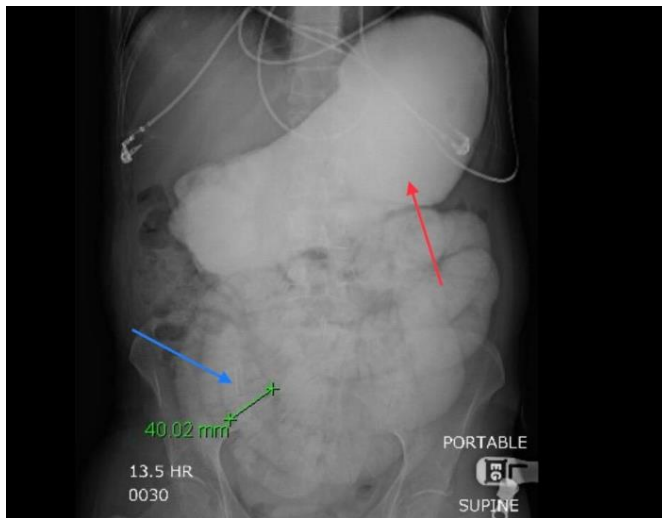
Treatment

is by a high-fiber diet, recommended on the theory that the increased stool bulk & decreased the exaggerated peristalsis.



BOWEL OBSTRUCTION

- Although any part of the gut may be involved, because of its narrow lumen, *the small bowel* is most commonly affected.



Small bowel obstruction can lead to tissue damage and even tissue death.

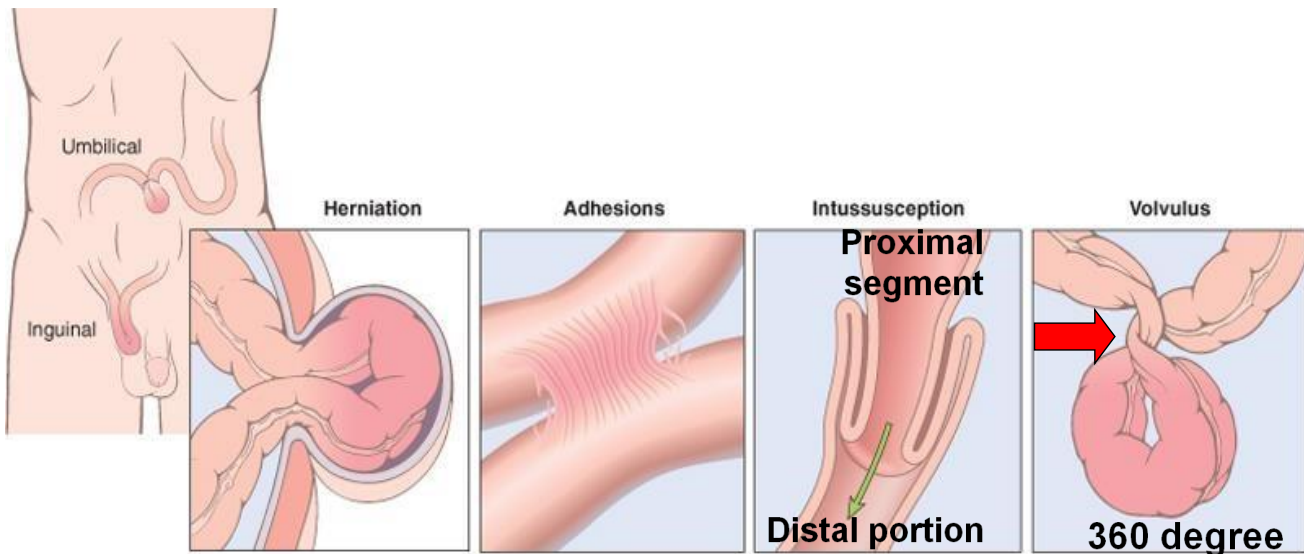
4 major Causes of Intestinal Obstruction are mechanical,

- internal or external Hernias
- Adhesions
- Intussusception
- Volvulus

accounting for at least 80% of the cases

The four major causes of intestinal obstruction:

- (1)Herniation of a segment in the umbilical or inguinal regions,
- (2)Adhesions between intestinal loops,
- (3) Intussusception,



