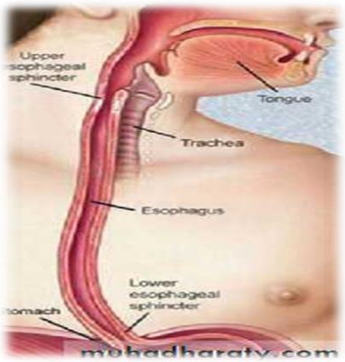
General pathology

Pathology of the GIT

Lec. 20 **Dr. Ahlam Thabet**

Esophagus

It is a hollow, highly distensible muscular tube that extends from the epiglottis to the gastroesophageal junction،located just above the diaphragm. Histologically, the wall of the oesophagus consists of mucosa, submucosa, muscularis propria and adventitia/ serosa.



The main functions of the esophagus are :

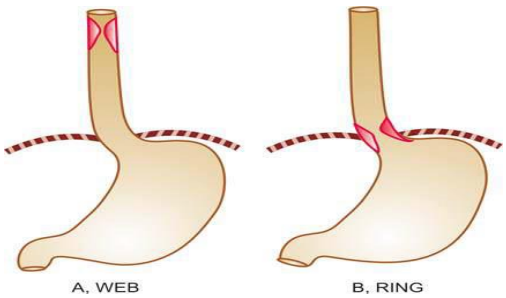
1. Conduct food and fluids from the pharynx to stomach

2. Prevent reflux of gastric contents into the esophagus.

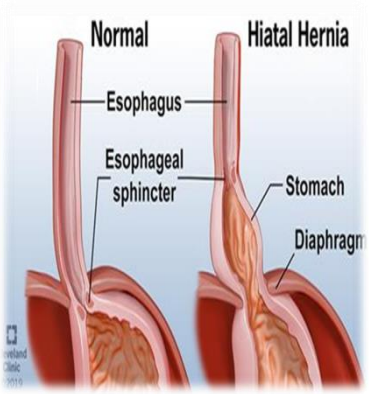
CONGENITAL ANOMALIES :

These include a few rare anomalies such as :

1. Agenesis (congenital absence of esophagus) which is incompatible with life.
2. Duplication of oesophagus (double esophagus).
3. Congenital stenosis (i.e. fibrous thickening of the esophageal wall)
4. Oesophageal atresia
5. Tracheo-oesophageal fistula.
6. Oesophageal webs ; these are located in the upper oesophagus, seen more associated with dysphagia, iron deficiency anaemia and chronic atrophic glossitis (Plummer-Vinson syndrome).
7. Oesophageal rings : those located in the lower oesophagus, not associated with iron-defi ciency anaemia, nor occurring in women alone, are referred to as ‘Schatzki’s rings’.



HIATUS HERNIA

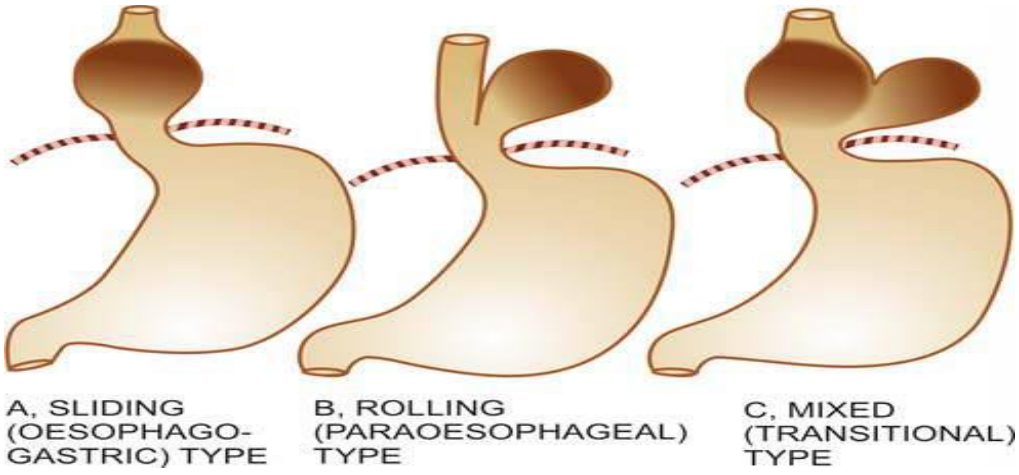


Hiatus hernia is the herniation or protrusion of part of the stomach through the esophageal hiatus of the diaphragm. In symptomatic cases, especially the elderly women, the clinical features are heartburn (retrosternal burning sensation) and regurgitation of gastric juice into the mouth, both of which are worsened due to heavy work, lifting weights and excessive bending.

Morphologic features

There are 3 patterns in hiatus hernia

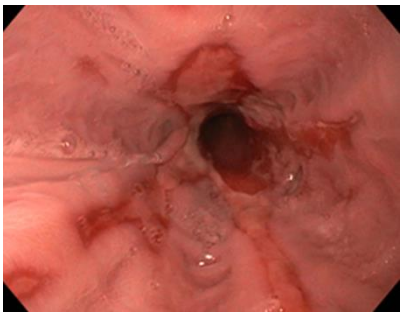
A. Sliding or oesophago-gastric hernia is the most common, occurring in 85% of cases. The herniated part of the stomach appears as supradiaphragmatic bell due to sliding up on both sides of the oesophagus.
B. Rolling or para-oesophageal hernia is seen in 10% of cases. This is a true hernia in which cardiac end of the stomach rolls up para-oesophageally, producing an intrathoracic sac.
C. Mixed or transitional hernia constitutes the remaining 5% cases in which there is combination of sliding and rolling hiatus hernia.



ESOPHAGITIS

This term refers to inflammation of the esophageal mucosa. It may be caused by a variety of physical ,chemical or biological agents.

Reflux (peptic) oesophagitis: Is the commonest cause of oesophagitis. The associated clinical condition is termed gastroesophageal reflux disease (GERD). Reflux of gastric juices is central to the development of mucosal injury in GERD.

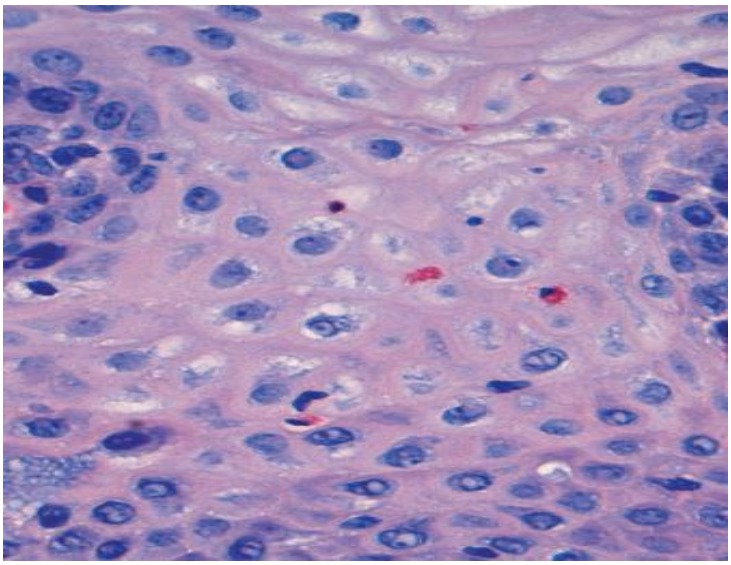


Endoscopic features:

In mild GERD there is simple hyperemia. With more significant disease, usually are associated with more severe injury (erosions or ulceration).

