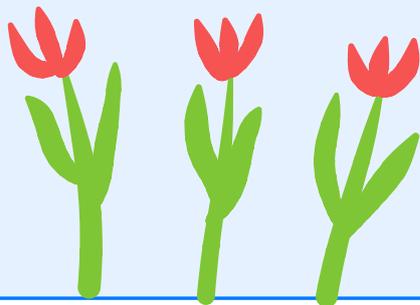


تبييض مخاطرة

Small intestine

د. سعد العزاوي

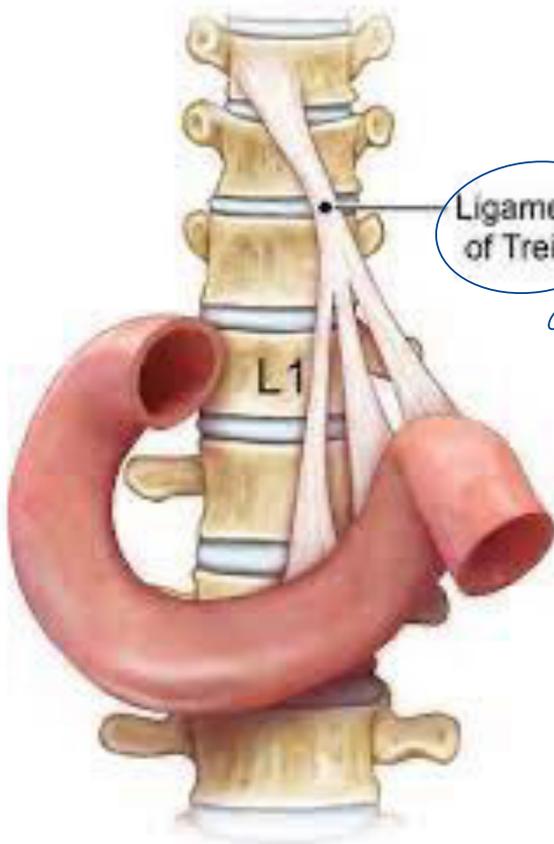
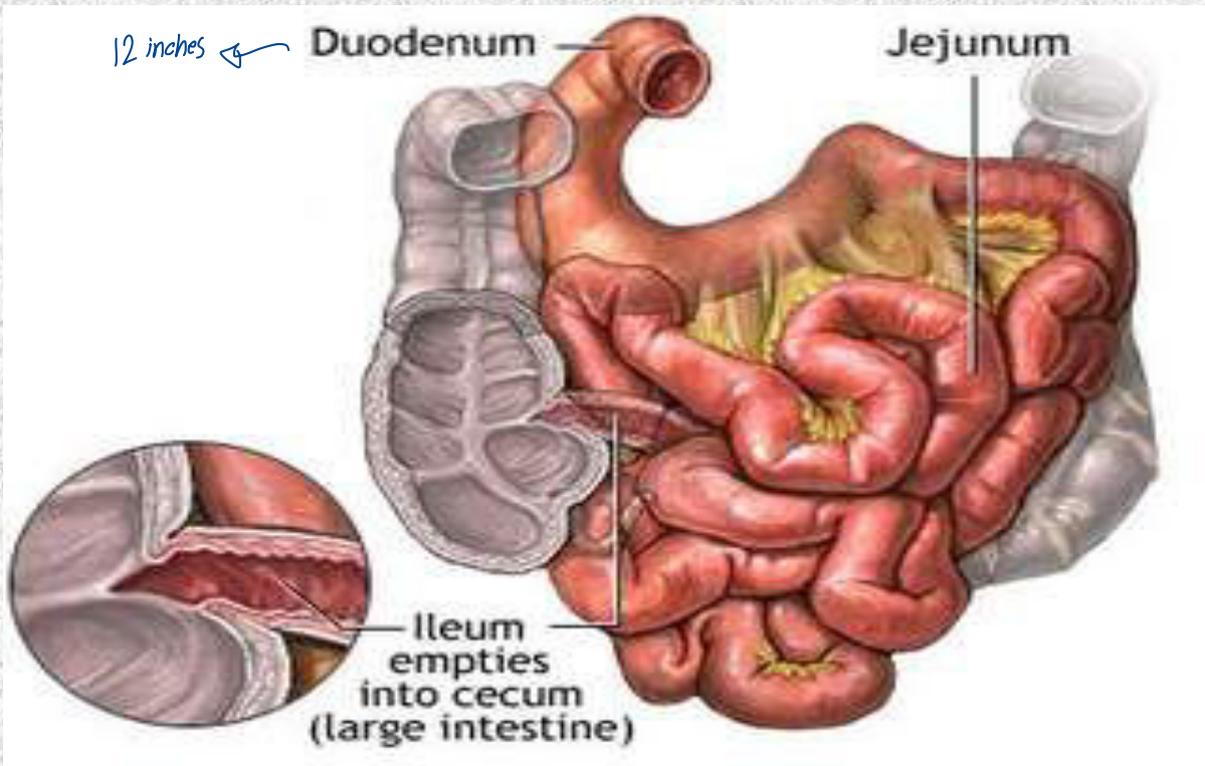
Done by :