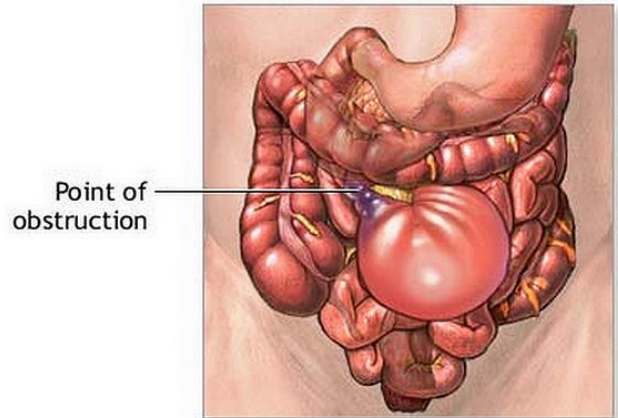
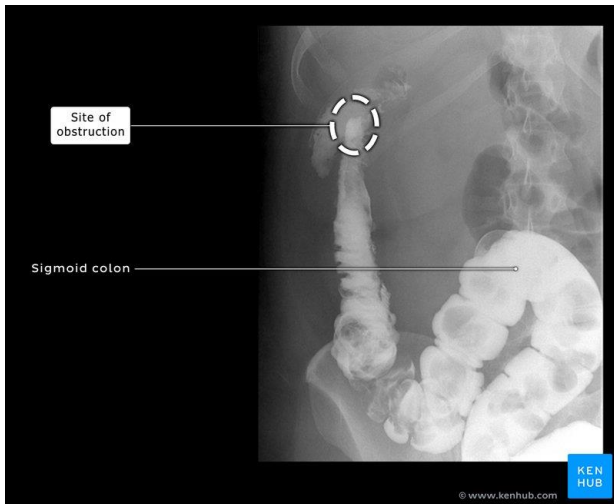
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(4) Volvulus.

Less Frequent Causes:

- Tumors,
- Inflammatory strictures,
- Obstructive gallstones
- fecaliths,
- foreign bodies,
- Congenital stricture or bands
- atresias,
- imperforate anus,

- Meconium in cystic fibrosis.



Acute obstruction: ileum.

A large gall-stone is impacted in the terminal ileum. The proximal segment of the gut is dilated & the distal portion collapsed.

The source of the gallstone was a chronic fistulous connection between the gall bladder & the duodenum {cholecystoduodenal fistula}.

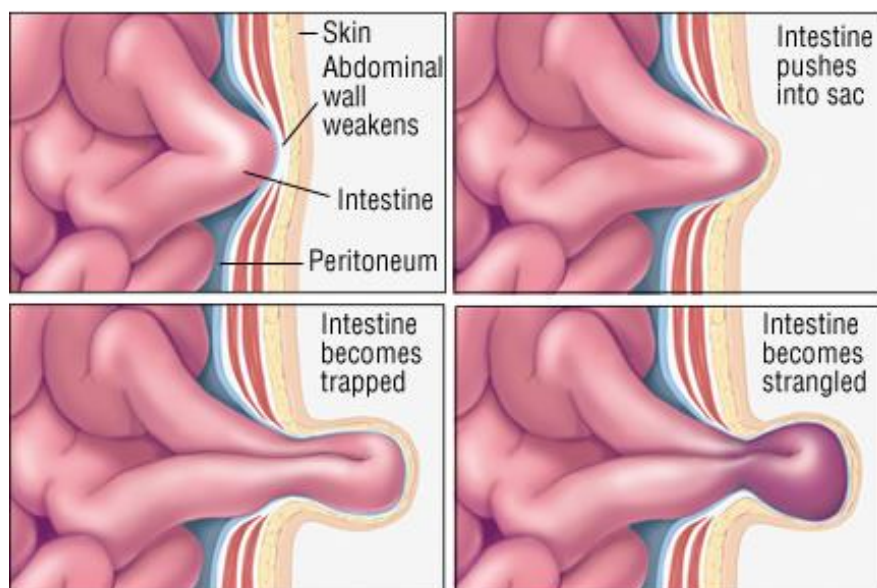
**Dilated
Proximal
segment**



Co

➤ **1)Hernias:**

- when there is a weakness or defect in the wall of the peritoneal cavity, it may permit protrusion of a pouchlike, serosa-lined sac of peritoneum, which is called a hernial sac.
- The usual sites of weakness are:
 - anteriorly at the inguinal & femoral canals
 - at the umbilicus
 - in surgical scars.
- Segments of viscera, mostly small bowel loops , or portions of omentum or large bowel, frequently intrude & become trapped in hernias (external herniation), particularly in the inguinal hernias, which have narrow orifices & large sacs.
- Pressure at the neck of the hernial sac may :
 - Impair venous drainage of the trapped viscus causes stasis & edema, increasing the bulk of the herniated loop, leading to
 - incarceration, i.e.; permanent trapping which further compromise its blood supply & drainage, leading to
 - strangulation of the trapped segment, i.e.; Infarction.



- Surgical procedures, infection, & even endometriosis often cause localized or general peritonitis. With healing...

