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- Only organ navigating through three different body cavity
- "The history of esophageal surgery is the tale of men repeatedly losing to a stronger adversary yet persisting in this unequal struggle until the nature of the problems became apparent and the war [is] won."
- Dobromysslow performed the first intrathoracic segmental esophageal resection and primary anastomosis
- Franz Torek, Oshava, Ivor Lewis, McKewon, Orringer and Sloan, Dor, Heller, Toupet, Belsey, Nissen -- few surgeons
- Boerhaave, Zenker, and Barrett—physicians

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EMBRYOLOGY

- Esophagus begins in week 3 of gestation and, by the 14th week, the fetus takes its first swallow
- Develops from the foregut

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SURGICAL ANATOMY

- 25 cm long
- Starts at C6
- UES upper esophageal sphincter
  - Cricopharyngeus muscle
- Upper part striated muscle
- Transitional zone
- Lower part only smooth muscle
- Vagus , Aeurbach's plexus , Meissner's plexus

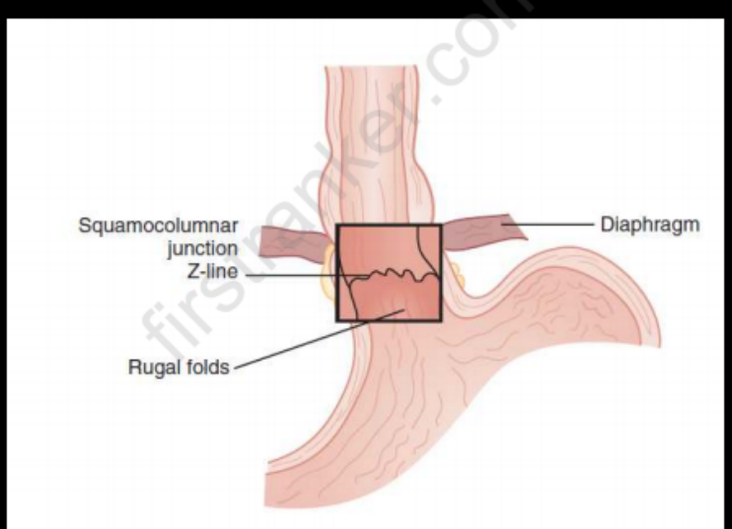
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- Midline, left(trachea), right(carina) and left(esophageal hiatus)
- Enters abdomen at T11
- Pharyngeal , cervical, thoracic and abdominal parts
- Only mucosa and muscularis propria
- No serosa
- Lining throughout squamous
- Z-line distal transitional zone (1 to 2 cm)– columnar
- The collar of Helvetius – transitional zone between circular and oblique muscle fibres

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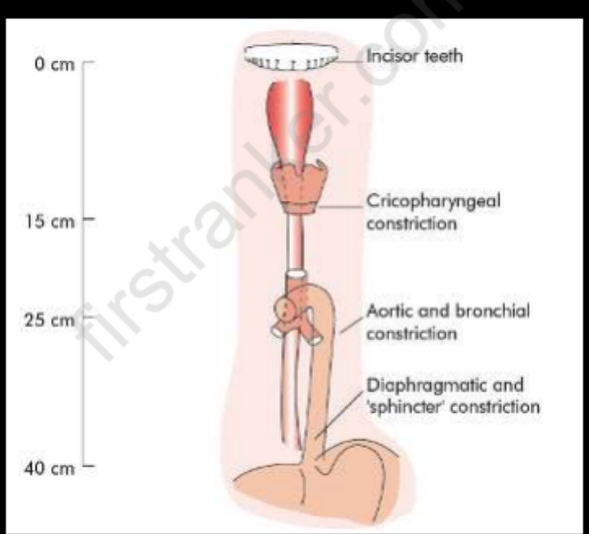
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- Three anatomical narrowing
  - Cricopharygeal (15 cm)---14mm
  - Aortic and bronchial (25 cm)---16mm
  - Diaphragmatic (40cm)—18mm
- Normal diameter 25mm
- GEJ/LES for identifying land marks two external and two endoscopic
  - Internally Z Line and transition from smooth to rugal fold
  - Externally collar of Helvetius and gastroesophageal fat pad