(duodenum
Jejunum, ileum)

SMALL INTESTINE

→ 6 meters



Ligament of Treitz

→ Marks the end of the duodenum & the start of the jejunum

SURGICAL ANATOMY

→ **Retroperitoneal structure**

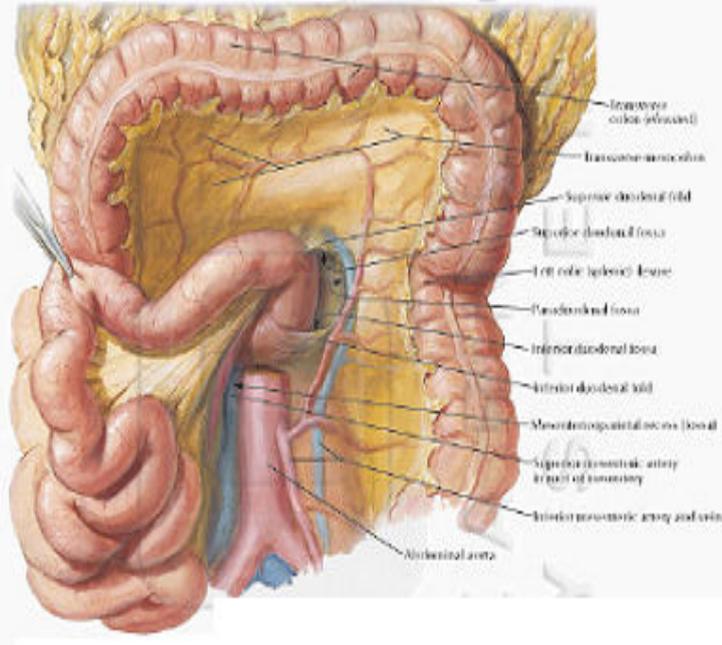
* The **duodenum** has 4 parts: superior, descending, horizontal, and ascending

* Except for its first part, the duodenum is largely retroperitoneal it has no mesentery and is covered by peritoneum only on its anterior surface.

* **Jejunum** completely intraperitoneal

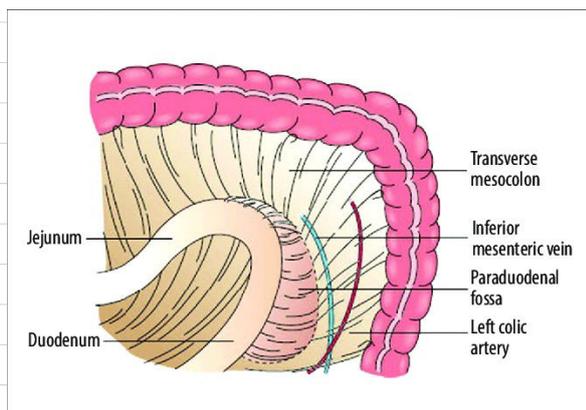
* The B. supply of small intestine by sup. Mesenteric artery

Mesenteric Relations of Intestines



* The reflexion of peritoneum over the duodenum then completely encircle the Jejunum

→ **Paraduodenal fossa**



May be loops of small bowel enter this fossa & make obstruction

① (one of the most common causes of intestinal obstruction)

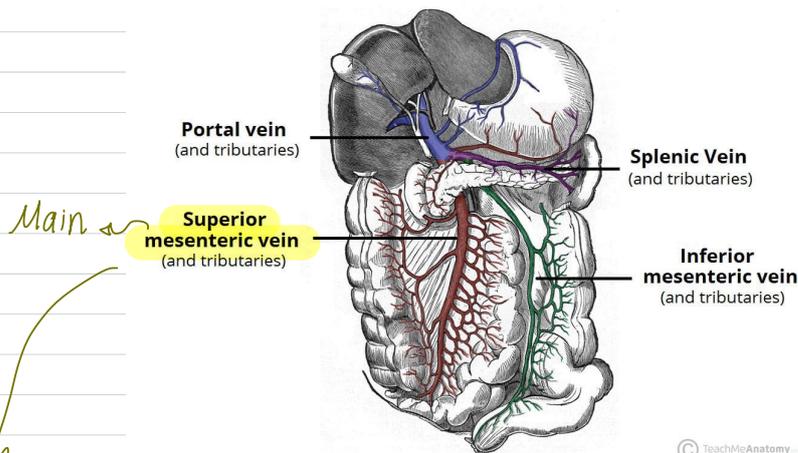
&

② (site for internal hernia)

* The duodenum is fixed because it is completely covered by parietal peritoneum

* **Jejunum, ileum** → freely mobile
→ site of volvulus & torsion

blood supply



(from second part of duodenum to the distal third part of Transverse Colon)

