GIT

Class-note on

The Gastrointestinal Tract

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Oesophagus

Diseases of oesophagus:

1. Congenital anomalies
   - Atresia
   - Fistula
   - Stenosis
   - Webs
   - Rings
2. Lesions associated with motor dysfunction
   - Achalasia
   - Hiatus hernia
   - Diverticula
   - Laceration (Mallory-Weiss syndrome)
3. Varices
4. Oesophagitis
5. Tumours
   - Benign tumours
   - Malignant tumours
     - Squamous cell carcinoma
     - Adenocarcinoma

Important diseases of oesophagus:

1. Achalasia
2. Oesophagitis
3. Squamous cell carcinoma
4. Adenocarcinoma

Achalasia:

- Failure of relaxation with consequent dilatation of the oesophagus
- Manifest in young adulthood, infancy or childhood.
- May result from primary degenerative change in neural innervation.

Oesophagitis:

Causes:

- Reflux of gastric contents
- Prolonged gastric intubation
- Ingestion of irritants – corrosive acid or alkali, excessive hot fluids, heavy smoking etc.
- Cytotoxic anti-cancer therapy
- Infection following bacteraemia or viraemia.
- Fungal infection in debilitated or immunosuppressed patients or during broad sprectum antimicrobial therapy e.g. Candidiasis, Mucormycosis and Aspergilosis.
- Uraemia
- Radiation
- Systemic condition associated with decreased lower oesophageal sphincter tone including hypothyroidism, systemic sclerosis and pregnancy.
- In association with systemic dysquamative dermatological conditions such as pemphigoid and epidermolysis bullosa.
- Graft-versus host disease.

Barrette's oesophagus:

- Is a complication of long standing gastroesophageal reflux.
- The distal squamous mucosa is replaced by metaplastic columnar epithelium, as response to prolonged injury.
- It has 30-40 fold increased risk for developing adenocarcinoma over general population.

Tumours:

Benign tumours

- Leiomyoma
- Fibroma
- Haemangioma
- Neurofibroma
- Lymphangioma
- Squamous papilloma

Malignant Tumours

- squamous cell carcinoma
- Adenocarcinoma
- Undifferentiated carcinoma
- Carcinoid tumour
- Malignant melanoma

Squamous cell Carcinoma:

Epidemiology:

- Occurs in adult usually, over 50 years.
- M:F ratio 2:1
- High incidence in Northern and Eastern China, Puerto Rico, Iran, South Africa, and former Soviet Union.
- Blacks are at higher risk than are whites.

Aetiology:

- Genetic factors
- Carcinogens

  - Fungus contaminated food
  - Nitrosamine containing food

- Dietary deficiency of vitamins
- Alcohol consumption
- Smoking
- Human papilloma virus

Types:

A. Histological types

- In situ
- Infiltrating

B. Macroscopic types:

- Protruding
- Flat
- Excavating

Histological features:

- Anaplastic squamous cells may arrange in groups, nests, sheets and cords.
- Keratin pearls in well-differentiated lesions.

Stomach

Diseases of stomach:

1. Congenital anomalies

   - Diaphragmatic hernia
   - Pyloric stenosis

2. Gastritis

   - Acute gastritis
   - Chronic gastritis

3. Gastric ulceration

   - Peptic ulcers
   - Acute gastric ulceration

4. Miscellaneous conditions

   - Hypertrophic gastropathy
   - Gastric varices

5. Tumours

   - Gastric polyps
   - Gastric carcinoma
   - Gastric lymphoma

Important diseases of stomach:

- Congenital pyloric stenosis
- Acute gastritis
- Chronic gastritis
- Peptic ulcer
- Gastric carcinoma

Congenital pyloric stenosis:

- Encountered in infants
- M:F ratio 3:1 to 4:1
- Occurs in 1 in 300-900 live births.
- An ovoid mass is formed due to hypertrophy of muscularis propria of the pylorus.
- Mode of inheritance is multifactorial

Gastritis:

Gastritis is defined as inflammation of gastric mucosa

Acute Gastritis:

Acute gastritis is an acute mucosal inflammatory process, usually of transient nature.

Causes:

- Heavy use of NSAIDs, particularly aspirin.
- Excessive alcohol consumption.
- Heavy smoking
- Treatment with cancer chemotherapeutic drugs.
- Uraemia.
- Systemic infections
- Severe stress
- Ischaemia and shock.
- Acid and alkali
- Gastric irradiation
- Nasogastric intubation
- Following distal gastrectomy

Histological findings:

Presence of neutrophils along epithelial cells.