Strangulated hernia: small intestine.

Surgically resected gangrenous segment of small intestine,

which was incarcerated in an inguinal hernial sac, followed by strangulation (obstruction to the venous return) producing congestion & edema culminating in arterial obstruction, infarction & gangrene

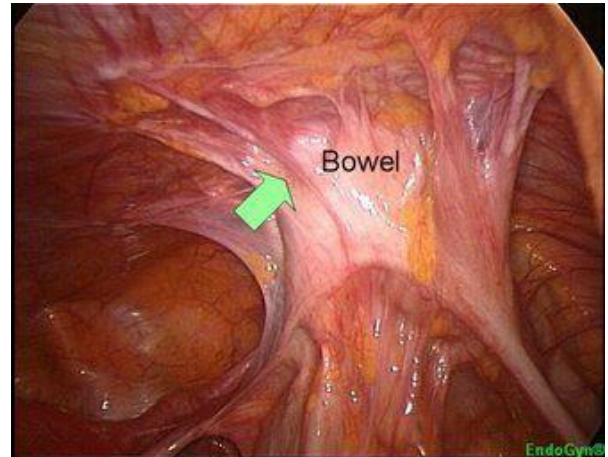


4.29 Strangulated hernia: small intestine

➤ (2) Adhesions

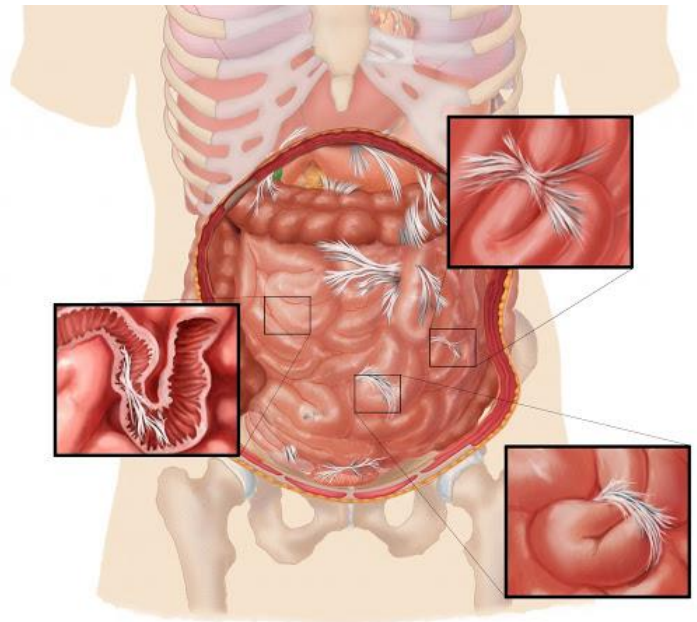


Adhesions on a loop of small bowel.
<http://library.med.utah.edu/WebPath/GIHTML/GI030.html>

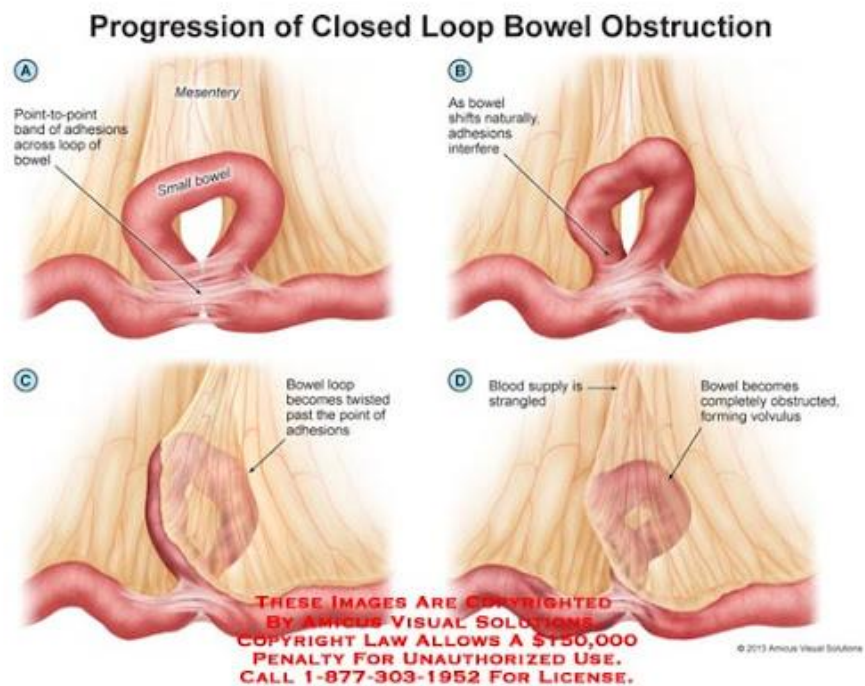


➤ (2) Adhesions

- may develop between the bowel segments or with the abdominal wall or the operative site.
- These fibrous bridges can create closed loops (rings) through which the intestines may slide & become trapped (internal herniation)