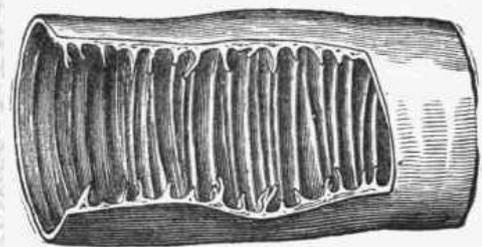
Clinical anatomy

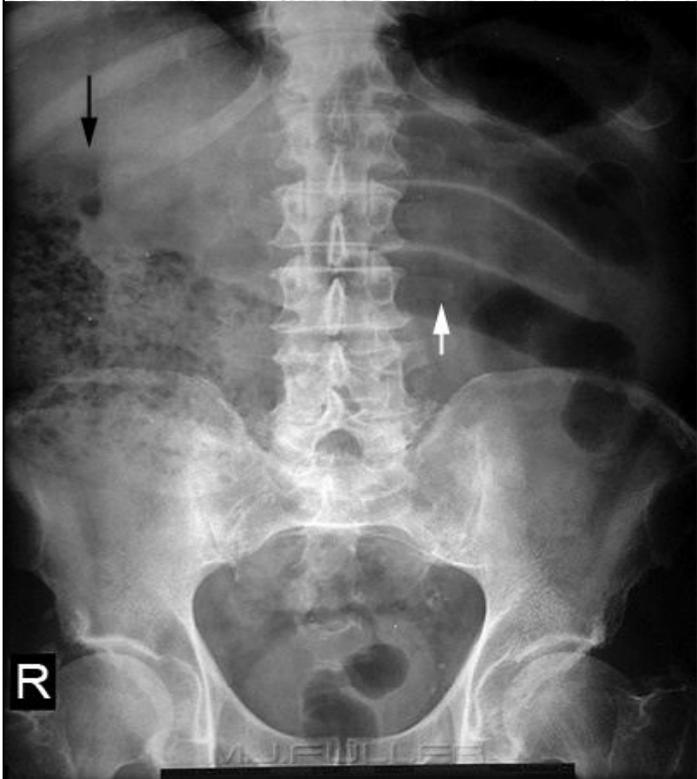


clear demarcation is noted between the ileum and jejunum

The jejunum has a thicker wall and a wider lumen than the ileum and mainly occupies the left upper and central abdomen.

* Mucosa of jejunum is thicker than mucosa of ileum
→ cause of folding (large area for absorption) (The main site)





The ileum has a thinner wall and a smaller lumen than the jejunum and mainly occupies the central and right lower abdomen and pelvis.

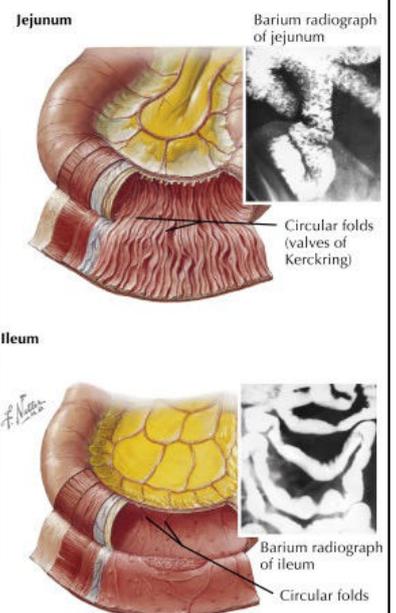
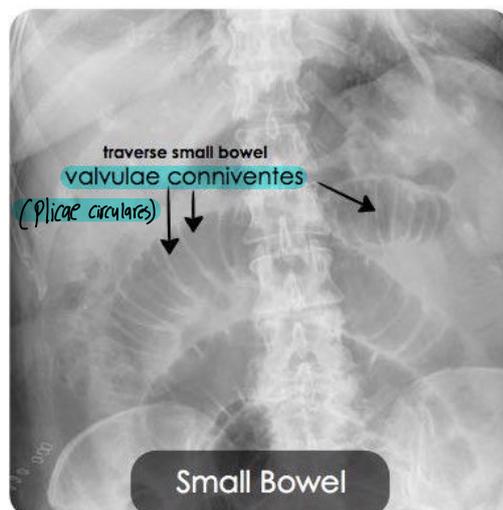
* terminal ileum absorb B₁₂, fatty acids, bile salts



The small bowel contains prominent mucosal folds known as ^{Anatomical} plicae circulares or ^{Radiological} valvulae conniventes. The jejunum has the most developed and highest concentration of these folds, which remain present even in distended bowel.

The plicae circulares decrease in density as you move distally to a nearly smooth distal ileum. The mucosal layer of small bowel contains finger-like projections into the lumen called villi.

