Esophageal Disorders

General Surgery Seminar

Contents

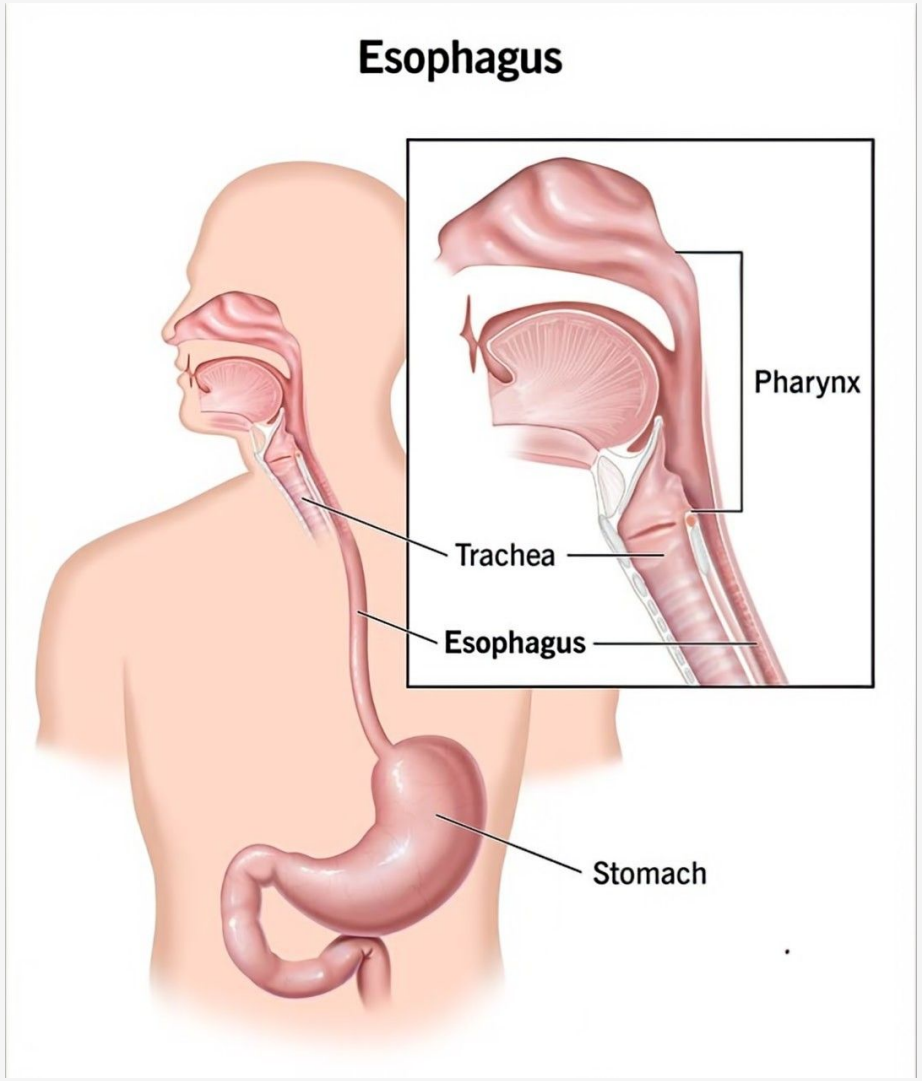
- ➔ Anatomy, Histology, & Physiology.
- ➔ Pathology & Clinical Approaches
  - ○ Achalasia.
  - ○ Esophageal Cancers.
  - ○ Clinical Approaches.
- ➔ Exercises

Anatomy, Histology, & Physiology

Let's revise the basic sciences 🥱

Introduction

- **Definition:** Hollow muscular tube.
- **Length:** About 10 in.(25 cm).
- **Begin:** Continuous above with the laryngeal part of the pharynx opposite the *sixth cervical vertebra.*
- **End:** It passes through the diaphragm at the level of the *10th thoracic vertebra* to join the stomach.