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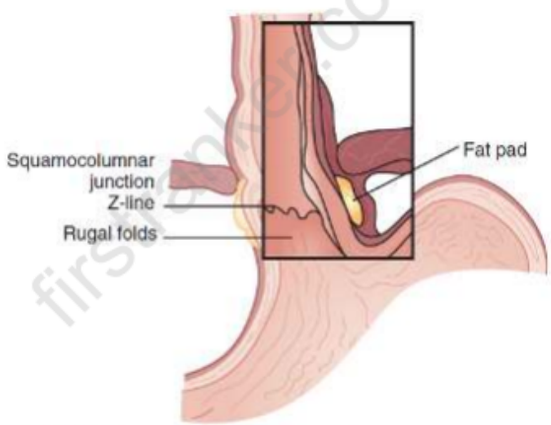
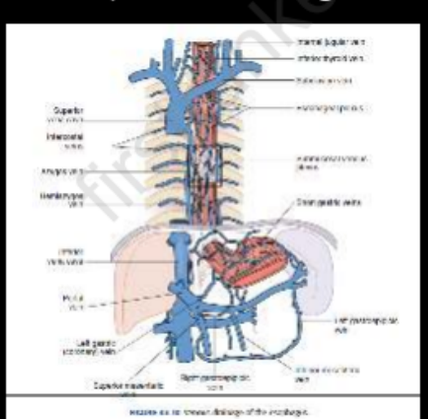
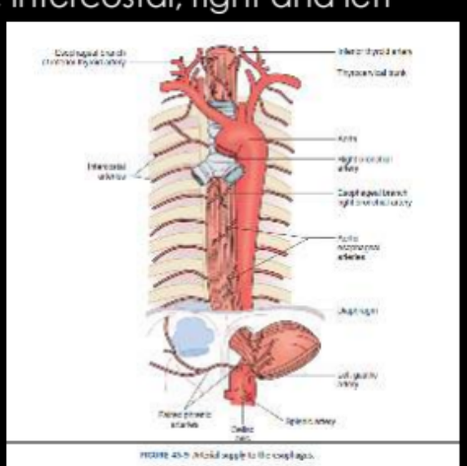


FIGURE 43-8 Identifiers of the gastroesophageal junction.

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- Arteries and veins
  - Sup thyroid, inf thyroid , esophageal branches, intercostal, right and left bronchial arteries, inferior phrenic , left gastric





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SYMPTOMS OF ESOPHAGEAL DISEASES

- Esophageal dysphagia – Malignancy
  - Occurs in involuntary phase
  - Food sticking
  - Solid and /fluid
- Odynophagia – inflammation/ ulcer/chemical injury
- Reflux –GERD
  - Passive return of gastroduodenal contents
  - Loss of weight, anemia , cachexia, voice change, cough, dyspnea
- Chest pain ? Cardiac

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INVETSIGATIONS

- Radiography
  - Plain x ray – foreign body
  - Barium swallow – narrowing, lesions, anatomical distortions, motility disorder
  - CT scan
- Endoscopy
  - View , biopsy/cytology, removal of FB, stricture dilatation
  - Rigid/flexible
  - GA/local
  - Flexible – along with OGDScopy
- Endosonography
- Manometry – for motility disorders
- 24 hr p H monitoring –GERD ---Johnson-Demeester scoring

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FOREIGN BODIES

- Food most common
- Associated pathological lesions may be seen
- Plain radiograph
- Flexible endoscopy
- Button / batteries dangerous --- should not be pushed to stomach
- Over-tube used for sharp objects

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PERFORATION

- Iatrogenic / barotrauma
- Iatrogenic – most common , usually conservative
  - 1 in 4000
  - Pharynx/esophagus/at the site of pathology
  - Contributed by osteophytes, pharyngeal pouch,
  - Biospy
  - More with therapeutic endoscopy
  - Pain/hoarseness/surgical emphysema/pnemo/hydropneumothorax