Chronic Gastritis:

Chronic gastritis is defined as the presence of chronic mucosal inflammatory changes leading eventually to mucosal atrophy and epithelial metaplasia, usually in the absence of erosion.

Epithelial change may become dysplastic and constitute a background for development of carcinoma.

Etiological association:

- Immunologic - associated with pernicious anaemia.
- Chronic infection, especially Helicobacter pylori.
- Toxic, as with alcohol consumption and smoking
- Post surgical, especially following antrectomy and gastroenterostomy with reflux bilious duodenal secretion.
- Motor and mechanical, including obstruction, bezours (luminal concretion) and gastric atony.
- Radiation
- Granulomatous condition (e.g. Crohn's disease).
- Miscellaneous conditions – graft versus host disease, amyloidosis, uraemia

Autoimmune gastritis:

Autoimmune gastritis also known as diffuse corporal atrophic gastritis. It is due to presence of autoantibody to gastric gland parietal cells and intrinsic factors.

H. Pylori gastritis:

The bacteria elaborate toxin induce host's inflammatory response.

Morphology:

The mucosa is usually reddened and may flattened. Inflammatory infiltrates of lymphocytes and plasma cells is present within lamina propria.

Additional histologic features are - activity, regenerative changes, metaplasia (intestinal metaplasia), atrophy and presence of H. pylori.

Erosion:

Loss of superficial epithelium, generating defect in the mucosa that does not cross muscularis mucosa.

Ulcer:

Ulcer of gastrointestinal tract is defined as a breach in the mucosa which extends through muscularis mucosa into the submucosa or deeper.

Peptic Ulcers:

Peptic ulcers are chronic, often solitary, lesions that occur in any portion of the gastrointestinal tract exposed to the aggressive action of acid-peptic juices.

Distinctive features of peptic ulcer:

- Usually a single lesion
- Tends to be less than 4 cm in diameter.
- Penetrates muscularis mucosa, may perforate gastric wall.
- Is frequently recurring, with intermittent healing.
- Is located in the following sites:
    - Duodenum, first part
    - Stomach, usually antrum
    - Within Barrette's oesophagus.
    - In the margin of gastroenterostomy.
    - In the duodenum, stomach or jejunum of patients with Zollinger-Ellion syndrome.
    - Within or adjacent Meckel's diverticulum that contains ectopic gastric mucosa.

Epidemiology:

- Peptic ulcers are remitting and relapsing lesions.

- Most often diagnosed in middle-aged or older adults.
- Prevalence:
  - Man, 6-14%
  - Women, 2-6%

- M:F
  - Duodenal ulcer, 3:1
  - Gastric ulcer, 1.5:1 to 2:1

- No significant racial differences have been identified.
- Genetic influence: a little or no
- More frequent in patient with alcoholic cirrhosis, chronic obstructive pulmonary diseases, chronic renal failure and hyperprathyroidism

Pathogenesis:

- Peptic ulcer is produced by an imbalance between the gastrointestinal mucosal defence mechanisms and the damaging forces.
- Gastric acid and pepsin are requisite for all peptic ulceration.
- The mechanism of hyperacidity is not always clear. The possible causes are increased parietal cell mass, increased sensitivity to secretory stimuli, increased basal acid secretory drive or impaired inhibition of stimulatory mechanism such as gastrin release.
- In some patients with duodenal ulcers, there is too rapid gastric emptying, exposing the duodenal mucosa to an excessive acid load.
- In H. pylori infection, gastric ulcers presumably result from the action of bacterial urease, which generate ammonia, and protease, which breaks down glycoprotein in the mucous. Damage to the protective mucous layer exposes the underlying epithelial cells to damaging influence of the acid-peptic injury is thus more prone to peptic ulceration. When duodenal mucosa chronically exposes to increased acid, it is replaced by metaplastic gastric mucosa. Metaplastic mucosa is infected by H. pylori and may eventually develop duodenal ulcers.
- NSAIDs may cause peptic ulcer by suppression of mucosal prostaglandin synthesis and by direct irritation.
- Cigarette smoking is suspected of being ulcerogenic, possibly by suppression of mucosal prostaglandin synthesis.
- Alcohol has not been proved to cause peptic ulceration directly but alcoholic cirrhosis is associated with an increased incidence of peptic ulcers.
- High dose and repeated use of corticosteroid may promote peptic ulcers.
- Personality and psychological stress are important contributing factors.