Microscopically

- Basal cell hyperplasia .
- Deep elongation of the papillae touching close to the surface epithelium.
- In early stage, mucosa and submucosa are infiltrated by some polymorphs and eosinophils.
- In chronic stage, there is lymphocytic infiltration and fibrosis of all the layers of the oeso phageal wall.



TUMOURS OF OESOPHAGUS

Benign tumours : Benign tumors of the oesophagus are uncommon and small in size (less than 3 cm). The epithelial benign tumors project as intraluminal masses arising from squamous epithelium squamous cell (papilloma), or from columnar epithelium (adenoma).

The stromal or mesenchymal benign tumours are intramural masses such as leiomyoma and others like lipoma، fibroma, rhabdomyoma, lymphangioma and haemangioma.

Malignant tumours : Two morphologic variants account for a majority of esophageal cancers: adenocarcinoma and squamous cell carcinoma.Worldwide, squamous cell carcinoma is more common, but adenocarcinoma is on the rise.

STOMACH

The stomach is 'gland with cavity', extending from its junction with lower end of the oesophagus (cardia) to its junction with the duodenum (pylorus). The lesser curvature is inner concavity on the right, while the greater curvature is the outer convexity on the left side of the stomach.

The stomach has 5 anatomical regions :

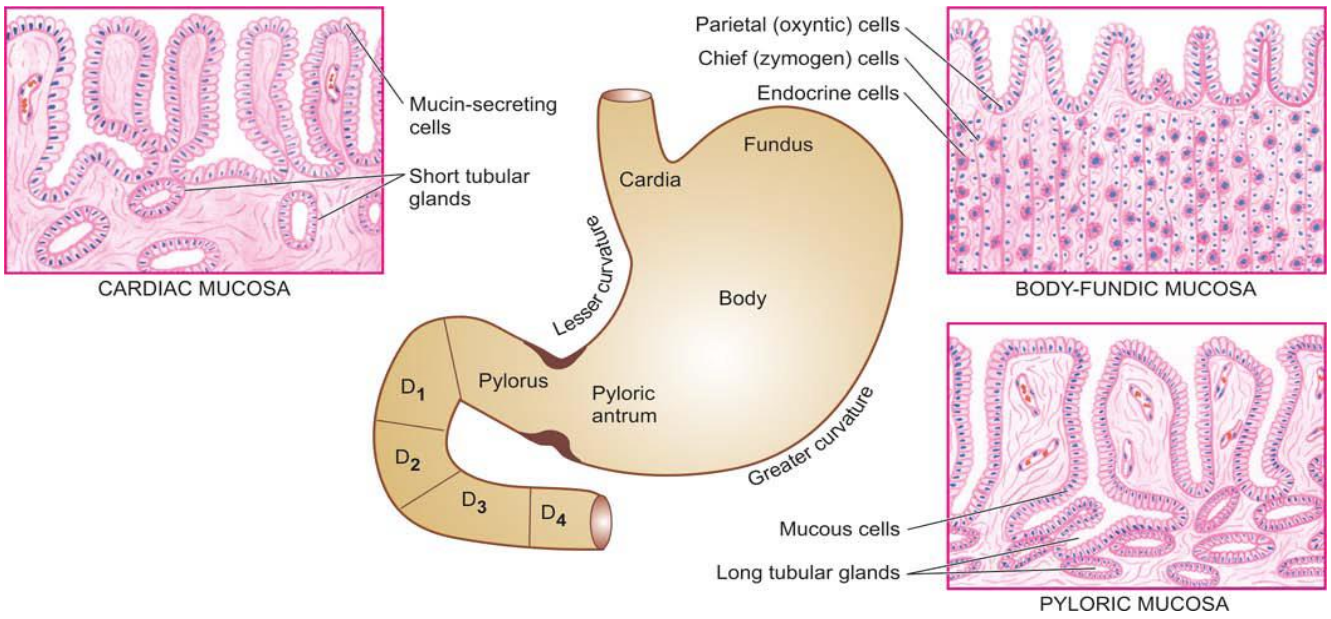
1 . Cardia is the oesophagogastric junction and lacks the sphincter.

2 .Fundus is the portion above the horizontal line drawn across the oesophagogastric junction.

3 .Body is the middle portion of the stomach between the fundus and the pyloric antrum.

4 .Pyloric antrum is the distal third of the stomach.

5 .Pylorus is the junction of distal end of the stomach with the duodenum. It has powerful sphincter muscle.



GASTRITIS

Is inflammation of gastric mucosa . When neutrophils are present, the lesion is referred to as acute gastritis, and if plasma cells or lymphocyte are present so the lesion is chronic gastritis .

Acute Gastritis

Acute gastritis is a transient acute inflammatory involvement of the stomach, mainly mucosa. Acute gastritis may be asymptomatic or cause variable degrees of epigastric pain, nausea، and vomiting.

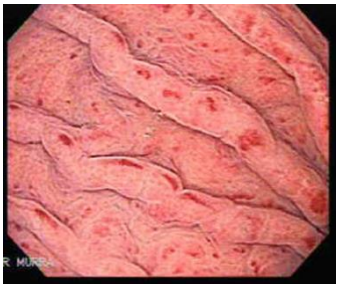
Etiologic agents:

1. Diet and personal habits (Highly spiced food, alcohol ,Malnutrition and Heavy smoking).
2. Infections (Helicobacter pylori , viral hepatitis, influenza, infectious mononucleosis).

3 .Drugs: like non-steroidal anti-inflammatory drugs(NSAIDs), aspirin, cortisone).

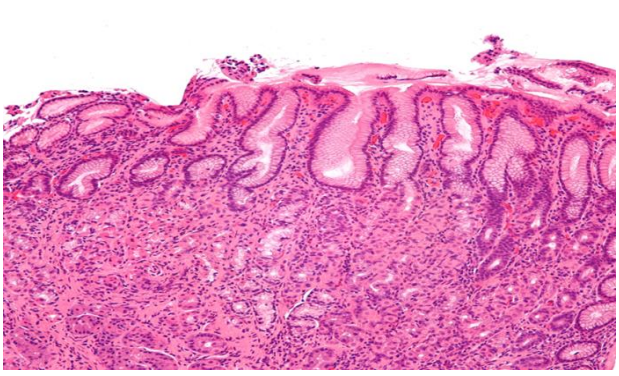
4 .Chemical and physical agents (caustic soda، phenol, Gastric irradiation).

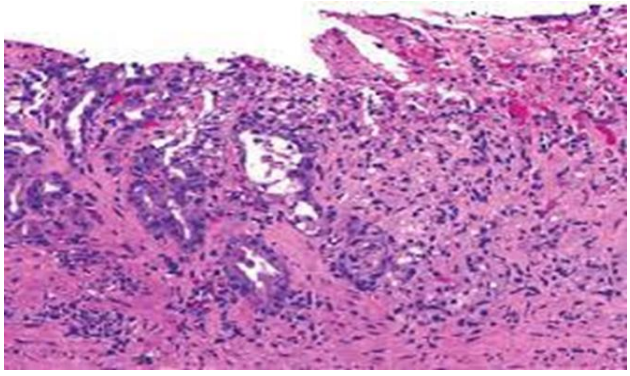
5 .Severe stress: Emotional factors like (shock, anger), Extensive burns, Trauma and Surgery.



Morphologic features grossly → The gastric mucosa is oedematous with abundant mucus and haemorrhagic spots.