- Spontaneous – Boerhaave syndrome
  - Vomiting against closed glottis
  - Lower third – weekest
  - Mediastinitis
  - d/d MI/ peptic ulcer perforation / pancreatitis
  - Xray – pnemomediastinum / pleural effusion
  - Surgical intervention

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- Aim of treatment to limit infection
- Surgery depends on site, event, underlying pathology, status of esophagus
- Cervical/spontaneous/benign/empty esophagus – conservative
- Antibiotics , diversion, nasogastric aspiration ,
- Surgery – direct repair/external fistula creation/resection and late repair

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MALLORY WEISS SYNDROME

- Vigorous vomiting – vertical split in lower esophagus – below Z line(90%)/in esophagus(10%) producing hematemesis
- Endoscopic injection therapy may be required
- Usually self subsiding
- Resolve in 7 – 10 days

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CORROSIVE INJURIES

- Acid/ alkali
- Suicidal
- Type/concentration and volume decides the damage
- Alkali – more of esophagus – liquifaction, saponification, thrombosis of blood vessels fibrous scarring
- Acid – stomach also affected , coagulation necrosis and eschar formation
- Early endoscopy by experts
- Conservative management to feeding jejunostomy, resection and replacement of esophagus(late)
- Dilatation --- controversial

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GORD

- Most common disease of esophagus
- Loss of competence of LOS
- What is TLOSRs ? (Transient Lower Oesophageal Sphincter Relaxations)
- Associated with hiatus hernia – sliding
- Triad of symptoms – heartburn , epigastric pain and regurgitation
- Diagnosis – suspicion , endoscopy, 24hr pHmonitoring is the gold standard
- Esophageal manometry – TLOSRs
- Dysphagia – late and sign of stricture

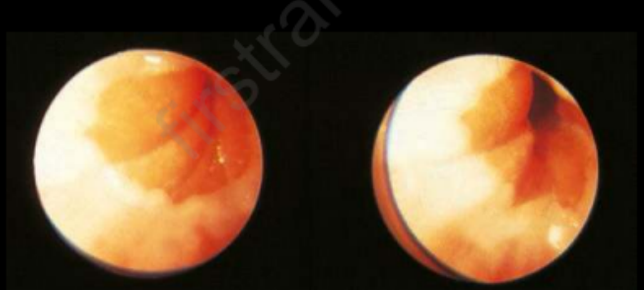
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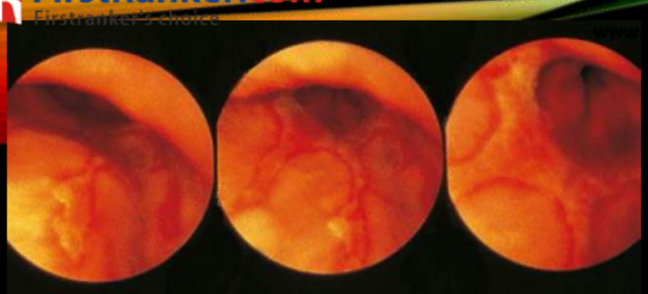


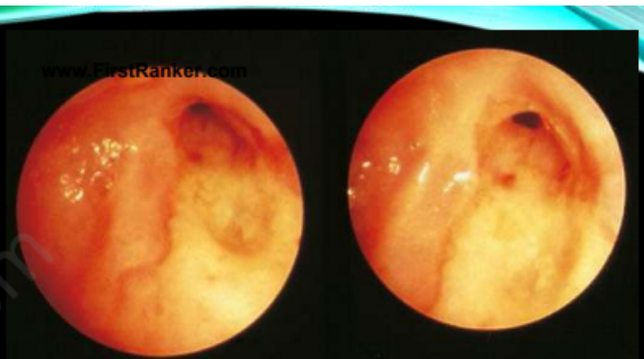


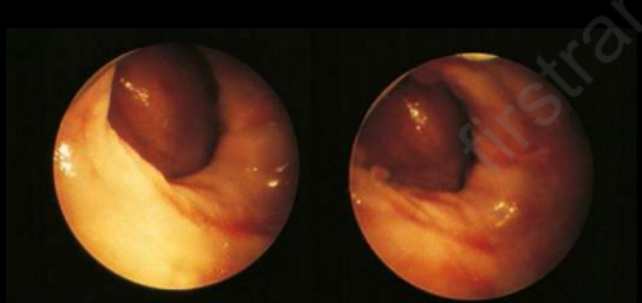
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- Treatment
- Medical
  - PPI, (8wks)
  - Lifestyle modification
- Endoscopic dilatation
- Surgery
  - Endoscopic procedures – plication, radio-frequency ablation, injection of polymers
  - Surgery – antireflux surgeries
  - Create intra abdominal esophagus
    - Fundoplication (partial or full)
  - Crural repair
  - Wrapping of stomach