*distended loop / No features, Net → ileum



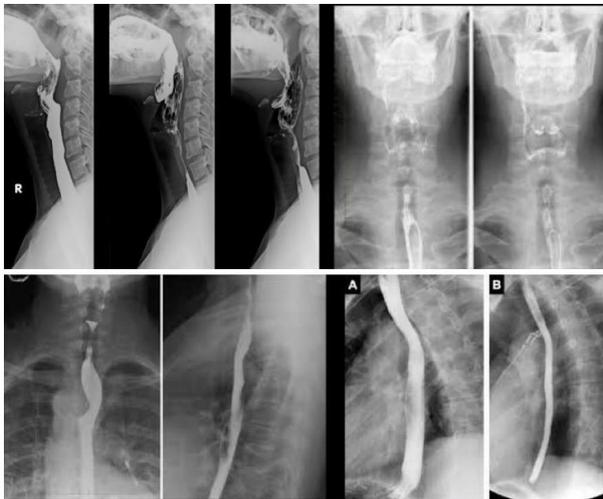
Investigation of GIT

دست پرہیہ و oral و IV
سوال تکرار

The small intestine is evaluated radiologically by:

- Plain abdominal Xray → most common (easier & more beneficial)
- upper GI series using **barium** or Gastrografin follow-through.
- enteroclysis, in which contrast is introduced directly into the proximal jejunum through a nasojejunal tube.
- CT scanning can also be combined with enteroclysis.
- Capsule endoscopy, video camera that is swallowed by the patient; as it passes through the gastrointestinal tract, it keeps transmitting digital images of the mucosa that are captured by a receiver device strapped to the patient.

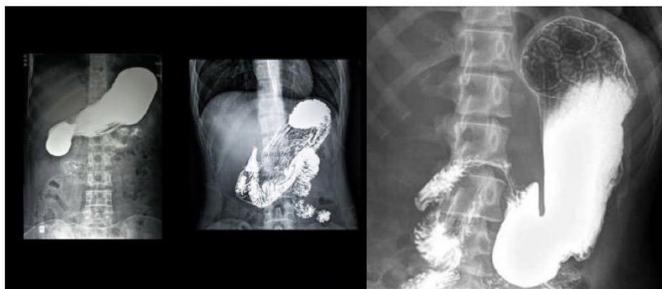
* barium → enema → rectum
 * barium → meal → gastric
 * barium → swallowed → esophagus
 * barium → follow-through → small intestine



Barium swallow



Barium follow-through



Barium meal

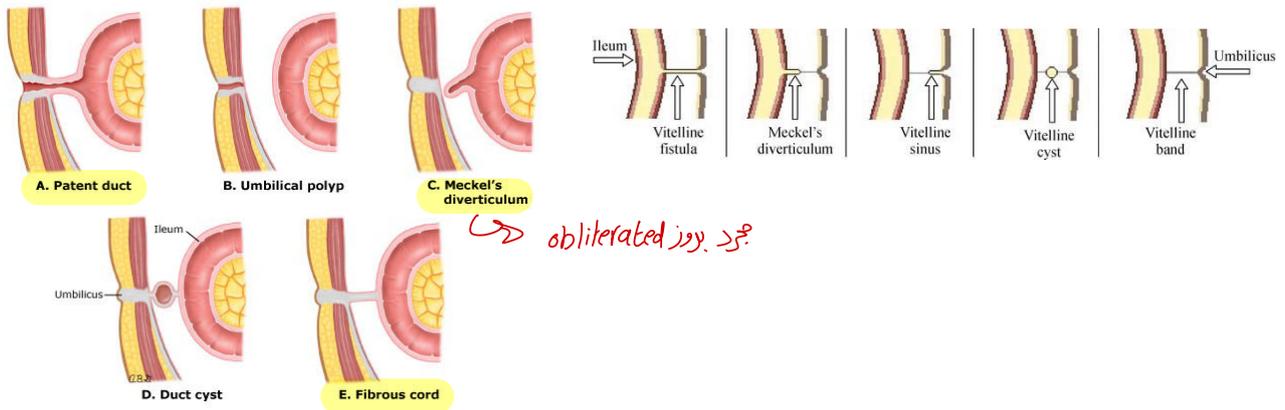
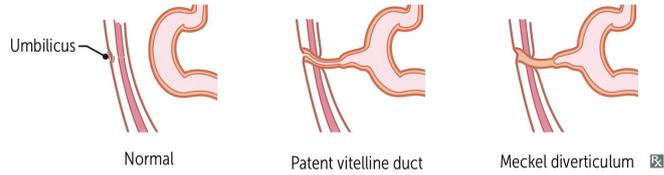
DISEASES OF SMALL INTESTINE

1. CONGENITAL → في الأطفال
2. INFLAMMATORY
3. MECHANICAL CAUSES
4. VASCULAR
5. NEOPLASTIC

Congenital variants

- * A patent vitellointestinal duct: → Most common complication is intestinal obstruction
- * Meckel diverticulum: → lower GI bleeding it's a true diverticulum contains all intestinal layers
بالأطفال
- Vitelline sinus at the umbilicus
- Fibrous band between ileum and umbilicus, around which torsion of a small bowel loop may occur
- * Malrotation of the gut results in the location of the small intestine on the right side and the narrow base of the small bowel mesentery predisposes it to volvulus.
- * Atresia (duodenal, jejunal, and ileal), narrowing, or even complete obliteration of the lumen resulting in neonatal intestinal obstruction
- * Diverticulae and duplication can occur in any part of the small intestine.