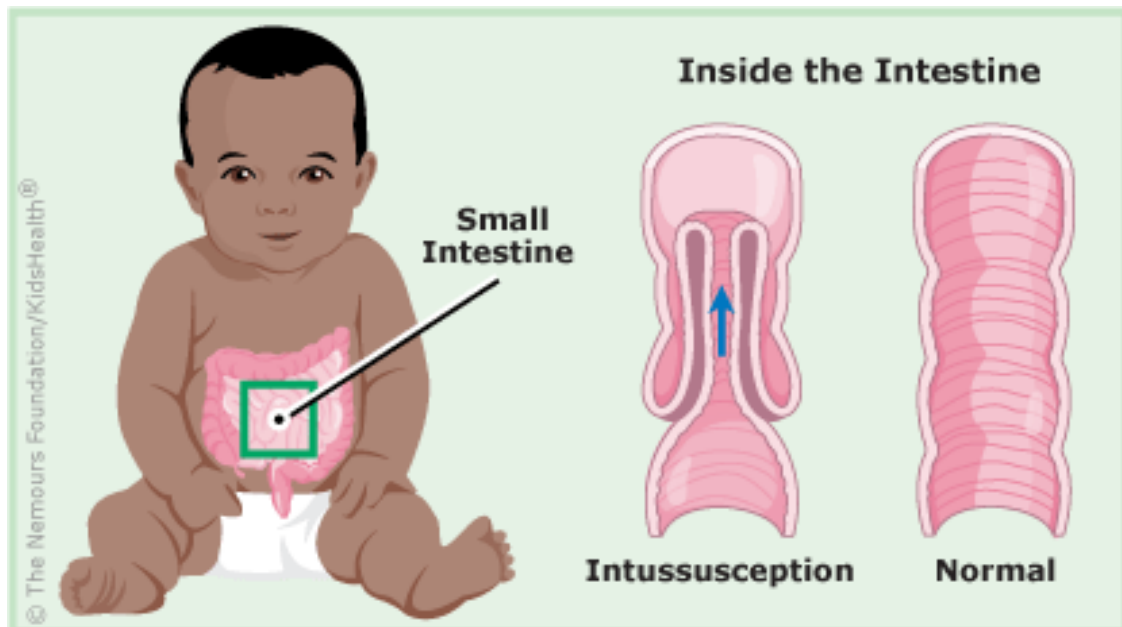


- The sequence of events is the same as with external hernias



➤ (3) Intussusception

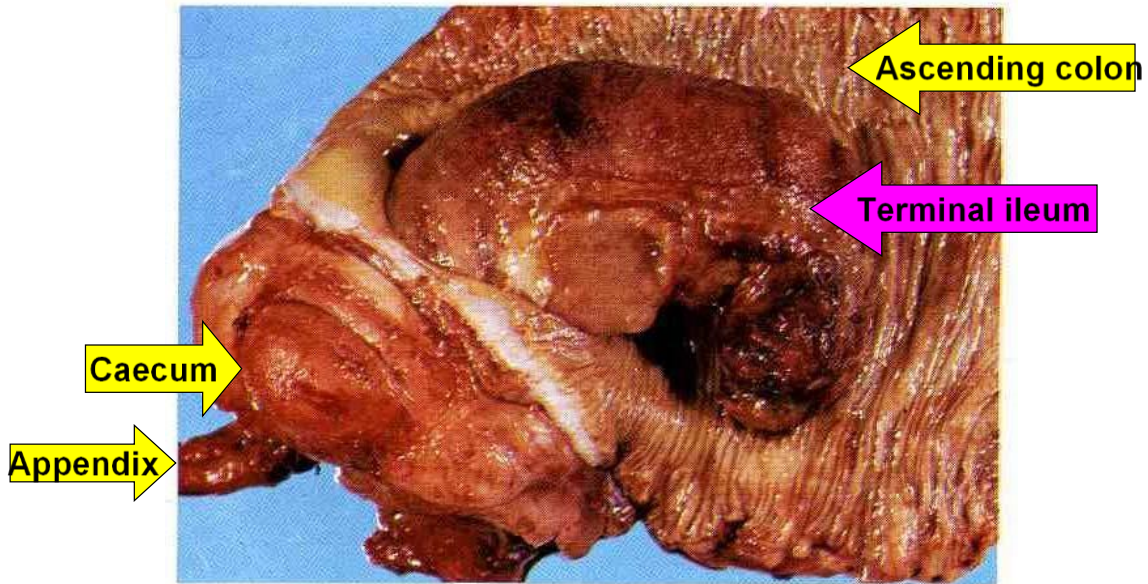
- means telescoping of a proximal segment of the bowel into the immediately distal segment.
- In infants & children, intussusception sometimes occurs without apparent cause.
- While in adults, such telescoping often points to an intraluminal mass (e.g., tumor) that becomes trapped by a peristaltic wave & pulls its point of attachment along with it, into the distal segment.
Not only does intestinal obstruction ensue, but the vascular supply may be so compromised as to cause infarction of the trapped segment. (Treatment ?)