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FUNDOPLICATION

- Nissen –full
  - Short term dyphagia but better long term control
  - Gas blot syndrome – no belching – solution by floppy technique
- Toupet / Dor / Watson - partial
  - Less complication but no long term control
- Some times two surgeries or revisional surgeries may be required
- Hill's procedure
- Belsey's Mark IV

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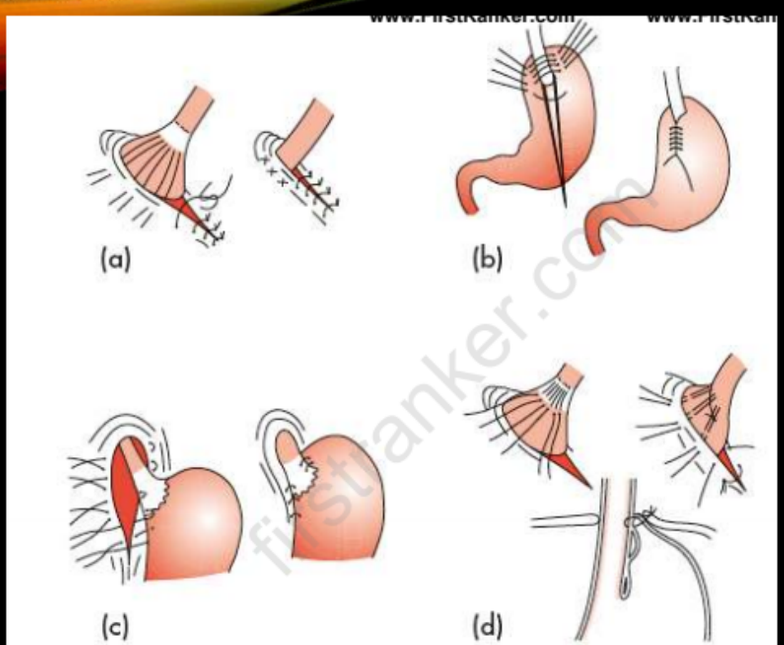
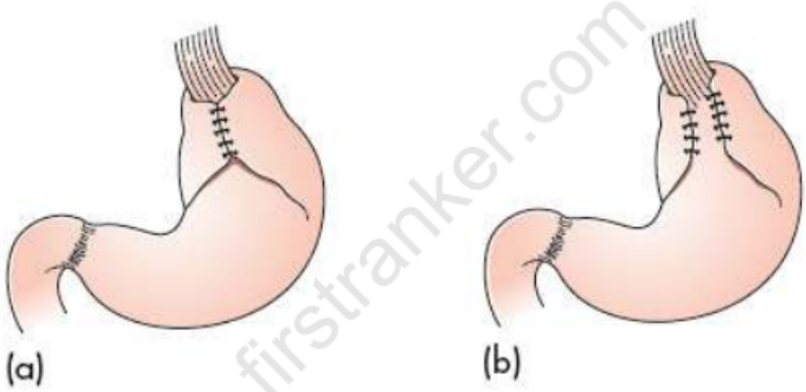


Figure 62.23 Various operations for the surgical correction of gastro oesophageal reflux disease. (a) The original Allison repair of hiatus hernia (this is ineffective and is no longer done); (b) Nissen fundoplica tion; (c) Hill procedure; (d) Belsey Mark IV operation.

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Figure 62.25 (a) Total (Nissen) fundoplication; (b) partial fundoplication (Toupet).

