## Pharyngo-oesophageal Diverticulum (Zenker’s diverticulum)

- **Etiology:** Failure of relaxation of cricopharyngeus muscle (spasm or achalasia) during swallowing → ↑ intraluminal pressure and herniation of pharyngeal mucosa

- **Pathology:**
  - **Site:** It develops as a midline mucosal herniation on the posterior aspect of pharyngo-oesophageal junction through defect between fibers of thyropharyngeus muscle and transverse fibers of cricopharyngeus muscle (Killian dehiscence).
  - **Structure:** Mucosa and submucosa and incomplete muscular coat.

- **Presentation:**
  - **Type of patients:** Males > females and occurs in middle age and elderly.
  - **Symptoms:**
    1. Long history of dysphagia which becomes severe due to compression of esophagus.
    2. Regurgitation of foul undigested food with attacks of choking & cough.
    3. Pain, halitosis, hoarseness, anorexia & loss of weight
    4. The patient may hear and feel gurgling sound during swallowing.
  - **Signs:**
    1. Regurgitated material is non-acid.
    2. Pouch at first globular then enlarges and becomes pear shaped sufficiently to become clinically palpable.
    3. Gurgling sound elicited on palpation of left side of neck at level of cricoid cartilage.

- **Treatment:**
  1. **Cricopharyngeal myotomy:** (Heller’s operations) suitable for small non-dependent diverticula.
  2. **Diverticulectomy** (invagination into lumen & closing point of invagination) → Suitable for moderate-sized pouches which are not infected or adherent to adjacent structures and is often combined with cricopharyngeal myotomy.
  3. **Diverticulectomy (best):** suitable for large dependent pouches and is combined with cricopharyngeal myotomy.
  4. **Endoscopic division of septum:** suitable for elderly poor-risk patients with large dependent diverticula.

## Mid – Thoracic Diverticula

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| Mid – thoracic diverticula | 1. Congenital. 2. Acquired:  
  a) Pulsion type (common): due to esophageal motility disorder— Persistent elevation of the esophageal intraluminal pressure with subsequent mucosal herniation through a weak spot.  
  b) Traction mid-oesophageal diverticula are rare | The pulsion diverticula are usually narrow-necked and globular in shape and do not have a muscular coat. The congenital and traction diverticula are usually tented triangular shape with a wide neck and have a muscular coat. | 1. Haematemesis  
  2. Perforation, usually by a swallowed fish bone/foreign body → abscess formation and tracheo/broncho-esophageal fistula.  
  3. Halitosis, anorexia and chest pain | Treatment of the underlying disorder.  
  Symptomatic: diverticulectomy through a right thoracotomy. |
| Epiphrenic Diverticulum | 1. Congenital is rare.  
  2. Pulsion (common): due to esophageal motility disorder, HH and GERD. | As Mid-thoracic Diverticula | 1. Haematemesis (may be severe)  
  2. Perforation.  
  3. Halitosis, anorexia and chest pain | 1. Treatment of the underlying disorder.  
  2. Symptomatic → diverticulectomy through a right thoracotomy.  
  • Large compressing the esophagus  
  • Dependent with narrow neck which cannot drain adequately  
  • Inflamed |

## Gastric diverticula

- **Complications:** It is usually congenital  
  - It is usually solitary.  
  - Occurs mainly in posterior surface of cardia or fundus  

## Complications of Zenker’s diverticula
1. Bleeding from diverticulum (rare)
2. Pneumonitis, lung abscess, pulmonary collapse due to aspiration.
3. Perforation (usually following endoscopy)
4. Predispose to carcinoma (0.3%).