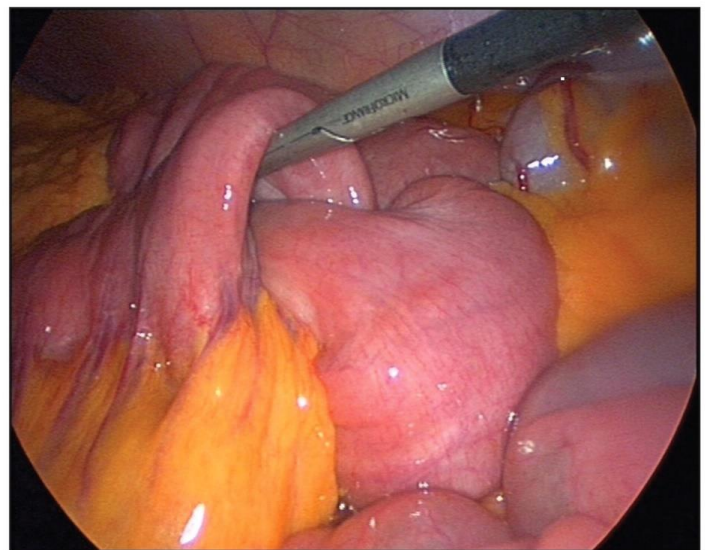
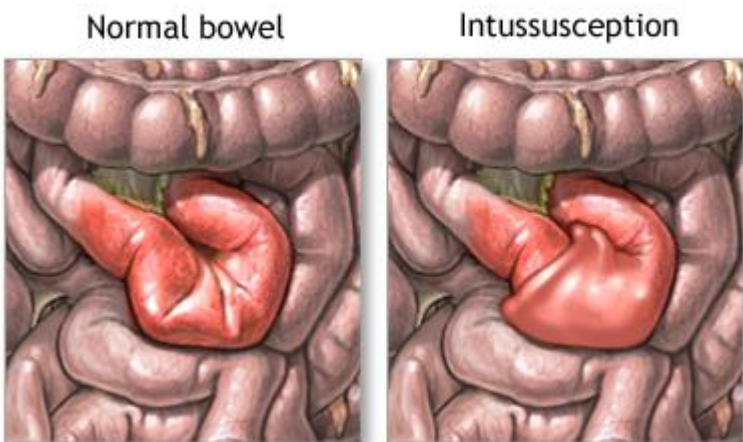
Intussusception: ileo-colic.

The terminal ileum has intussuscepted into the caecum & ascending colon, forming a red, tumor-like mass with a granular swollen surface.