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COMPLICATIONS OF GORD

- Stricture
  - Differentiate from malignancy
  - PPI long term
  - Dilatation
  - Surgery – standard antireflux surgery
- Esophageal shortening
  - Inflammation , fibrosis , shortening
  - Collis gastroplasty
  - Collis- Nissen Operation

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Figure 62.26 Collis gastroplasty to produce a neo-oesophagus around which a Nissen fundoplication is done. The operation may be performed by a laparoscopic as well as an open approach using circular and linear staplers.

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BARRETTS ESOPHAGUS

- Columnar lined lower esophagus
- In response to chronic GORD
- Intestinal metaplasia – contains goblet cells
- Distinguish from sliding hernia (gastric mucosal folds)
- Stricture can develop
- Malignancy – adenocarcinoma esophagus – 25 fold increase
- Regular endoscopy
- Length determines the incidence of ca

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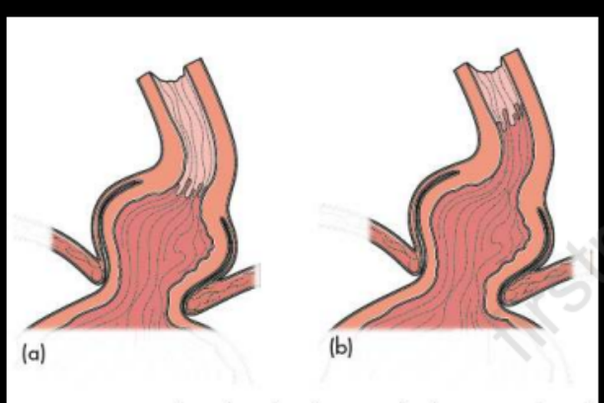


Figure 62.28 (a) The relationship between the lower oesophageal sphincter, the squamocolumnar junction and the diaphragm in sliding hiatus hernia. (b) Barrett's oesophagus and sliding hernia.



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- Classic Barrett's (3 cm or more columnar epithelium);
- Short -segment Barrett's (less than 3 cm of columnar epithelium);
- Cardia metaplasia (intestinal metaplasia at the oesophagogastric junction without any macroscopic change at endoscopy)
- Treatment
  - PPI
  - Dilatation endoscopic ablation with Laser, photodynamic therapy, argon-beam plasma coagulation and endoscopic mucosal resection (EMR)??
  - Surveillance

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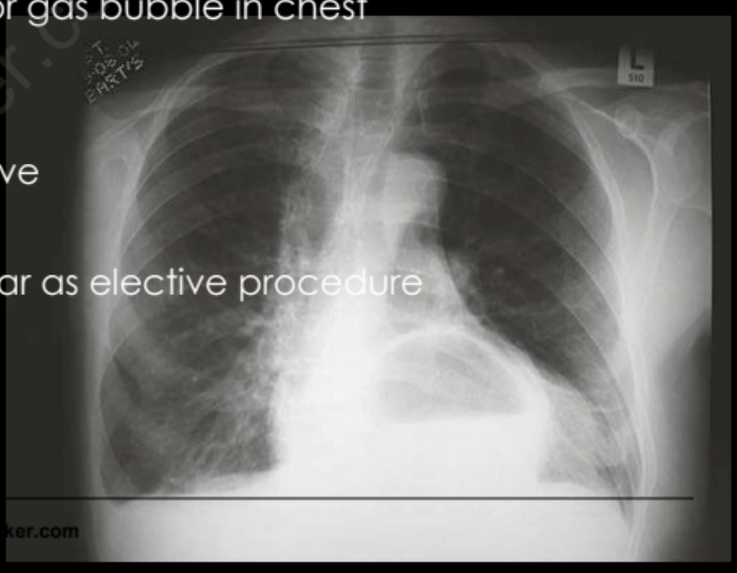
ROLLING HERNIA

- Para-esophageal hiatus hernia
- Mixed type
- Cardia displaced into chest with greater curvature rolls into mediastinum
- Colon or small bowel may be there
- Volvulus may be associated
- Elderly
- Dysphagia, chest pain (relieved by loud belch)
- Strangulation, gastric perforation , gangrene