## Investigations of Zenker's = Mid thoracic diverticula = Epiphrenic diverticulum
1. Barium swallow: → Tea-pot appearance with fluid level (Zenker’s)  
2. Endoscopy: risky as it may induce perforation of pouch.  
3. Pharyngeal manometry.
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| **Duodenal diverticulum** | They are pulsion diverticulae | - They multiple and are of variable size.  
- Occurs mainly in the medial wall of 2nd and 3rd parts of duodenum | 1. Obstructive jaundice or pancreatitis  
2. Pain, bleeding or perforation | 1. Upper GI endoscopy  
- Medial wall: diverticulectomy is not recommended.  
- Bleeding: transduodenal ligation of bleeding vessel  
- Perforation: drainage |
| **Jejunal & ileal diverticulae** | Pulsion diverticulae  
Motility disturbance of the involved intestine | - They are found on the mesenteric border of involved intestine  
- They are multiple and of variable size.  
- 80% in jejunum, 15% in ileum and 5% in both. | Type of patients: male : females. It occurs in patients in 7th decade.  
Symptoms & signs:  
- Abdominal pain and postprandial bloating  
- Malabsorption syndrome due to bacterial proliferation → diarrhea,  
- Steatorrhea or vitamin B12 deficiency  
- Acute intestinal obstruction (intussusception), bleeding or perforation | Barium follow through (the most important) | **Conservative:**  
1. Diet: High protein, low residue diet  
2. Drugs: broad spectrum antibiotics.  
**Surgical:** Segmental resection of the involved segment  
It is indicated in complicated cases. |
| **Merkel’s diverticulum** | Due to persistent patent proximal portion of the vitellointestinal duct | 1. It occurs in 2% prevalence of human race.  
2. It occurs in 2:1 female predominance.  
3. It is symptomatic in 2% of these.  
4. It becomes symptomatic in infants younger < 2 years.  
5. It is about 2 inches long.  
6. It projects from the antimesenteric border of the ileum—commonly 2 feet (60 cm) from the ileo-caecal valve.  
7. It contains heterotopic gastric & pancreatic tissues in 20% of cases  
8. Shape:  
   a. Usually blind pouch with rounded end  
   b. Tapers into a thin fibrous cord which attached to the umbilicus (represents the obliterated distal part of vitello-intestinal duct)  
   c. Tapers into a thin fibrous cord which hangs free in the peritoneal cavity  
9. Being congenital, it contains all 3 coats of intestinal wall & has its own blood supply. |  
A- Asymptomatic (98%)  
B- Symptomatic (2%) → presented with complications →  
(1) Chronic peptic ulcer:  
   o Due to ulceration of adjacent ileal mucosa by acidic secretion of heterotopic gastric epithelium in the diverticulum.  
   o It leads to dyspepsia similar to that of DU but pain felt around umbilicus  
(2) Bleeding per rectum (commonest in children):  
   o Due to chronic peptic ulcer:  
   o It presents as painless episodic hemorrhage that is typically bright red to maroon-colored stool (Melena is not characteristically seen)  
(3) Intestinal obstruction (commonest in adult) due to:  
   a. Volvulus of the related loop of ileum around a fibrous band between apex of diverticulum & umbilicus.  
   b. Internal herniation: where the fibrous band attached to umbilicus strangulates a loop.  
   c. Intussusception: Swollen inflamed base of diverticulum act as the apex  
   d. Stricture 2ry to chronic diverticulitis.  
(4) Littre’s hernia:  
   Incarceration of diverticulum in inguinal or femoral hernia without intestinal obstruction  
5) Acute diverticulitis:  
   o Due to stagnation of content due to lodgement of coarse food residue or FB.  
   o Inflammatory process may proceed to perforation & peritonitis.  
   o Symptoms & signs are identical with those of acute appendicitis (difficult to diff. ) both appendicitis and diverticulitis  
   o At operation → if appendix appears healthy → an inflamed Meckel’s diverticulum should be looked for. | (1) Gastrograffin follow through  
(2) Meckel’s scanning (99Tcm Pertechnetate):  
   o When perforation or haemorrhage has occurred → imaging of the abdomen with gamma camera, after injection of 30-400 u Ci 99Tcm IV → may localize heterotopic gastric mucosa in a Meckel’s diverticulum in 90% of cases | **Asymptomatic:**  
- If it is encountered during abdominal operations or unrelated condition:  
- If the general condition of patient permits→ it should be resected to avoid subsequent complications.  
- If wide mouth & thin wall → leave it  
**II. Symptomatic:**  
a. Meckel diverticulectomy:  
   - If the base & related loop of ileum are healthy → diverticulum is excised tangentially & defect is closed so that suture line is transverse.  
   - b. Resection-anastomosis:  
   - If the base is grossly indurated with congested or inflamed loop of ileum → resection-anastomosis of affected segment of ileum containing diverticulum.  
   - Diverticulum should not be amputated at its base & imaged in the same way as an appendix because of the risks of stricture and of leaving heterotopic epithelium at the base. |