The caecum & appendix being visible to the left

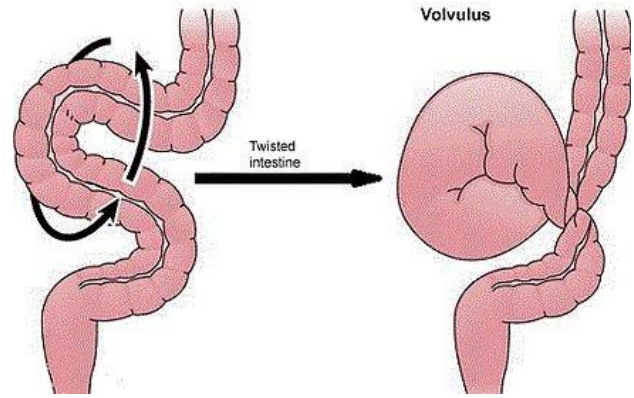


4.27 Intussusception: colon

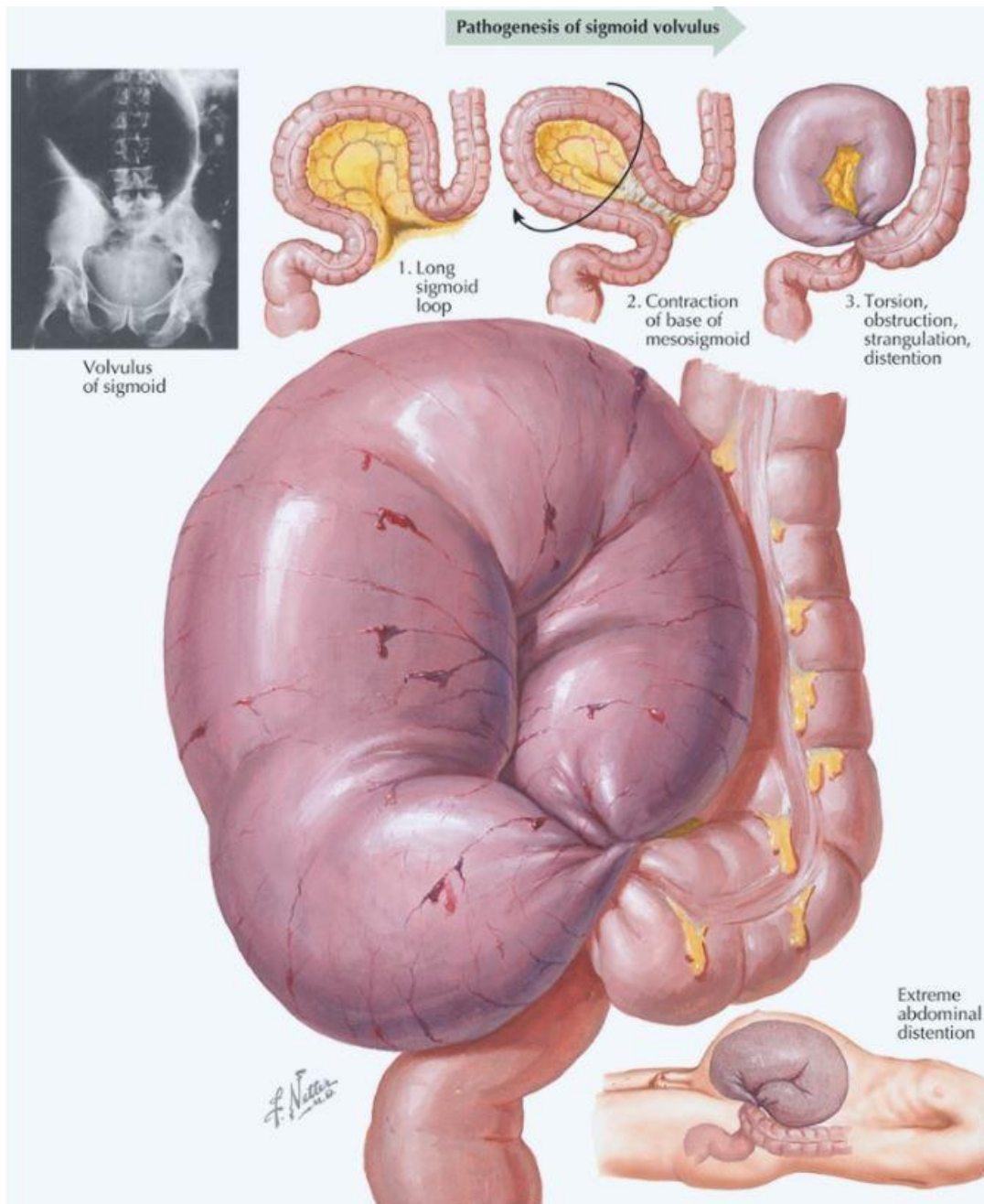


➤ **4) Volvulus**

- refers to 360 degree twisting of a loop of bowel (or other structure e.g., ovarian cyst or tumor) about its base of attachment constricting the venous outflow & sometimes the arterial supply as well.



- Volvulus affects the small bowel most often & rarely the redundant sigmoid.
- Intestinal obstruction & infarction may follow



: Gangrenous infarction of small intestine as a result of volvulus, i.e., twisting of a loop of intestine upon itself through 360 degree, a process which obstructs the intestine & interferes with its blood supply. The gangrenous, bluish-black small intestinal coils are greatly distended



Malabsorption Syndrome

- Is defective absorption of fats, fat-soluble & other vitamins, proteins, carbohydrates, electrolytes & minerals, & water.
- The most common presentation is chronic diarrhea;
- the ® hallmark of malabsorption syndromes is steatorrhea (excessive fat content of the feces).
- The most common malabsorptive disorders encountered in the US are
 - pancreatic insufficiency,
 - celiac disease
 - Crohn disease.