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- X ray typical – fluid level behind heart or gas bubble in chest
- Barium meal
- Endoscopy confusing
- Surgery required – emergency or elective
- Fundoplication ?
- Laparoscopic approach getting popular as elective procedure



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NEOPLASAMS OF ESOPHAGUS

- Benign
  - Rare
  - Papillomas, adenomas, hyperplastic polyps
  - GIST, lipomas, granular cell tumor – arise from outer wall
  - Small and asymptomatic
  - Adequately biopsied to rule out malignancy
- Malignant
  - Primary
  - Secondary – from bronchogenic crcinoma
  - Non epithelial malignancy – malignant melanomas

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BENIGN





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CARCINOMA ESOPHAGUS

- 6th most common cancer
- Mid to late adulthood
- 5-10% five year survival
- SCC upper 2/3rd adenocarcinoma lower 1/3rd
- Commonest SCC
- Geographical variation
- Asian belt SCC , western adeno
- Fungal contamination of food, nutritional deficiency, tobacco, alcohol
- Obesity – GORD – barrett's esophagus

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- Symptomatic when advanced
- Direct , lymphatic and blood spread
- Trans-peritoneal for intra-abdominal oesophagus
- Dysphagia –for solid food , weight loss, odynophagia, regurgitation, vomiting
- Recurrent laryngeal palsy, horner's syndrome, spinal pain , diaphragmatic palsy
- Cutaneous mets, cervical LN
- Endoscopy – gold standard –biopsy
- Barium swallow -

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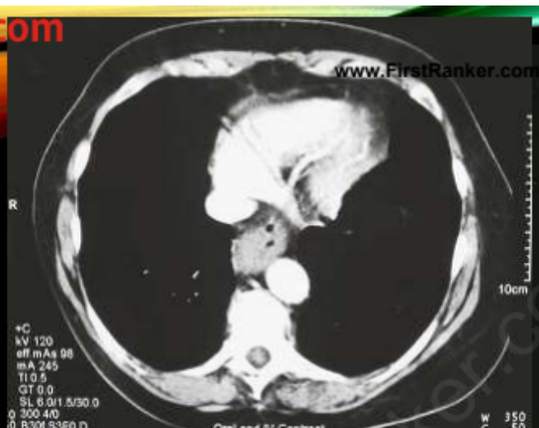
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- Blood inv- general assessment – HB LFT etc
- USS – abdomen mainly
- CT – contrast -- Lymph nodes minimum size 5mm
- MRI
- Bronchoscopy
- Laparoscopy
- EUS – depth of tumor penetration and lymph node status
- PET

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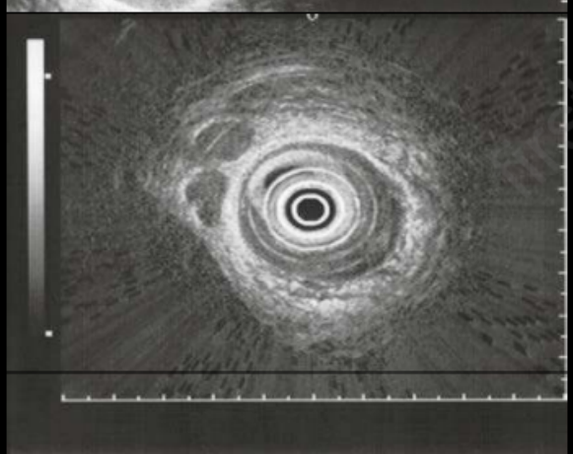


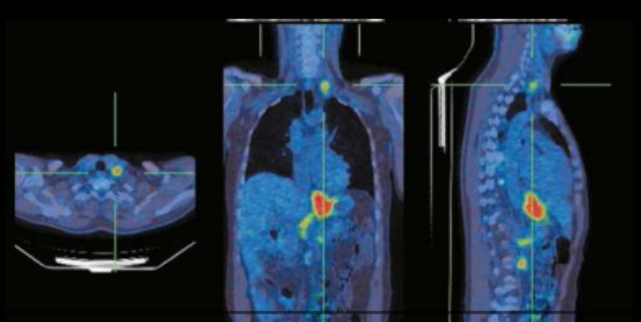
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STAGING