Vitelline duct	Also called omphalomesenteric duct. Connects yolk sac to midgut lumen. Obliterates during week 7 of development.
Patent vitelline duct	Total failure of vitelline duct to obliterate → meconium discharge from umbilicus.
Vitelline duct cyst	Partial failure of vitelline duct to obliterate. ↑ risk for volvulus.
Meckel diverticulum	Slight failure of vitelline duct to obliterate → outpouching of ileum (true diverticulum, arrow in B). Usually asymptomatic. May have heterotopic gastric and/or pancreatic tissue → melena, hematochezia, abdominal pain.



CROHNS DISEASE



American gastroenterologist
† Burrill Bernard Crohn

- * *not common in middle east*
- * *There is fissure in anal*
- * Dr. Burrill B. Crohn, who first described the disease in 1932
 - Crohn's disease may affect as many as 780,000 Americans.
- * Men and Women are equally likely to be affected.
- * the disease can occur at any age, *كرد في كل الأعمار*, is more prevalent among adolescents and young adults between the ages of 15 and 35 y.
- * The causes of Crohn's disease are not well understood. Diet and stress may aggravate the dis., It tends to run in families.
 - recently a gene called NOD2 has been identified as being associated with Crohn's disease and the susceptibility to abnormal activation of the immune system is genetically inherited.

PATHOLOGY

Affect any part of G.I.T.,

comonly :

Distal ileum only 33%

Colon only 20%

Ileum & colon 50%

1. Transmural pathology *entire wall*
2. Skipped areas are characteristic
3. dull purple red loops + areas of thick grey - white exudate → *in acute inflammation*
4. Deep mucosal ulcerations + edema of the mucosa in between -
(cobble stone appearance) *عجی کیس مرہون* → *but called pseudopolyps in UC*
5. Enlarged mesenteric L.N.
6. extensive fat wrapping of intestine
7. dilated proximal segment

CLINICAL FEATURES

The symptoms of Crohn's disease are dependent on the location, the extent, and the severity of the inflammation

1. colicky intermittent pain is the most common symptom of Crohn's disease, becomes constant dull ache as the disease progresses.
2. Diarrhoe, the 2nd most common symptom
3. Hematochezia
4. Low grade fever
5. malaise, wt loss
6. arthralgia *extraintestinal Manifestation*
7. tenderness in Rt lower abdomen → *Might confuse with acute appendicitis*
↳ *not fixed (midline, anteriorly & posteriorly)*
8. Non classical anal fissures, recurrent perianal abscesses

Diagnosis of Crohn's disease

There isn't any single test that can diagnose Crohn's disease.
(can't diagnose with certainty)

- * Crohn's disease is initially diagnosed on the basis of a combination of clinical, laboratory, radiologic and histologic findings (collection)
- * A diagnosis of Crohn's disease should be considered in any patient who presents with chronic diarrhea, abdominal pain, bowel obstruction, weight loss, fever, or night sweats

Laboratory study

* Generally they are nonspecific but may be helpful in supporting the diagnosis

ESR, CRP. Hb,

* Serologic studies are sometimes used to facilitate differentiation of Crohn's disease from ulcerative colitis

- Antibodies to the yeast *Saccharomyces cerevisiae* are found more commonly in Crohn's disease than in ulcerative colitis,

whereas perinuclear antineutrophil cytoplasmic antibody (p-ANCA), is found more commonly in ulcerative colitis than in Crohn's disease

Radiology

Various imaging modalities are available to aid in the diagnosis and management of Crohn disease

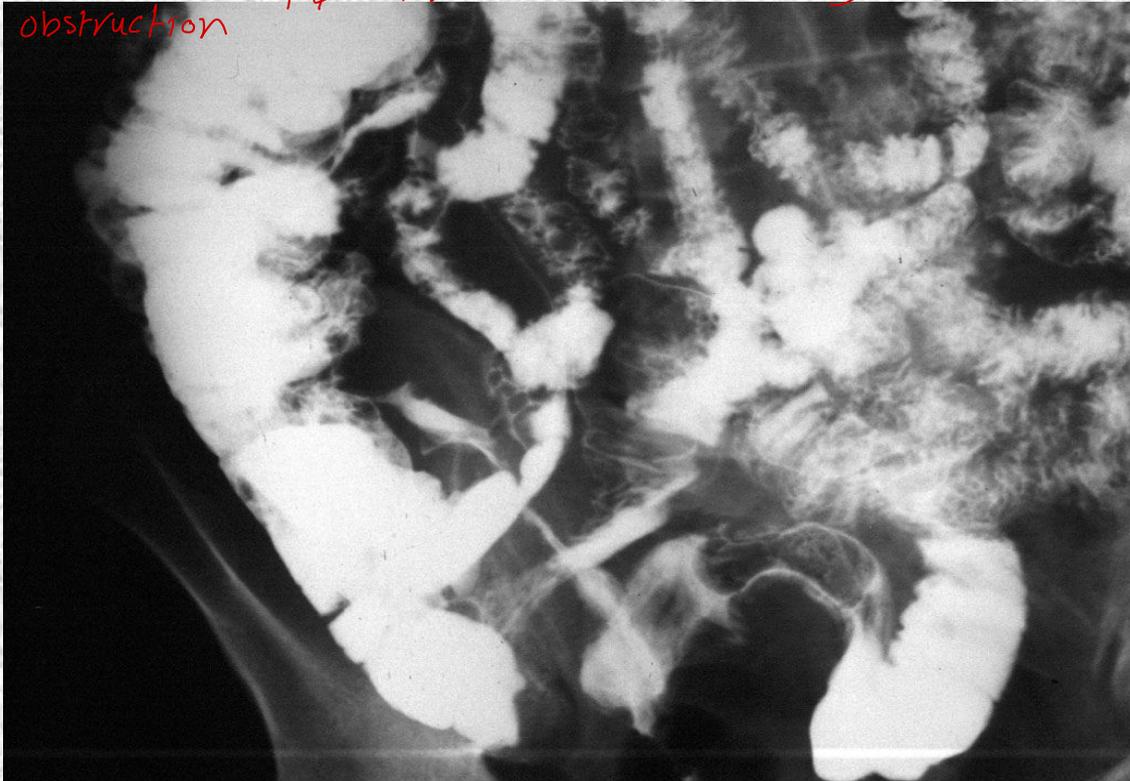
1. Plain abdominal X ray
2. Barium meal and follow through
3. C.T. scan
4. U/S