- Basically, malabsorption is the result of disturbance of at least one of these normal digestive functions:

(1) Intraluminal digestion,

- in which carbohydrates, proteins, & fats are enzymatically broken down.
- The process begins in the mouth with saliva, receives a major boost from gastric peptic digestion,
- & continues in the small intestine,
- assisted by pancreatic enzyme secretion & the emulsive action of bile.

(2) Mucosal absorption

- in which water, electrolytes, & nutrients are absorbed & transported into the cell.
- Absorbed fatty acids are converted to triglycerides & are assembled with + cholesterol & + apoprotein B into = chylomicrons.
- Disturbances can be caused by:
 - (1) primary mucosal cell abnormalities or
 - (2) reduced small intestinal surface area or
 - (3) from mucosal infections.

(3) Nutrient delivery,

- involving the delivery of nutrients from the intestinal cells into the lymphatics. --
- Disturbances may be caused by:
 - (1) congenital defects,
 - (2) or be secondary to tuberculosis
 - (2) or retroperitoneal fibrosis.

The Major Malabsorption Syndromes

- Here we give some examples of the most common malabsorption syndromes caused by defects in either intraluminal digestion or mucosal absorption.

Crohn disease is discussed later.

(في كلام لقدام)

1. Defective Intraluminal Digestion

- Digestion of fats & proteins:

-Pancreatic insufficiency, due to pancreatitis or cystic fibrosis

-Zollinger-Ellison syndrome, with inactivation of pancreatic enzymes by excess gastric acid secretion

- Solubilization of fat, due to defective bile secretion,

-hepatic dysfunction,

-Biliary obstruction, resulting in cessation of bile flow,

-Ileal dysfunction or resection, with \downarrow bile salt uptake,

- Nutrient preabsorption or modification by bacterial overgrowth

- Distal ileal resection or bypass,

- Total or subtotal gastrectomy

2. Primary Mucosal Cell Abnormalities:

- Defective terminal digestion
 - Disaccharidase deficiency (lactose intolerance)
 - Bacterial overgrowth, with brush-border damage
- Defective transepithelial transport → Abetalipoproteinemia

3. Reduced Small Intestinal Surface Area

- Celiac disease
- Crohn disease
- Short-gut syndrome, after surgical resections

4. Infections

- Acute infectious enteritis
- Parasitic infestation
- Tropical sprue
- Whipple disease

5. Lymphatic Obstruction

- Lymphoma
- Tuberculosis & tuberculous lymphadenitis

Defects of Intraluminal Digestion

- Typical features of defective intraluminal digestion are:
an osmotic diarrhea from undigested nutrients, & steatorrhea (excess output of undigested fat in the stool).
- the latter can arise either from inadequate action of pancreatic lipases or from inadequate solubilization of fat by hepatic bile secreted into the gut lumen.

- The most common causes are :

1-pancreatic insufficiency associated with chronic alcoholism

2- Crohn disease.

Other causes are :

3-intestinal bacterial overgrowth,

4- cholestatic liver disease,

& surgical procedures such as

5- extensive ileal resection

6- & gastrojejunostomy.

Defects of Mucosal Absorption

Lactose intolerance

- Lactose intolerance is caused by the deficiency of disaccharidase (lactase).
- The inherited form is rare but is of great consequence, because in infants it produces milk intolerance, leading to diarrhea, weight loss, & failure to thrive.
- The acquired deficiency is common among adults, particularly North American blacks.
- Aside from the need to avoid milk products, the disorder is of minimal consequence.
- The intestinal mucosa is morphologically normal.

▼ Diagnosis

is made by measurement of breath hydrogen level, which reflects bacterial overgrowth in the presence of excess intraluminal carbohydrate.

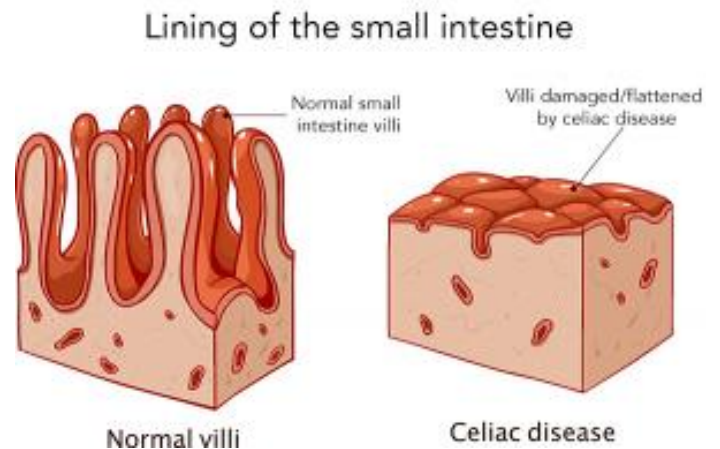
Deficiency of apolipoprotein B

- Apolipoprotein B is the protein required for the assembly of dietary lipids into chylomicrons, which are then secreted into intestinal lymphatics. In the case of abetalipoproteinemia, the mucosal epithelial cell is unable to export lipid.
- In this disease, mucosal absorptive cells contain vacuolated lipid inclusions, but the mucosa is otherwise normal. This deficiency causes diarrhea & steatorrhea in infancy & significant failure to thrive.