Microscopically → depending upon the stage, there is variable amount of oedema and infiltrate on by neutrophils in the lamina propria. In acute haemorrhagic and erosive gastritis، the mucosa is sloughed off and there are haemorrhages on the surface.





Chronic Gastritis

The signs and symptoms associated with chronic gastritis typically are less severe but more persistent than those of acute gastritis. Nausea and upper-abdominal discomfort may occur, sometimes with vomiting.

Etiological Agents:

All the causative factors of acute gastritis described above may result in chronic gastritis too. Some additional causes are as under:

1 .Reflux of duodenal contents into the stomach.

2 .Infection with H. pylori is strongly implicated in the etiology of chronic gastritis and is more common.

3 .Associated disease of the stomach and duodenum, such as gastric or duodenal ulcer, gastric carcinoma.

4 .Chronic hypochromic anaemia .

5 .Immunological factors such as autoantibodies to gastric parietal cells .

Morphologic features Grossly → The gastric mucosa may be normal, atrophied, or oedematous.

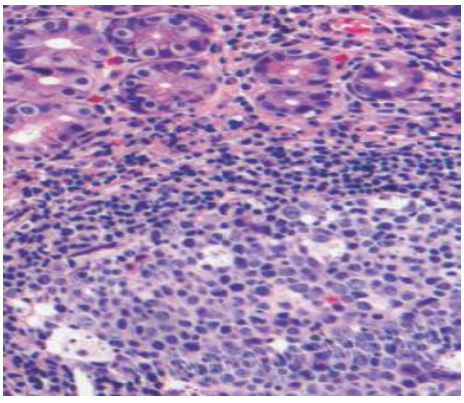
Histologically :

1. Large numbers of plasma cells, lymphocytes and macrophages.

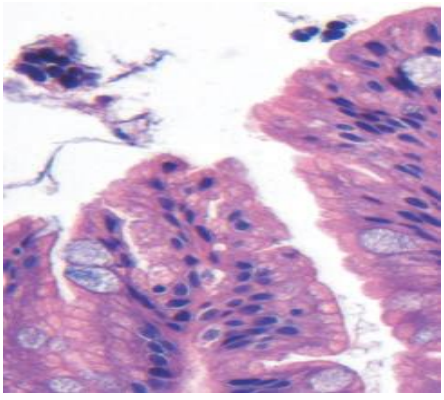
2. Lymphoid aggregates, with germinal centers, are frequently present .(Fig –A)

3. Intestinal metaplasia, characterized by the presence of goblet cells and columnar absorptive cells .(Fig-B)

4. Dysplasia with long standing chronic gastritis which may lead to carcinoma in situ.



A



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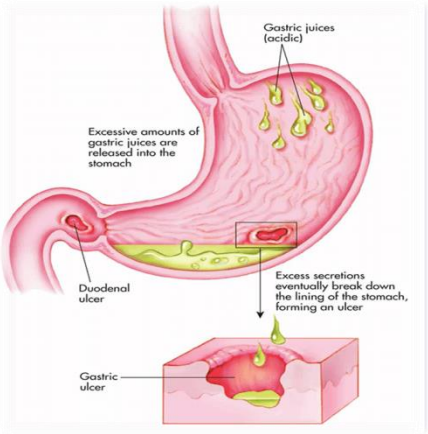


PEPTIC ULCERS

Peptic ulcers are the areas of degeneration and necrosis of gastrointestinal mucosa exposed to acid-peptic secretions. They can occur at any level of the alimentary tract but they occur most commonly in either the duodenum or stomach.

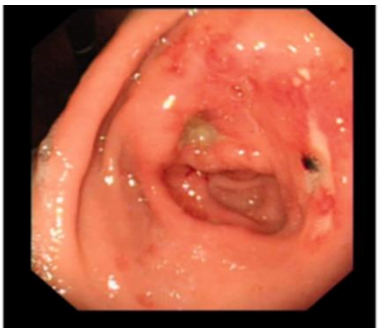
Acute Peptic (Stress) Ulcers

Acute peptic ulcers or stress ulcers are multiple, small mucosal erosions, seen most commonly in the stomach but occasionally involving the duodenum.

ETIOLOGY:

1 .Psychological stress

2 .Physiological stress as in the following(Shock, Severe trauma, Extensive burns ,Drug intake



3. Local irritants (e.g. alcohol, smoking).

Morphologic features

Acute stress ulcers are multiple (more than three ulcers in 75% of cases). They are more common anywhere in the stomach, followed in decreasing frequency by occurrence in the first part of duodenum. They may be oval or circular in shape, usually less than 1 cm in diameter.

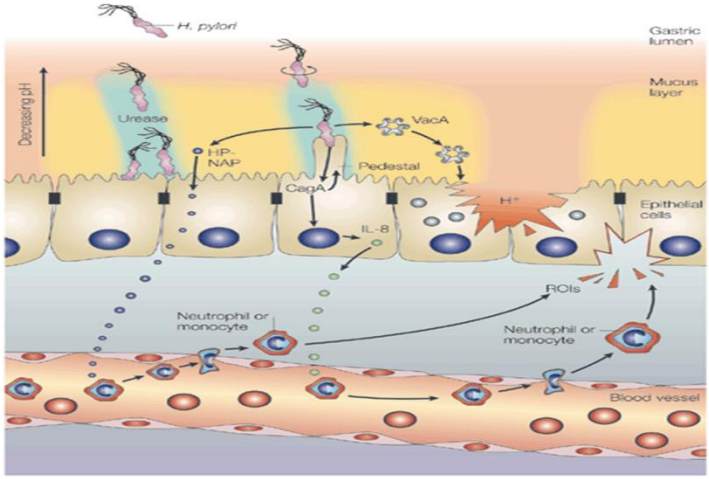
Microscopically, the stress ulcers are shallow and do not invade the muscular layer. The margins and base may show some inflammatory reaction depending upon the duration of the ulcers.

Chronic Peptic Ulcers (Gastric and Duodenal Ulcers

Chronic peptic ulcers would mean gastric and duodenal ulcers, the two major forms of 'peptic ulcer disease' of the upper GI tract in which the acid-pepsin secretions are implicated in their pathogenesis.

Pathogenicity:

1. The imbalances of mucosal defenses and damaging forces that cause chronic gastritis.
2. NSAIDs-induced mucosal injury.



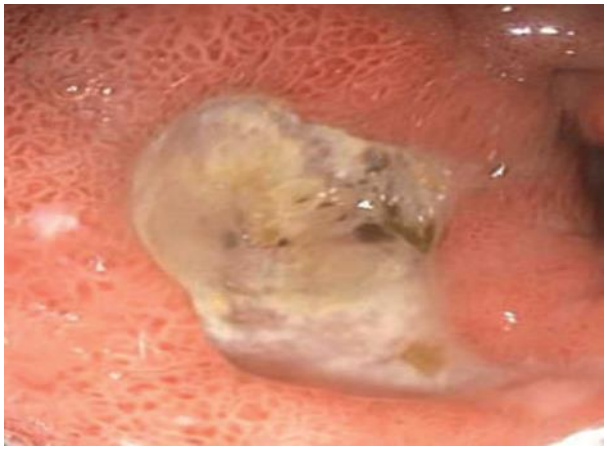
3. Helicobacter pylori gastritis About 15-20% cases infected with H. pylori in the antrum develop duodenal ulcer in their life time while gastric colonization by H. pylori never develops ulceration and remain asymptomatic. The underlying mechanisms are as under:

A) Gastric mucosal defense is broken by bacterial elaboration of urease, protease, catalase and phospholipase.

b) Host factors: mucosal epithelium releases proinflammatory cytokines such as IL-1, IL-6, IL-8 and tumour necrosis factor, all of which incite intense inflammatory reaction.

c) Bacterial factors: several bacterial products cause epithelial injury .