Gross Appearance of Peptic Ulcer:

Peptic ulcer is round to oval, sharply punched out defect with relatively straight walls. The margins are usually level with surrounding mucosa. The base is smooth and clear. Scaring may involve the entire thickness of the stomach. Puckering of the surrounding mucosa creates mucosal folds that radiate from crater in a spoke-like fashion. Surrounding mucosa is oedematous and reddened due to gastritis.

Histologic Appearance:

Histologic features vary in different stage such as active necrosis, chronic inflammation and scarring, and healing. In active ulcer with ongoing necrosis, 4 zone are demonstrable:

1. Superficial thin layer of necrotic fibrinoid debris.

2. Zone of non-specific inflammatory infiltrates, with neutrophils predominating.
3. Active granulation tissue infiltrated by mononuclear leukocytes.
4. Collagen scar.

Complication of Peptic ulcer:

- Bleeding
- Perforation
- Obstruction
- Intractable pain

Acute Gastric ulcer:

Encountered in patients with

- Shock
- Extensive burns
- Sepsis
- Severe trauma
- Raised intracranial pressure
- NSAIDs

Morphology

- Usually multifocal
- Less than 1 cm in diameter
- Dark-brown ulcer base.
- Normal rugal folds
- Histologically unremarkable mucosa.

Gastric Polyps:

Types:

- Non-neoplastic polyp (90%)
    - Inflammatory
    - Hyperplastic
- Neoplastic polyp (adenomatous polyp)

Malignant Tumour:

- Adenocarcinoma (90-95%)
- Lymphoma (4%)
- Carcinoid (3%)
- Malignant spindle cell tumour (2%)

Gastric Adenocarcinoma:

Epidemiology:

- Is world-wide disease
- High incidence in Japan, Costa Rica, Colombia, China, Portugal, Iceland, Finland and Scotland.
- Represent 3% off all cancer death in USA.

Factors Associated With Increased Incidence of Gastric Carcinoma:

A. Diet:

- Nitrites derived from nitrates
- Smoked and salted foods, prickled vegetable
- Lack of fresh fruits and vegetable.

B. Host factors:

- Chronic atrophic gastritis
- Infection by H. pylori
- Partial gastrectomy
- Gastric adenocarcinoma

Location:

- Pylorus antrum (50-60%).
- Cardia (25%)
- Body and fundus (15-25%)

- Favourable location is lesser curvature of the antropyloric region.

- Ulcerative lesion on greater curvature is more likely to be malignant.

Classification of Gastric Carcinoma:

A. Based on depth of invasion:

- Early gastric cancer – confined to mucosa and submucosa.
- Advanced gastric cancer – extended below submucosa into muscular wall.

B. Based on macroscopic growth pattern:

- Exophytic
- Flat or depressed
- Excavating

C. Based on microscopic feature (Lauren's classification):

- Intestinal type
- Diffuse type

Major features of Lauren's classification of gastric carcinoma:

Number	Features	Intestinal type	Diffuse type
1.	Most common gross configuration	Polypoid and fungating	Ulcerative; infiltrative.
2.	Microscopic features		
	Differentiation	Well differentiated; gland forming	Poorly differentiated; signet ring cells
	Mucin production	Limited; confined to glad lumen	Extensive; may be prominent in stroma around gland (colloid carcinoma)
	Growth pattern	Expansile; inflammation often prominent.	Non-cohesive; infiltrating
3.	Association with intestinal metaplasia	Almost universal	Less prominent
4.	Clinical features		
	Mean age (Years)	55	48
	M:F ratio	2:1	approx. 1:1

Special Features:

- **Linitis plastica** – Uncommonly a broad region of the gastric wall or the entire stomach is extensively infiltrated by malignancy, creating a rigid, thickened 'leather bottle'.
- **Krukenberg's tumour** – Metastatic adenocarcinoma to the ovaries (from stomach, breast, pancreas and gall bladder) is called Krukenberg's tumour.