Reduced Small Intestinal Surface Area

Celiac disease (Gluten-sensitive enteropathy)

- Is a noninfectious cause of malabsorption resulting from a reduction in small intestinal absorptive surface area.



- Celiac disease is believed to be quite common, affecting about 1 in 300 persons both in Europe & in the US (1 Million in US), & many patients have subclinical disease.
- The basic disorder in celiac disease is immunological sensitivity to gluten, the component of wheat & related grains (oat, barley, & rye) that contains the water-insoluble protein gliadin.
- Gliadin peptides are efficiently presented by antigen presenting cells in the lamina propria of the small intestine to CD4+ T cells, thereby driving an immune response to gluten.
- There is hence a strong genetic susceptibility, with 95% of patients having an HLA DQ2 haplotype & the remainder having HLA-DQ8.

- When the small intestinal mucosa exposed to gluten, it accumulates intraepithelial CD8+ T cells & large numbers of lamina propria CD4+ T cells sensitized to gliadin.
- The intestinal pathology may result from epithelial cell stress, perhaps induced by gliadin sensitivity, & CD8+ T cell-mediated killing of these epithelial cells.
- The effect of the immune response is...
Total flattening of mucosal villi (& hence loss of surface area), affecting the proximal more than the distal small intestine, with lymphocytic & plasma cell infiltration in the lamina propria.
- Age of presentation, with symptomatic diarrhea & malnutrition, varies from infancy to mid-adulthood;
- Removal of gluten from the diet is met with dramatic improvement.
- There is a low, long-term risk of malignant disease, with about a twofold increase over the usual rate of Intestinal lymphomas and other malignancies include GI & breast carcinomas
- In some patients with celiac disease there is an associated skin disorder called dermatitis herpetiformis.

Infections

Tropical sprue

- Resembles celiac disease in symptomatology, but occurs almost exclusively in persons living in or visiting the tropics.
- No specific causal agent has been clearly identified, but the appearance of malabsorption within days or few weeks of an acute diarrheal enteric infection strongly implicates an infectious process, as does the Prompt response to broad-spectrum antibiotic therapy!
- Small intestinal changes vary: from near normal to severe diffuse enteritis with villus flattening.
- In contrast to celiac disease, injury is seen at all levels of the small intestine, proximal and distal.

Whipple disease

- Is a rare systemic infection that may involve any organ of the body but principally affects the intestine, CNS, & joints.
- The ® hallmark of Whipple disease is a small intestinal mucosa laden with distended PAS-positive macrophages in the lamina propria.
- The causal organism is a gram-positive & culture-resistant actinomycete, *Tropheryma whippelii*.
- Affecting principally males in the 4th to 5th decades of life, Whipple disease causes a malabsorptive syndrome.
- Response to antibiotic therapy is usually prompt, but relapses are common.

► **CLINICALLY,**

All the malabsorption syndromes resemble each other:

- ® Steatorrhea,
the passage of abnormally bulky, frothy, greasy, yellow or gray stools is a prominent feature of malabsorption,

accompanied by:

- weight loss,
- anorexia,
- abdominal distention,
- borborygmi & flatus,
- & muscle wasting.

The consequences of malabsorption affect many organ systems:

•*Hematopoietic system:*

- anemia

from iron, pyridoxine, folate, or vitamin B12 deficiency (vitamin B12 is normally absorbed in the ileum)

- bleeding

from vitamin K deficiency (a fat-soluble vitamin).

•*Musculoskeletal system:*

- osteopenia & tetany

from defective calcium, magnesium, vitamin D, & protein absorption.

•*Endocrine system:*

-amenorrhea,
-impotence,
- & infertility;
from generalized malnutrition

-hyperparathyroidism
from protracted calcium & vitamin D deficiency

•*Skin:*

- purpura & petechiae
from vitamin K deficiency;

- edema
from protein deficiency;

-dermatitis & hyperkeratosis
from deficiencies of vitamin A (fat soluble), zinc, essential fatty acids, & niacin;

-mucositis
from vitamin deficiencies.

•*Nervous system:*

-peripheral neuropathy
from vitamin A & B12 deficiencies