*Endoscopic visualization and biopsy are essential in the diagnosis of Crohn disease

not necrotic
A noncaseating granulomas in about 15-30% of cases of biopsy samples and 40-60% of surgical specimens.

in inflammatory

Small intestinal and intestinal obstruction *علاج كرفين**
obstruction



barium follow-through

COMPLICATIONS

1. Obstruction

← ulceration

2. Fistula formation:

-peritoneum

-bowel

-Skin

-Urinary bladder

3. Haemorrhage

4. localised abscesses

5. malignancy

TREATMENT

عكس
UC ال

There is NO CURE for crohns disease

MEDICAL & SURGICAL therapy are palliative

- to treat the acute flare-ups
- to maintain remission
- the use of medication, designed to suppress the immune system's abnormal inflammatory response

* مرض حصى المرارة ← التهاب المرارة الذي يحدث في المرارة
⇒

(medical & surgical causes) ? small intestine ? chronic inflammatory disease
← مرض المرارة ← imbalance between bile salts & cholesterol
في المرارة ← Terminal ileum

عوامل الخطر Risk factor

* الجراح دائماً يحاول تجنب الإصابة بالcolon ← مرض المرارة healing very poor

Mild to moderate Crohn's disease

1. Treated with a salicylate preparation which include mesalamine and sulfasalazine

The dosage of oral mesalamine is 3 to 4 g per day

The response to therapy should be evaluated after several weeks.

2. antibiotic therapy :

Moderate to Severe Disease

*Treated with steroids until symptoms resolve and weight loss is reversed.

prednisone 40 mg daily over eight to 12 weeks have been shown to achieve a clinical response

*The immunomodulators azathioprine (Imuran) and mercaptopurine (Purinethol) may be used, but full response may not be achieved for several months.

Recently:

(TNF - α)

infliximab, an antibody to human tumor necrosis factor used to treat Crohn's disease

, infliximab has proved successful in closure of fistulas, steroid-refractory disease, and in the improvement of moderate to severe disease