Morphological features:

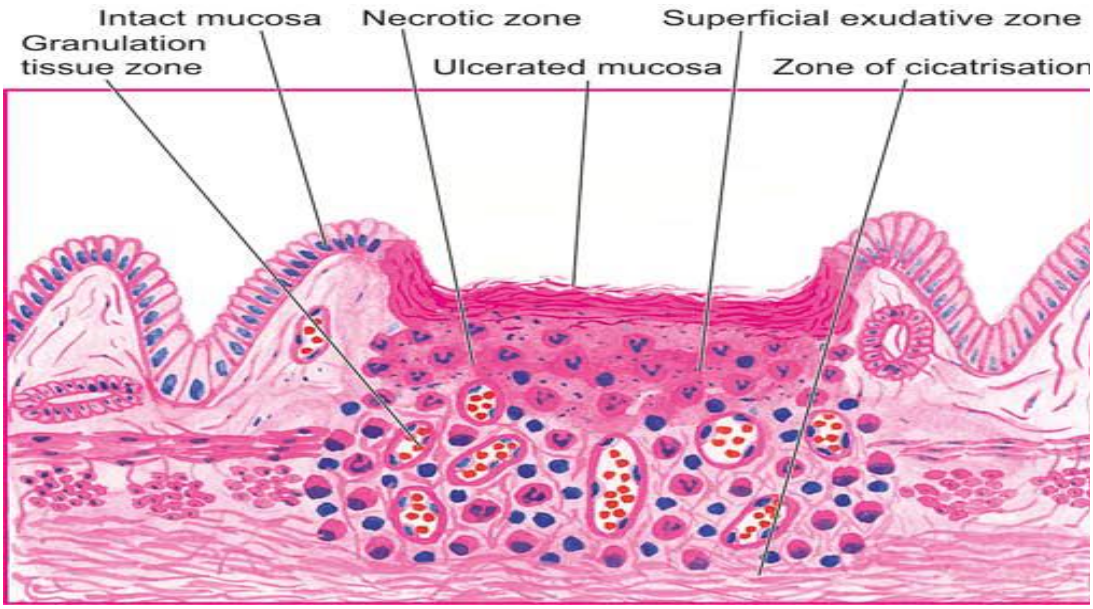


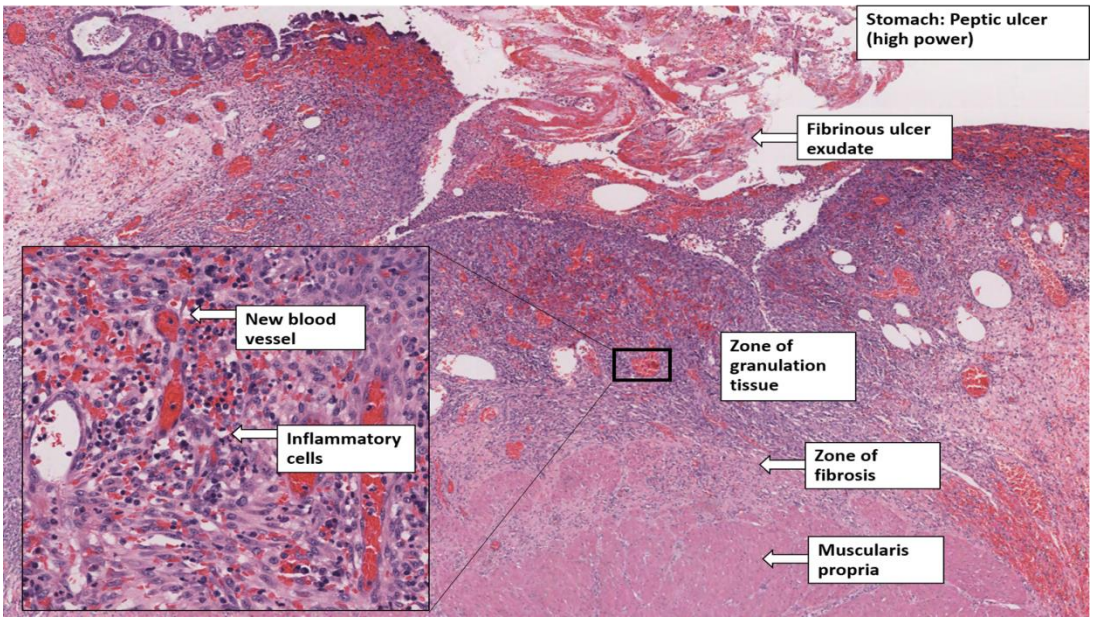
Typical peptic ulcers are commonly solitary small (1-2.5 cm in diameter), round to oval and characteristically 'punched out'. The mucosal folds converge towards the ulcer. The ulcers may vary in depth from being superficial (confined to mucosa)to deep ulcers (penetrating into the muscular layer).

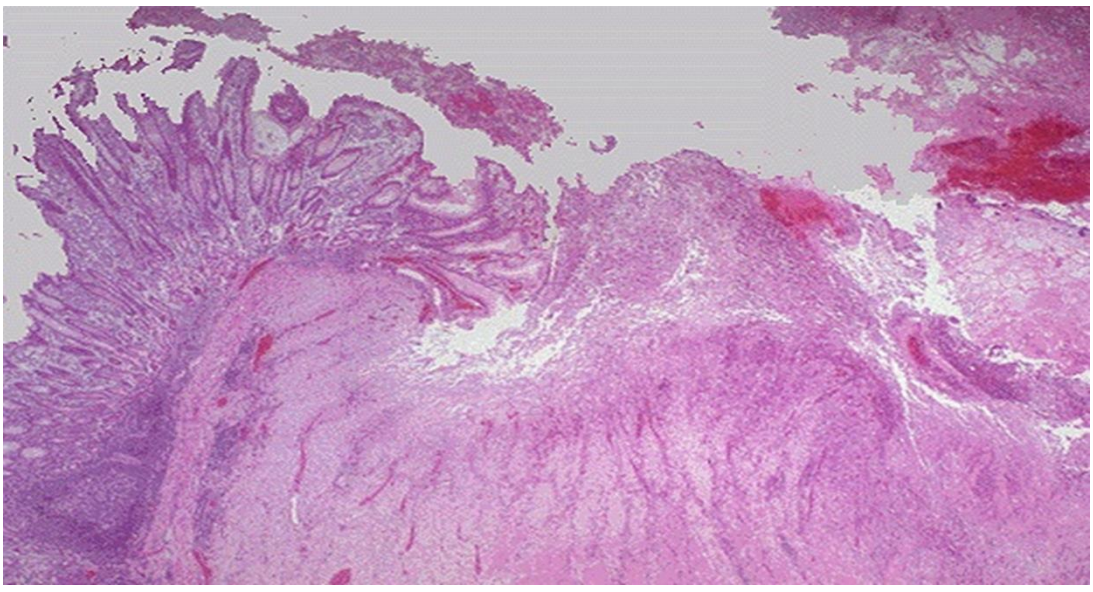
Microscopically:

Chronic peptic ulcers have 4 histological zones. From within outside, these are as under :

1. Necrotic zone—lies in the floor of the ulcer and is composed of fibrinous exudate containing necrotic debris and a few leucocytes.
2. .Superficial exudative zone—lies underneath the necrotic zone. The tissue elements here show coagulative necrosis giving eosinophilic, smudgy appearance with nuclear debris.
3. Granulation tissue zone—is seen merging into the necrotic zone. It is composed of nonspecific inflammatory infiltrate and proliferating capillaries.
4. Zone of cicatrisation—is seen merging into thick layer of granulation tissue. It is composed of dense fibrocollagenic scar tissue over which granulation tissue restes.