Intestine

Diseases of small and large intestines:

1. Congenital anomalies

    - Meckel's diverticulum
    - Hirschprung's disease
    - Atresia and stenosis

2. Vascular disorders
    - Ischaemic bowel disease
    - Angiodysplasia
    - Haemorrhoids

3. Enterocolitis:

    - Diarrhoea and dysentery
    - Infectious enterocolitis
    - Bacterial enterocolitis
    - Necrotizing enterocolitis
    - Antibiotic-associated colitis
    - Miscellaneous intestinal inflammatory disorders

4. Malabsorption syndromes:

    - Celiac sprue
    - Tropical sprue
    - Whiple's disease
    - Bacterial overgrowth syndrome
    - Disaccharidase deficiency
    - Abetalipoproteinemia

5. Idiopathic inflammatory bowel diseases:

    - Crohn's disease
    - Ulcerative colitis

6. Chronic diverticulosis

7. Bowel obstruction

    - Hernia
    - Adhesions
    - Intussusception
    - Volvulous

8. Tumours

Important diseases of intestines:

1. Meckel's diverticulum
2. Hirschprung's disease
3. Haemorrhoids
4. Celiac sprue
5. Tropical sprue
6. Ulcerative colitis
7. Crohn's disease
8. Hernia
9. Tumours

Meckel's Diverculum:

Persistent of viteline duct on the antimesenteric side of the bowel may give rise to a solitary diverticulum, usually within 30 cm of ileocecal valve, termed Meckel's diverculum.

Hirschprung's disease:

When migration of neural crest cell arrest at some point before reaching the anus, a segment of the colon remain lack of both Meisner's and Auerbach's Myenteric plexuses. Loss of enteric neural co-ordination leads to functional obstruction and colonic dilatation proximal to affected segment.

Haemorrhoids:

- Haemorrhoids are variceal dilatation of the anal and perianal venous plexuses.
- Develop in setting of persistent elevated venous pressure within the haemorrhoidal plexuses.
- Predisposing influences are

    - Constipation with straining of stool
    - Venous stasis of pregnancy

Celiac sprue:

Celiac sprue is a chronic disease characterised by mucosal lesion of small intestine with impaired absorption, which improves on withdrawal of wheat gliadins and related grain.

Tropical Sprue:

Celiac like disease occurs almost exclusively in people living in or visiting the tropics.

Idiopathic Inflammatory Bowel Disease:

Two inflammatory disorder of unknown aetiology affecting the intestinal tracts is Crohn's disease (CD) and ulcerative colitis. These diseases share many common features and are collectively known as inflammatory bowel disease (IBD).

Crohn's Disease:

- Synonym – terminal ileitis, regional ileitis and regional enteritis.
- Characterised by:
  - Sharply delineated and typically transmural involvement of bowel by an inflammatory process with mucosal damage.
  - Noncaseating granulomas.
  - Fissuring and formation of fistula.
  - Systemic manifestation in some patients.

Ulcerative Colitis:

Ulcerative colitis is an ulceroinflammatory disease limited to the colon and affecting only the mucosa and submucosa except in the most severe cases. UC extends in a continuous fashion proximally from the rectum. Well-formed granulomas are absent.

Distinctive features of Crohn's disease and Ulcerative Colitis:

Features		CD	UC
Macroscopic:			
	Bowel region	Ileum ± colon	Colon only
	Distribution	Skip lesions	Diffuse
	Stricture	Early	Late or rare
	Wall appearance	Thickened small intestine/thin large intestine	Thin
	Dilation	No in small intestine/Yes in Large intestine	Yes
Microscopic:			
	Pseudopolyp	No to slight	Marked
	Ulcers	Deep, linear	Superficial

Lymphoid reaction	Marked	Mild
Fibrosis	Marked	Mild
Serositis	Marked	Mild
Granulomas	Present 50%	Absent
Fistula/sinus	Present	Absent

Tumour of Intestine:

1. Non-neoplastic polyps

    - Hyperplastic polyp
    - Hamartomatous polyp

        - Juvenile polyp
        - Peutz-Jegher polyp

    - Inflammatory polyp

    - Lymphoid polyp

2. Neoplastic epithelial lesions;

    - Benign polyps

        - Tubular adenoma
        - Tubulovillous adenoma
        - Villous adenomas

    - Malignant lesions

        - Adenocarcinoma
        - Carcinoid tumour
        - Anal zone carcinoma

3. Mesenchymal lesions:

    - Benign lesions

        - Leiomyoma
        - Lipoma
        - Neuroma
        - Angioma

    - Malignant lesions

        - Leiomyosarcoma
        - Liposarcoma
        - Malignant spindle cell tumour
        - Kaposis sarcoma