Other Considerations in treating crohns disease

vitamins and mineral supplementation

iron,

calcium

folic acid and vit.B12

SURGICAL INDICATIONS

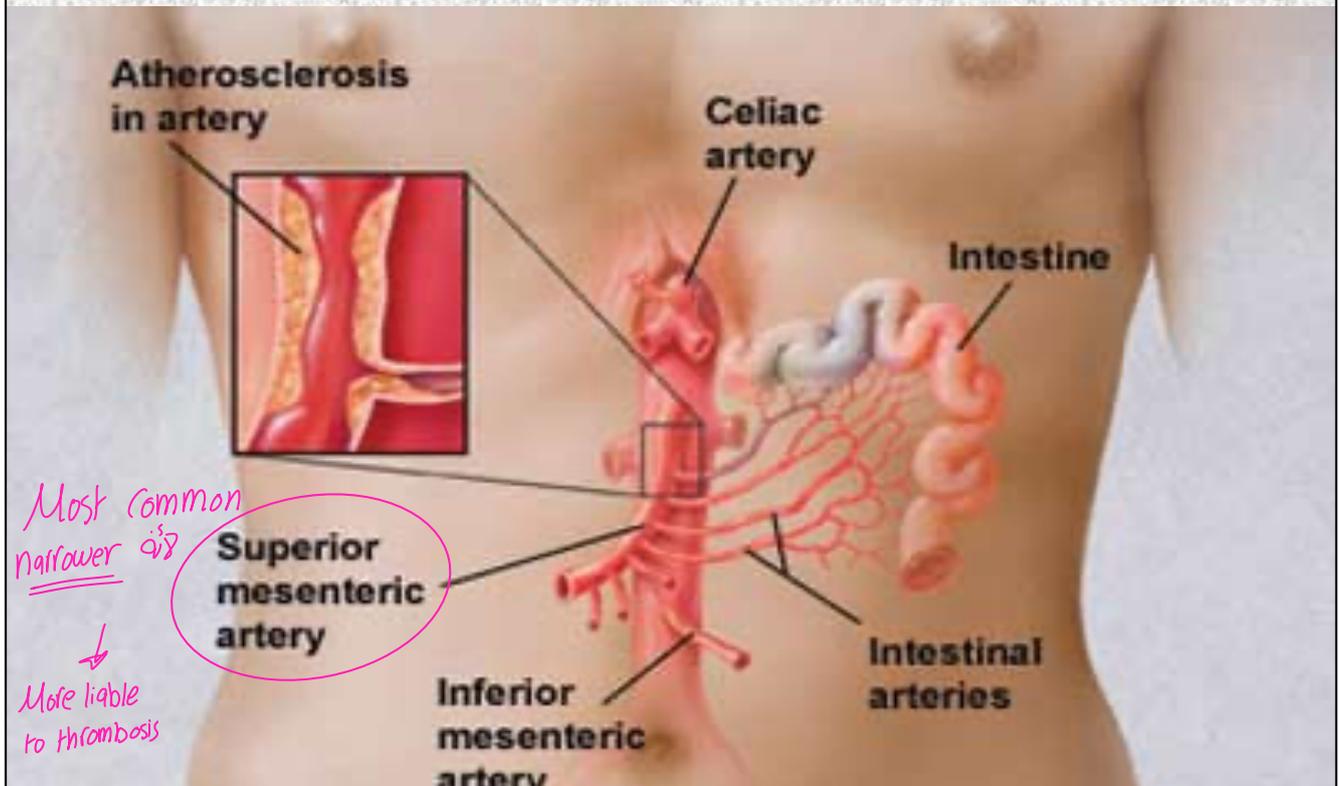
1. Recurrent intestinal obstruction
2. bleeding
3. Perforation
4. Abscess formation
5. intestinal fistula
6. malignant changes

* common surgical option for UC → ^{Total} Proctocolectomy

The surgical procedure in crohn disease

- * Resection of the affected bowel أقل ما يمكن
- * Drainage of any septic foci
- * Strictureplasty
- * Bypass
- * Endoscopic dilatation of symptomatic accessible strictures

Acute mesenteric ischemia (AMI) ^{→ Arterial} _{→ Venous}



Acute mesenteric ischemia (AMI)

*Is typically defined as a group of diseases characterized by an interruption of the blood supply to varying portions of the small intestine, leading to ischemia and secondary inflammatory changes. If untreated, this process will eventuate in life threatening intestinal necrosis.

*The incidence is low, estimated at 0.09–0.2% of all acute surgical admissions.

*Embolitic phenomena account for approximately 50%
arterial thrombosis for about 25%,

NOMI for roughly 20%, → Non-occlusive mesenteric ischemia

MVT for fewer than 10% → Mesenteric venous thrombosis

occlusion by thrombus or embolus

THE RISK FACTORS FOR ACUTE VISCERAL ISCHEMIA

1. Age greater than 50 years
2. Congestive heart failure, Digitalis therapy
3. Recent transmural myocardial infarction
4. Cardiac dys arrhythmias especially atrial fibrillation
5. Hypercoagulable state
6. Hypovolaemia with hypoperfusion.

PATHOLOGY

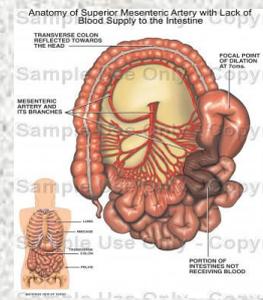
Damage to the affected bowel portion may range from reversible ischemia to transmural infarction with necrosis and perforation

1. The early changes ,alteration in capillary permeability.
2. Mucosal sloughing may cause bleeding into the gastrointestinal tract
3. As the ischemia persists, the mucosal barrier becomes disrupted, and bacteria, toxins, and vasoactive substances are released into the systemic Circulation
4. the bowel wall becomes edematous and cyanotic. Fluid is released I nto the peritoneal cavity
5. Transmural necrosis

CLINICAL FEATURES

Symptoms are nonspecific initially,

- 1. Medical history may be significant for presence of stroke, MI, or peripheral artery disease**
- 2. Patients may present with a long history of weight loss, postprandial pain, and phagophobia .**
- 3. abdominal pain :severe, acute, unrelenting abdominal pain**
- 4. vomiting**
- 5. frank blood in the stools.**



No signs before Perforation

Signs :

On abdominal examination ,the findings may be minimal.

- > if signs of peritonitis present, consider bowel perforation

DIAGNOSIS

1. Clinical features: the high index of suspicion
2. Leucocytosis : >15000
3. ECG
4. Moderately Elevated serum amylase
5. Metabolic acidaemia
6. A doppler ultrasound,
7. CT scan, CT angiogram.
8. Angiography, selective S.M.A.