Intact mucosa
Necrotic zone
Superficial exudative zone
Granulation tissue zone
Ulcerated mucosa
Zone of cicatrisation


Stomach: Peptic ulcer (high power)
Fibrinous ulcer exudate
New blood vessel
Inflammatory cells
Zone of granulation tissue
Zone of fibrosis
Muscularis propria



Complications of peptic ulcers :

1 .Obstruction : Development of fibrous scar at or near the pylorus results in pyloric stenosis. Healed duodenal ulcers cause duodenal stenosis. Healed gastric ulcers along the lesser curvatures may produce 'hourglass' deformity due to fibrosis and contraction.

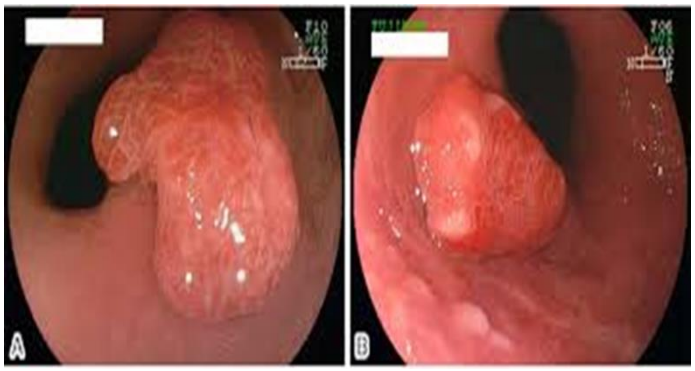
2 .Haemorrhage: Minor bleeding by erosion of small blood vessels in the base of an ulcer occurs in all the ulcers and can be detected by testing the stool for occult blood.

3 .Perforation : A perforated peptic ulcer is an acute abdominal emergency. Perforation occurs more commonly in chronic duodenal ulcers than chronic gastric ulcers.

4 .Malignant transformation: The dictum 'cancers ulcerate but ulcers rarely cancerate ' holds true for most pep tic ulcers. A chronic duodenal ulcer never turns malignant, while less than 1% of chronic gastric ulcers may transform into carcinoma.

Gastric Polyps

Polyps are nodules or masses that project above the level of the surrounding mucosa. They are identified in up to 5% of upper gastrointestinal tract endoscopies. Polyps may develop as a result of epithelial or stromal cell hyperplasia، inflammation, ectopia, or neoplasia.



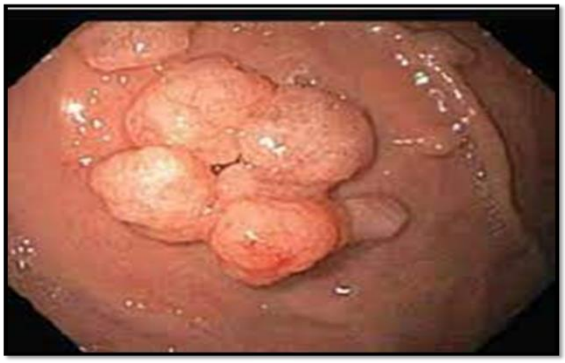
Inflammatory and Hyperplastic Polyps:

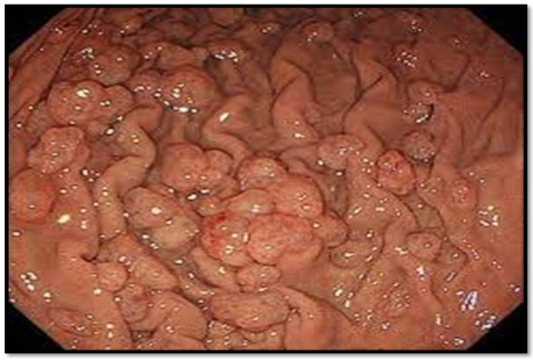
Up to 75% of all gastric polyps are inflammatory or hyperplastic polyps. They most commonly affect individuals between 50 and 60 years of age, usually arising in a background of chronic gastritis that initiates the injury and reactive hyperplasia that cause polyp growth. If associated with H. pylori gastritis, polyps may regress after bacterial eradication.

Fundic Gland Polyps:

Fundic gland polyps occur sporadically and in individuals with familial adenomatous polyposis (FAP) . Polyps associated with FAP (but not sporadic) may show dysplasia, but they almost never progress to become malignant. The incidence of sporadic lesions has increased markedly as a result of the widespread use of proton pump inhibitors.

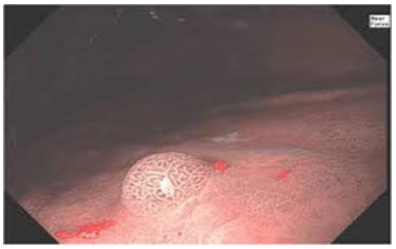
Fundic gland polyps are nearly always asymptomatic, and are usually an incidental finding. These often are multiple, and are composed of cystically dilated, irregular glands lined by flattened parietal and chief cells.





Gastric Adenoma:

Gastric adenomas represent up to 10% of all gastric polyps. Patients usually are between 50 and 60 years of age, and males are affected three times more often than females. Adenomas almost always occur on a background of chronic gastritis with atrophy and intestinal metaplasia. All gastrointestinal adenomas exhibit epithelial dysplasia, which can be classified as low- or high-grade. The risk for development of adenocarcinoma in gastric adenomas is related to the size of the lesion and is particularly elevated with lesions greater than 2 cm in diameter.



Malignant Tumors

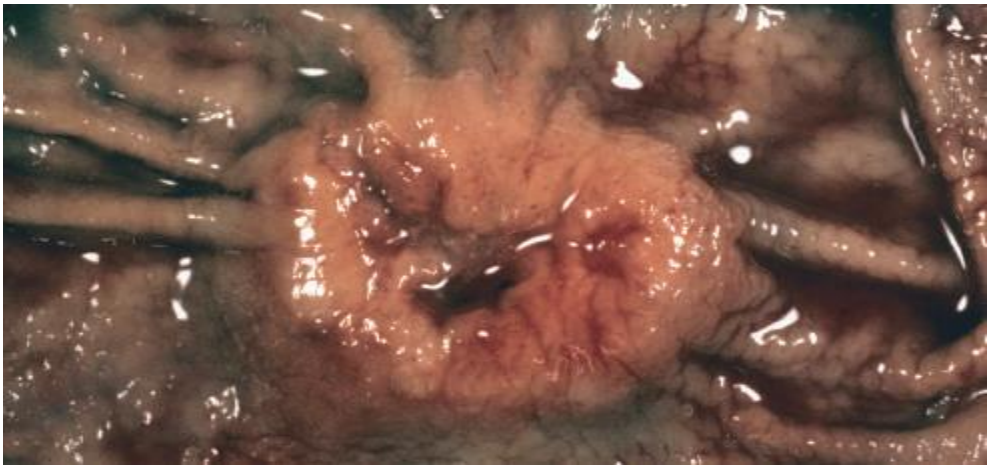
Gastric Adenocarcinoma

Adenocarcinoma is the most common malignancy of the stomach, comprising more than 90% of all gastric cancers. Early symptoms resemble those of chronic gastritis, including dyspepsia, dysphagia, and nausea.