4. Lymphoma

Important Tumours of Intestine:

1. Juvenile polyps
2. Adenocarcinoma
3. Carcinoid tumour
4. Lymphoma

Juvenile Polyp:

- Represent focal hamartomatous malformation of the mucosal elements.
- Vast majority occur in children below the age of 5 years.
- About 80% occur in rectum
- Appears as rounded smooth lesion about 1 to 2 cm in diameter with a stalk upto 2 cm in length.
- The bulk of the polyp is formed by lamina propria enclosing abundant cystically dilated glands. Inflammation, congestion and ulceration are common.

Colorectal Carcinomas:

- About 90% of all cancer in large intestine are adenocarcinoma.
- Peak incidence is in 60 to 70 years of age.
- Fewer than 20% of cases occur under 50 years of age.
- M:F ratio 2:1
- World-wide distribution.
- High rates in United State, Canada, Australia, Sweden and other different countries.
- Predisposing factors:

  Diet:

  - A low content of unabsorbable vegetable fibres
  - A corresponding high content of refined carbohydrate
  - A high fat content
  - Decreased intake of protective micronutrients.

  - Site:

    - Cecum and ascending colon (25%)
    - Rectum and distal sigmoid (25%)
    - Descending colon and proximal sigmoid (25%)
    - Scattered (25%).

- Almost all colorectal carcinomas begin as in situ lesions within adenomatous polyp.
- Macroscopic patterns

  - Polypoid, fungating (cecum, ascending colon)
  - Annular, encircling lesions napkin-ring constriction

- Microscopic patterns:

  - Composed of tall columnar cells invading the submucosa and muscularis propria.
  - Or masses of undifferentiated frankly anaplastic cells.
  - Many tumour produce mucin, which is secreted into gland lumina or into the interstium of the gut wall.

Carcinoid Tumour:

- Neuroendocrine cells are normally dispersed along the length of gastrointestinal tract mucosa as well as in many other organs, such as lungs, pancreas, biliary tract and else where; tumour of these cells are called 'carcinoid' on the basis of their slow growth pattern.
- Carcinoids arise in gut, pancreas, lungs, biliary tree and liver.
- Peak incidence is in sixth decade; may occur in any age.
- About 50% of small intestinal tumours are carcinoid 2% of colorectal malignancy.
- The appendix is the most common site of gut carcinoid tumour followed by ileum, rectum, stomach and colon.
- The tumour is solid and yellow-tan appearance on transaction.
- Histologically the tumour cells may form discrete islands, trabeculae, glands or undifferentiated sheets.
- The tumour cells are monotonously similar, having a scant, pink granular cytoplasms and a rounded to oval stipple nuclei.

Acute Appendicitis:

Causes:

1. Obstruction (50 – 80%)

   - Fecalith
   - Gall stone
   - Tumour
   - Ball o warms

2. Unknown (20%)

Pathogenesis:

Continued secretion of mucinous fluid in the obstructed viscous leads to a progressive increase in intraluminal pressure to cause collapse of draining veins. Ischaemic injury favours bacterial proliferation with additional inflammatory oedema and exudation.

Morphology:

1. **At earliest stage**: (early acute appendicitis)

   Only a scant neutrophilic exudate may found throughout the mucosa, submucosa and muscularis propria. Subserosal vessels are congested and perivascular neutrophilic infiltrates. The serosa is dull, granular red membrane.

2. Acute suppurative Appendicitis:

Prominent neutrophilic exudate producing fibrinopurulent reaction over the serosa, abscess formation and foci of suppurative necrosis.

3. **Acute gangrenous appendicitis**:

Large areas of haemorrhagic green ulceration of the mucosa and green black gangrenous necrosis through the wall extending to the serosa. It is followed by rupture and suppurative peritonitis.

- *Histologic criteria for the diagnosis of acute appendicitis is neutrophilic infiltration of the muscularis.*

Tumour of the appendix:

- Mucinous cystadenoma
- Mucinous cyst adenocarcinoma
- Carcinoid

Diseases of peritoneum:

- Peritonitis
- Tumour
  - Primary – mesothelioma
  - Secondary – Ovary, pancreas etc.

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