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Tis	High-grade dysplasia
T1	Tumour invading lamina propria or submucosa
T2	Tumour invading muscularis propria
T3	Tumour invading beyond muscularis propria
T4a	Tumour invading adjacent structures (pleura, pericardium, diaphragm)
T4b	Tumour invading adjacent structures (trachea, bone, aorta)
N0	No lymph node metastases
N1	Lymph node metastases in 1–2 nodes
N2	Lymph nodes metastases in 3–6 nodes
N3	Lymph node metastases in 7 or more lymph nodes
M0	No distant metastases
M1	All other distant metastases
Stage	1A: T1N0M0; 1B: T2N0M0; 2A: T3N0M0; 2B: T1/2N0M0; 3A: T4aN0M0, T3N1M0, T1/2N2M0; 3B: T3N2M0; 3C: T4aN1/2M0, T4bN0-3M0, T1-4N3M0; 4: T1-4N1-3M1

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TREATMENT

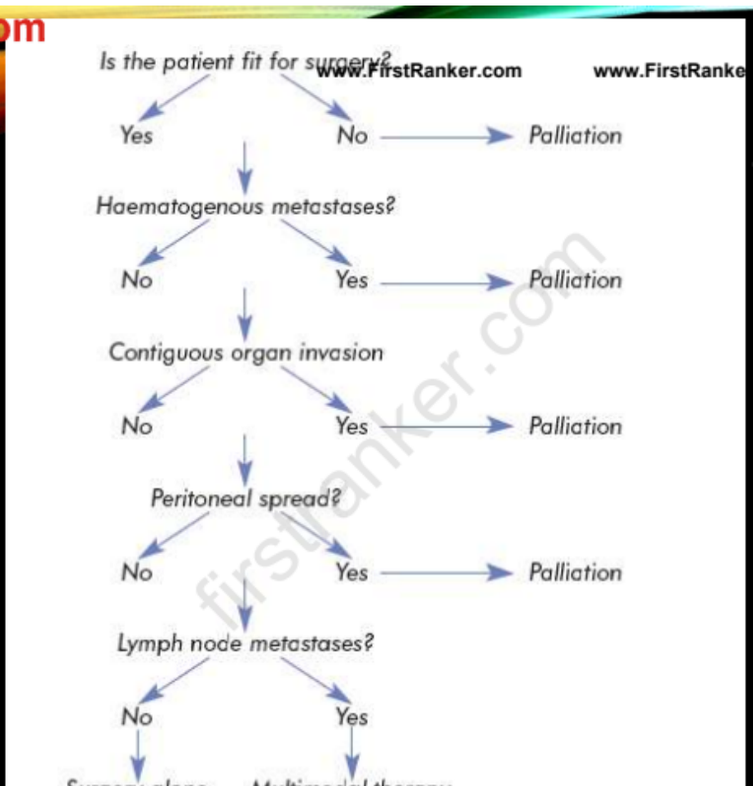


Figure 62.45 Algorithm for the management of oesophageal cancer.

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TREATMENT

- Definitive
  - Surgery – esophagectomy/esophago-gastrectomy
  - Possible in 1/3rd of cases
  - Clearance 10 cm proximally and 5 cm distally
  - Phototheraopy – intramucosal tumors
  - Surgery alone in T1/T2 N0 lesions
  - Others multimodal approach – radio/chemo
  - Neoadjuvant
  - Chemo radiation alone for SCC

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- SURGERY
  - Thoraco abdominal approach – single incision towards left thorax
  - Two stage (Ivor Lewis – abdominal and right thoracotomy)
  - McKeown three incisions
  - Trans-hiatal Orringer
- Neoadjuvant
- Non surgical
- Palliative
  - Intubation
  - Endoscopic laser
  - Brachytherapy
  - Feeding jejunostomy or gastrostomy

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ACHALASIA CARDIA

- "Failure to relax"
- Loss of ganglion in myenteric plexus
- Similarity with chaga's disease
- Dysphagia (rule out carcinoma)
- Few ganglion in dilated esophagus (in comparison to hirschsprung)
- Non relaxing LOS with absent peristalsis
- Absent gas bubble in stomach
- Mega-esophagus
- Retention esophagitis – predispose to carcinoma
- Peudo-achalasia – cardia tumor