Lymphoma

Nearly 5% of all gastric malignancies are primary lymphomas, the most common of which are indolent extranodal marginal zone B-cell lymphomas. Primary gastric lymphomas most often are derived from the mucosa-associated lymphoid tissue whose development is induced by chronic gastritis.

Other carcinomas that occur rarely in the stomach are: adenosquamous carcinoma, squamous cell carcinoma and undifferentiated carcinoma .Also Leiomyosarcoma, Leiomyoblastoma and Carcinoid Tumour are consider rare tumors.



Small and Large Intestines

INFLAMMATORY BOWEL DISEASE

The term 'inflammatory bowel disease (IBD)' is commonly used to include 2 idiopathic bowel diseases having many similarities but the conditions usually have distinctive morphological appearance. These 2 conditions are Crohn's disease and ulcerative colitis.

Crohn's disease is autoimmune disease , characterized by transmural, noncaseating granulomatous inflammation, affecting most commonly the segment of terminal ileum and/or colon, although any part of the gastrointestinal tract may be involve.

Ulcerative colitis is an idiopathic form of acute and chronic ulcero-inflammatory colitis affecting chiefly the mucosa and submucosa of the rectum and descending colon, though sometimes it may involve the entire length of the large bowel.

Both diseases can occur at any age but are more frequent in 2nd and 3rd decades of life. Females are affected slightly more often. Also, both exhibit Extra intestinal inflammatory manifestation.

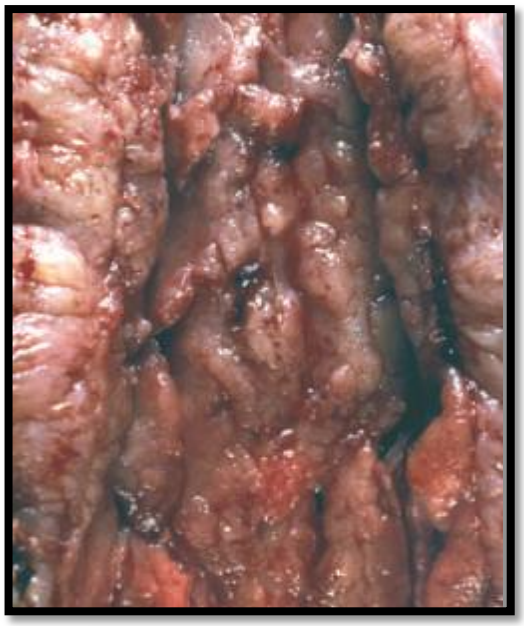
ETIOPATHOGENESIS

The exact etiology of IBD remains unknown. However, multiple factors are implicated which can be considered under the following 3 groups:

1 .Genetic factors

2 .Immunologic factors (Defective immunologic regulation).

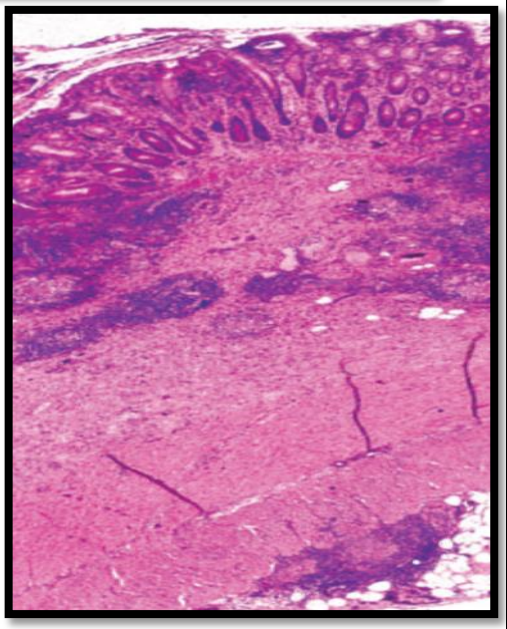
3. Exogenous factors(Microbial factors, Psychosocial factors, Smoking, and Oral contraceptives).



Crohn's disease:

Clinical feature:

Disease begins with intermittent attacks of relatively mild diarrhea, fever, and abdominal pain. Approximately 20% of patients present acutely with right lower-quadrant pain and fever, which may mimic acute appendicitis or bowel perforation. Patients with colonic involvement may present with bloody diarrhea and abdominal pain, creating a differential diagnosis with some colonic infections. Periods of disease activity typically are interrupted by asymptomatic intervals that last for weeks to many months.



Extraintestinal manifestations of Croh'n disease include:

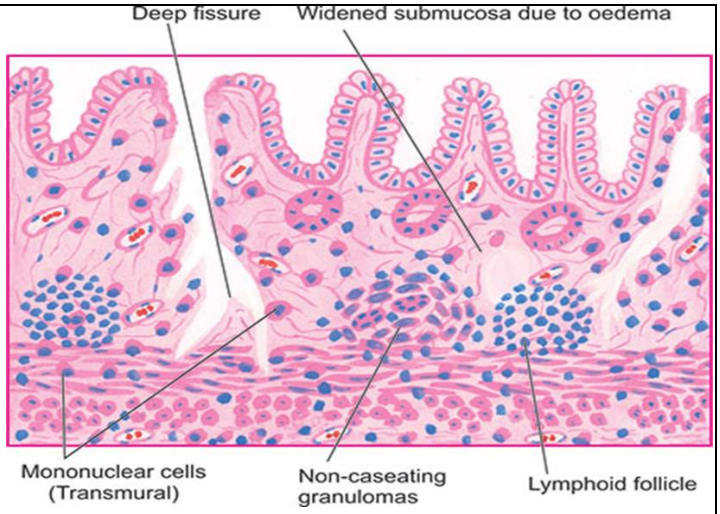
1. Uveitis
2. Migratory polyarthritis
3. Sacroiliitis
4. Ankylosing
5. spondylitis
6. erythema nodosum
7. clubbing of the fingertip.

Histologically: The characteristic features are as follows

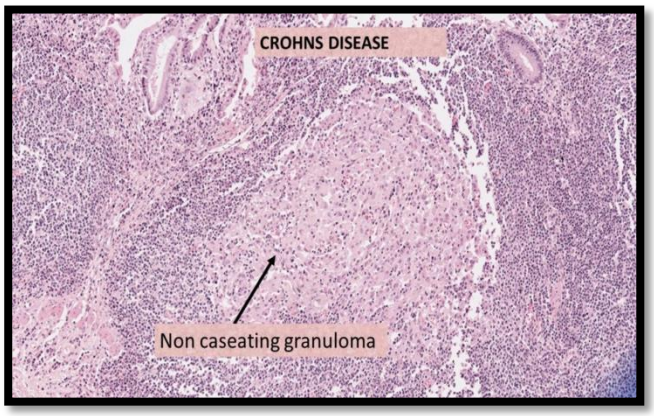
1 .Transmural inflammatory cell infiltrate consisting of chronic inflammatory cells (lymphocytes, plasma cells and macrophages) is the classical microscopic feature.

2 .Non-caseating, sarcoid-like granulomas.

3 .There is patchy ulceration of the mucosa which may take the form of deep fissures, accompanied by inflammatory infiltrate of lymphocytes and plasma cells.