On plain films Late findings include

- > intramural air
- > air in the portal venous system.
If bowel perforation occurs:
 - > free air in the abdomen may be observed



CT scan findings with a specificity greater than 95% include :

- > SMA or SMV thrombosis,
- > intestinal pneumatosis,
- > portal venous gas,



Treatment of Acute Mesenteric Ischemia

*Treatment options depend on the **etiology** of intestinal ischemia, as well as on the hemodynamic stability of the patient

Generally speaking, nonocclusive AMI is treated medically, whereas occlusive AMI is correctable with surgery

1. Angiographic: Vasodilators or thrombolysis
2. Surgical: Embolectomy, revascularization, with or without bowel resection
3. Long-term anticoagulation or antiplatelet therapy
4. A “second look” laparotomy may be needed to reassess the

viability
of questionable areas of bowel

SMALL INTESTINAL TUMOUR

Despite comprising 75% of the length and 90% of the surface area of the GI tract,

the small bowel harbors relatively few primary neoplasms

account 5% of all G.I. NEOPLASM and fewer than 2% of GI malignancies.

Why Rare there

Factors suggested to explain the scarcity of small bowel lesions and the infrequency of their malignant transformation:

- * Rapid Transit of contents fluidity
- * High turn over rate of epith. Cells
- * Alkalinity of small intestinal Media.
- * High level of IGA.
- * High level of benzyl peroxidase”detoxify potential carcinogene”

BENIGN TUMOURS

- adenoma,
- leiomyoma
- lipoma
- fibromas
- fibromyxomas
- neurofibromas
- ganglioneuromas
- hemangiomas

CLINICAL FEATURES:

1. they invariably present difficult problems in diagnosis
2. Symptoms are often absent until the tumor has progressed to produce a complication. “delayed complications”
3. Even then, the presentation is often vague and nonspecific, intermittent pain, chronic anemia
4. May present as one of the possible complications:
 - intestinal obstruction
 - intussusception
 - bleeding



Malignant small bowel tumors

- 1.adenocarcinoma,
- 2.sarcoma including gastrointestinal stromal tumor
- 3.carcinoid tumors,
- 4.lymphoma.

Adenocarcinoma is the most common type of small bowel cancer..

Risk factors for small intestine cancer

- Crohn's disease
- celiac disease
- Having inherited syndromes-
- Examples : Lynch syndrome, familial adenomatous polyposis (FAP)

Symptoms of small bowel malignant tumour

- Abdominal pain/cramping
- Unexplained weight loss
- Nausea/vomiting
- Blood in the stool
- Watery diarrhea
- Skin flushing
- A lump in the abdomen, abdominal distension, peritoneal signs of complication,



Imaging Studies

1.Plain abdominal x ray films may reveal partial or complete small-bowel obstruction.

2.Upper GI series with small-bowel followthrough show abnormalities in 53-83% of patients with small-bowel cancer.

3.Abdominal CT scan may elucidate the site and extent of local disease and the presence of liver metastases

MRI

Endoscopy

Endoscopic ultrasound

Treatment

Depend on the stage of small bowel cancer
and how far it has spread

Most likely a combination treatment of surgery,
radiation, and chemotherapy will be used.

Archive

* The most common location for a primary adenocarcinoma of the small intestine is:

- a. Duodenum.
- b. Jejunum.
- c. Ileum.
- d. The distribution is roughly equal.
- e. Never occur in the small intestine

* Three days after a myocardial infarction with cardiogenic shock, a 75-year-old man develops abdominal pain and distension. The abdomen is slightly tender with reduced bowel sounds. A plain abdominal X-ray shows distended small bowel without fluid levels. Blood tests reveal a metabolic acidosis. The most likely diagnosis is:

- a. perforated peptic ulcer
- b. mesenteric ischaemia
- c. pseudo-obstruction of the colon
- d. acute pancreatitis
- e. diverticulitis

* Small bowel obstruction in an elderly female without external hernia or previous surgery is most likely caused by :

A- small bowel neoplasm

* which of the following fistulas is most likely associated with metabolic acidosis:

- a. gastric
- b. small intestine
- c. colon
- d. pancreas
- e. biliary

* Concerning malign. tumour of small intestine the followings are true except:

- a. As common as large bowel tumour.
- b. 40% of the malignant tumours of small intestine are adenocarcinoma
- c. similar to adenocarcinomas of the colon, it is mostly arises from premalignant adenomas.
- d. occurs frequently in the proximal small bowel
- e. synchronous malignant tumor is seen

* most common presentation of benign small intestine tumor :

incidental ???!!! (other choices : gi bleeding , small bowel obstruction , perforation ,) ???

* all of them are cancer of small intestine except :

Peutz Jagger syndrome

* In all the following acute abdominal conditions vomiting is infrequent,

EXCEPT:

A. Intra-abdominal bleeding

B. Perforated peptic ulcer

C. High small intestinal obstruction

D. Acute appendicitis

E. Volvulus of sigmoid colon

* The most common organ in which carcinoid tumor arises is:

A. Rectum

B. Coon

C. Small intestine

D. Appendix

E. Bronchus