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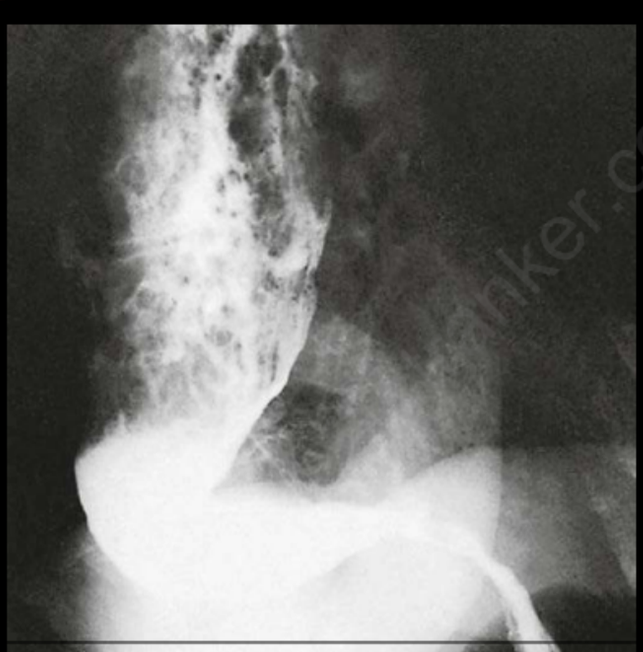
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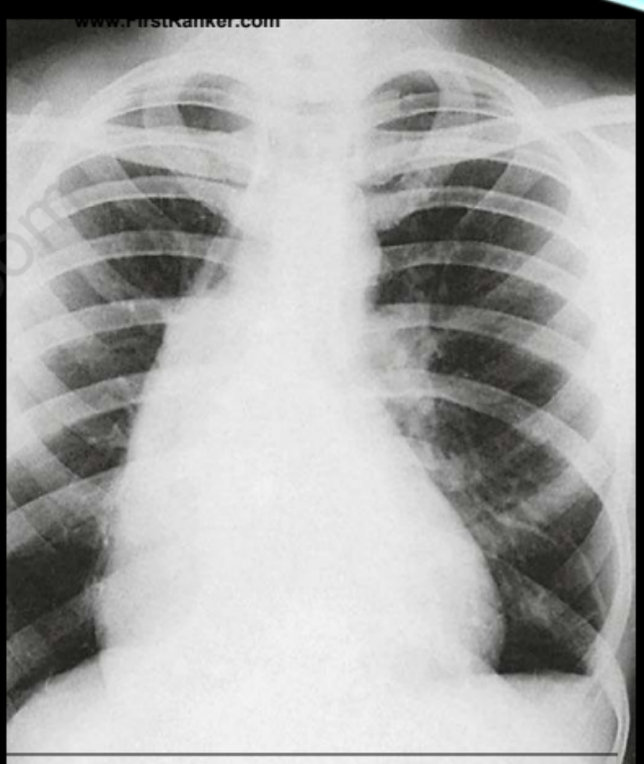
- Middle life , dysphagia, pain, regurgitation , pneumonia
- Endoscopy – tight cardia and food residue in esophagus
- Barium swallow – bird beak appearance
- Absent gastric bubble
- Esophageal manometry – final conclusion
- Treatment
  - Pneumatic dilatation – plummer – may cause perforation
  - Hellers myotomy - laparoscopic
  - Heller-Dor's operation – additional fundoplication
  - Botulinum toxin injection to LOS
  - Drugs – calcium channel blockers

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DIFFUSE ESOPHAGEAL SPASM

- Incordinate contractions
- Dysphagia and chest pain
- Corkscrew esophagus on barium
- Manometry – 400-500mm of hg
- Ca channel blockers,vasodilators , endoscopic dilatation – transient role
- Extended esophageal myotomy
- Nutcracker esophagus is condition where peristaltic pressure more than 180 mm of Hg

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