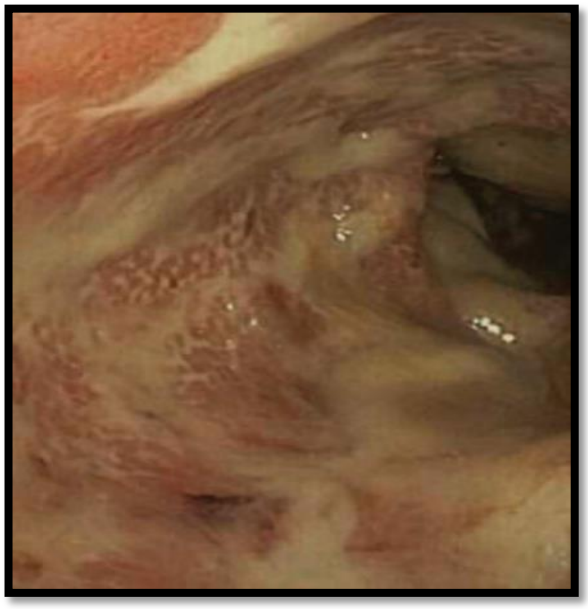
4 .There is widening of the submucosa due to oedema and foci of lymphoid aggregates.



Ulcerative colitis

Clinical Features:

Ulcerative colitis is a relapsing disorder characterized by attacks of bloody diarrhea with expulsion of stringy، mucoid material and lower abdominal pain and cramps that are temporarily relieved by defecation. These symptoms may persist for days, weeks, or months before they subside, and occasionally the initial attack may be severe.

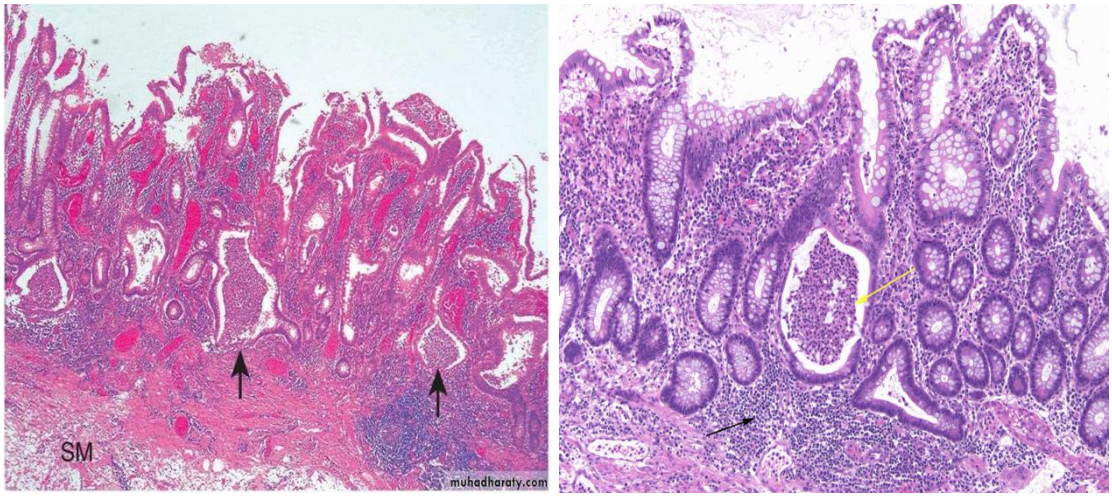


Histologic features :

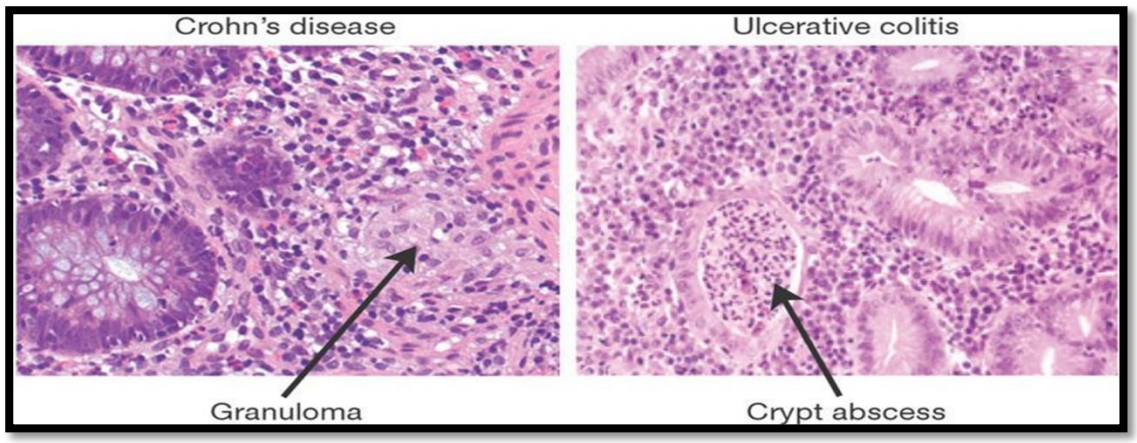
1. Inflammatory infiltrates, crypt abscesses, crypt distortion, and epithelial metaplasia.
2. In severe cases, mucosal damage may be accompanied by ulcers that extend

more deeply into the submucosa, but the muscularis propria is rarely involved.

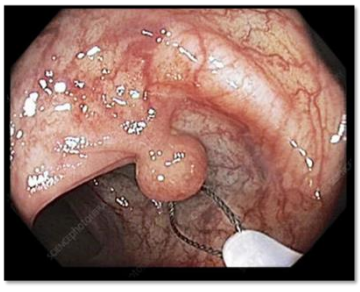
3. Submucosal fibrosis, mucosal atrophy, and distorted mucosal architecture remain as residua of healed disease.
4. Granulomas are not present.



Ulcerative colitis



Hyperplastic Polyps:

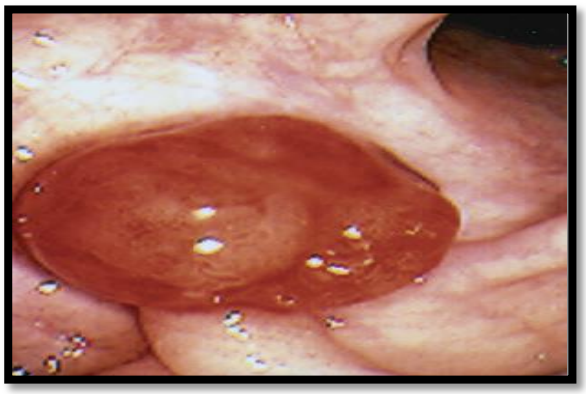


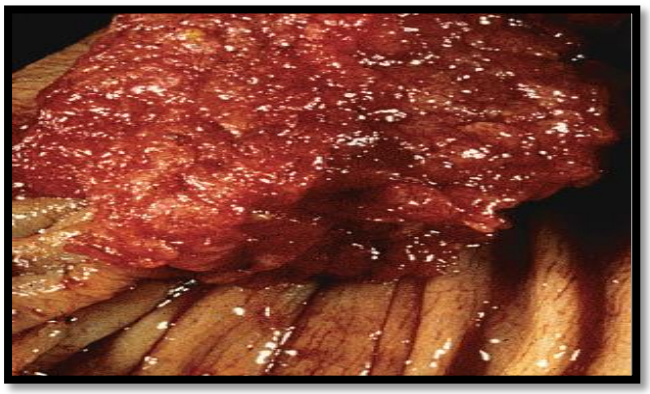
Colonic hyperplastic polyps are common epithelial proliferations that typically are discovered in the sixth and seventh decades of life. The pathogenesis of hyperplastic polyps is incompletely understood, but formation of these lesions is thought to result from decreased epithelial cell turnover and delayed shedding of surface epithelial cells، leading to a "pileup" of goblet cells.

Adenomas

The most common and clinically important neoplastic polyps are colonic adenomas, benign polyps that give rise to a majority of colorectal adenocarcinomas. Most adenomas,

however, do not progress to adenocarcinoma. Colorectal adenomas are characterized by the presence of epithelial dysplasia. Typical adenomas range from 0.3 to 10 cm in diameter and can be pedunculated or sessile, with the surface of both types having a texture resembling velvet or a raspberry‹ due to the abnormal epithelial growth pattern.



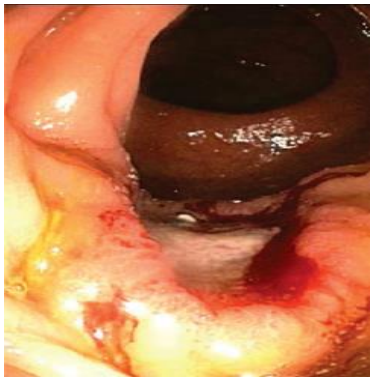
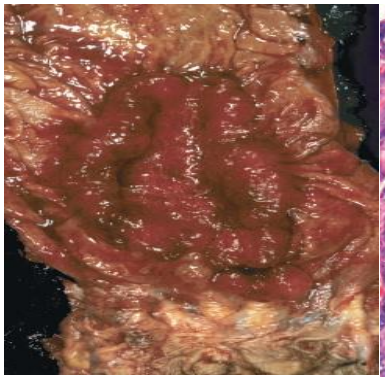
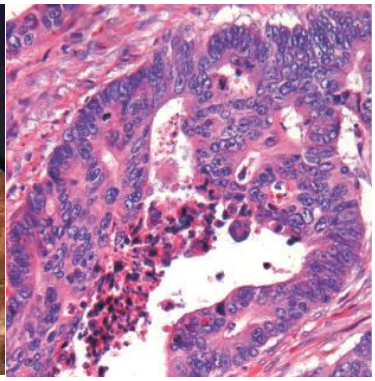


Adenocarcinoma

Adenocarcinoma of the colon is the most common malignancy of the gastrointestinal tract and is a major contributor to morbidity and mortality worldwide. Colorectalcancer incidence peaks at 60 to 70 years of age; less than 20 % of cases occur before 50 years of age. Males are affected slightly more often than females.

Overall, adenocarcinomas are distributed approximately equally over the entire length of the colon. Tumors in the proximal colon often grow as polypoid, exophytic masses that extend along one wall of the large-caliber cecum and ascending colon; these tumors rarely cause obstruction .By contrast, carcinomas in the distal colon tend to be annular lesions that produce “napkin ring” constrictions and luminal narrowing , sometimes to the point of obstruction.

The general microscopic characteristics of right- and left-sided colonic adenocarcinomas are similar. Most tumors are composed of tall columnar cells that resemble dysplastic epithelium found in adenomas . The invasive component of these tumors elicits a strong stromal desmoplastic response, which is responsible for their characteristic firm consistency.

Appendix

The appendix is a normal true diverticulum of the cecum. Like any diverticulum, it is prone to acute and chronic inflammation, and acute appendicitis is a relatively common entity. Other lesions, including tumors, can also occur in the appendix but are far less common.

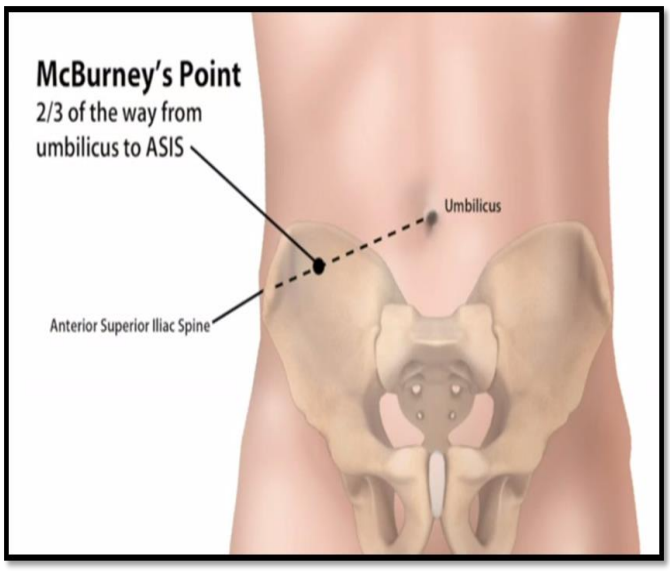
ACUTE APPENDICITIS

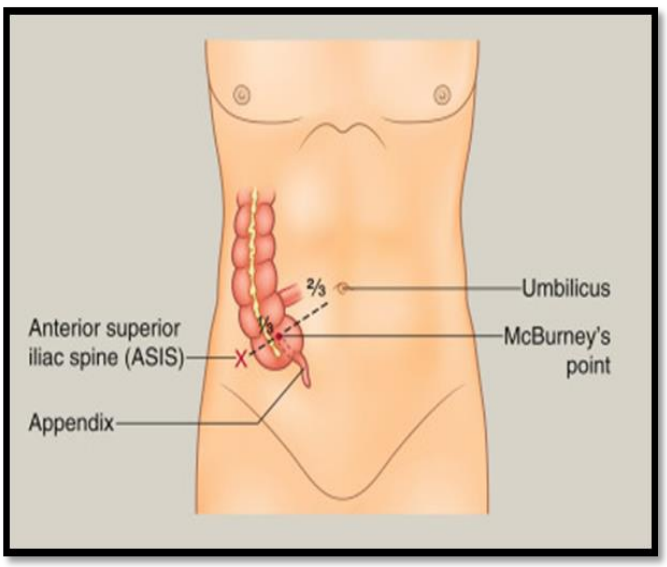
Acute appendicitis is most common in adolescents and young adults but may occur in any age group. The lifetime risk for appendicitis is 7%; males are affected slightly more often than females.

Clinical Features

Typically, early acute appendicitis produces periumbilical pain that ultimately localizes to the right lower quadrant، followed by nausea, vomiting, low-grade fever, and a mildly elevated peripheral white blood cell count. A classic physical finding is McBurney's sign, deep tenderness noted at a location two-thirds of the distance from the umbilicus to the right anterior superior iliac spine (McBurney's point).These signs and symptoms however, are often absent, creating difficulty in clinical diagnosis.

In early acute appendicitis, subserosal vessels are congested, and a modest perivascular neutrophilic infiltrate is present within all layers of the wall. The inflammatory reaction transforms the normal glistening serosa into a dull, granular-appearing، erythematous surface. In more severe cases, focal abscesses may form within the wall (acute suppurative appendicitis), and these may even progress to large areas of hemorrhagic ulceration and gangrenous necrosis that extend to the serosa, creating acute gangrenous appendicitis، which often is followed by rupture and suppurative peritonitis.


McBurney's Point
2/3 of the way from
umbilicus to ASIS
Umbilicus
Anterior Superior Iliac Spine


2/3
1/3
Umbilicus
McBurney's
point
Anterior superior
iliac spine (ASIS)
Appendix