Esophageal relations

Anterior	Posterior	Right	Left
Trachea	Bodies of the thoracic vertebrae	Mediastinal pleura	Left subclavian artery
Left recurrent laryngeal nerve	Thoracic duct & Azygos veins		Aortic arch
Left principal bronchus (Which constricts it)	Right posterior intercostal arteries	Terminal part of the azygos vein	Thoracic duct
Pericardium (Separates the esophagus from the left atrium)	Descending thoracic aorta (Lower end)		Mediastinal pleura

Esophageal relations

Anterior	
Trachea	**oclavian artery**
Left recurrent lary nerve	**arch**
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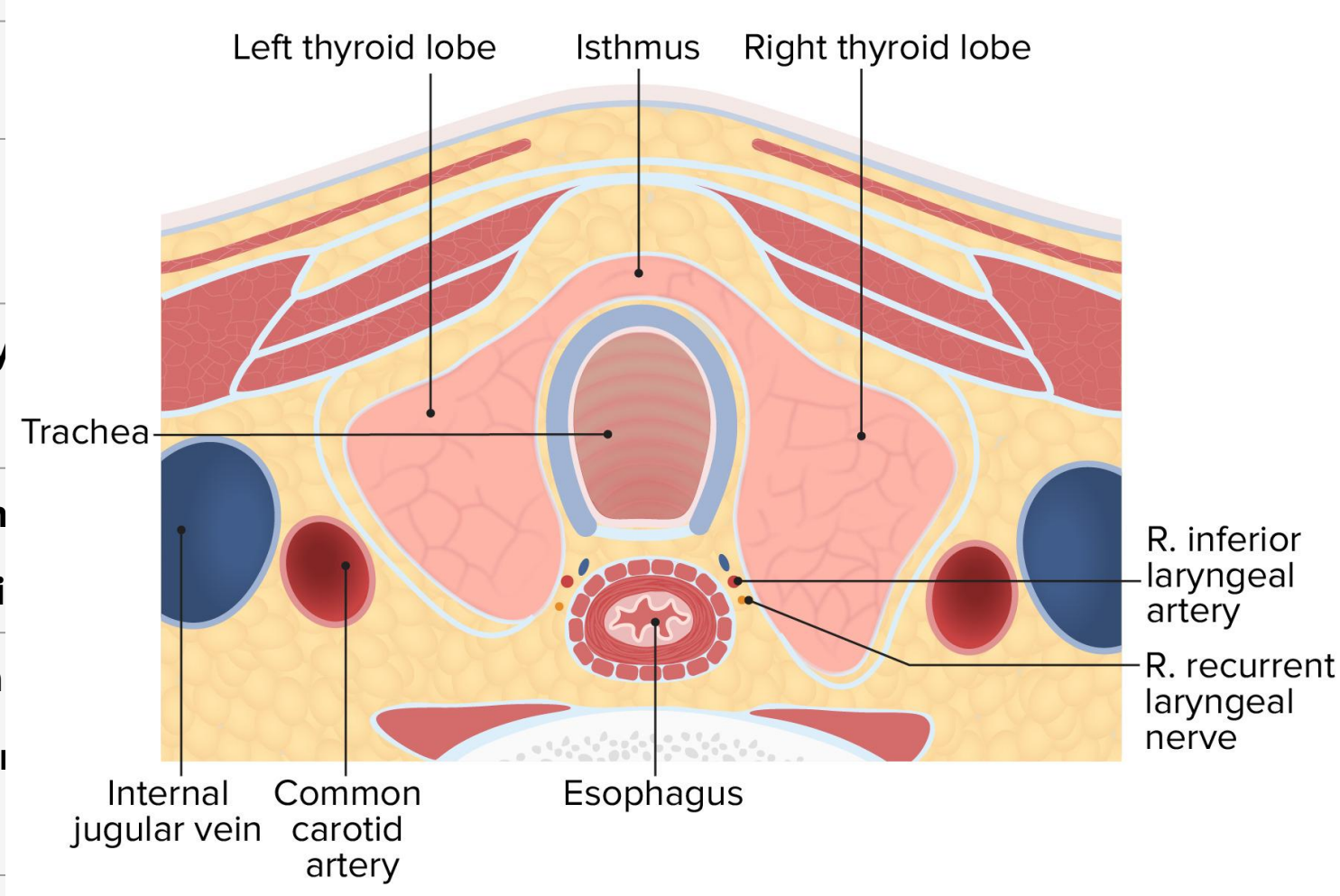

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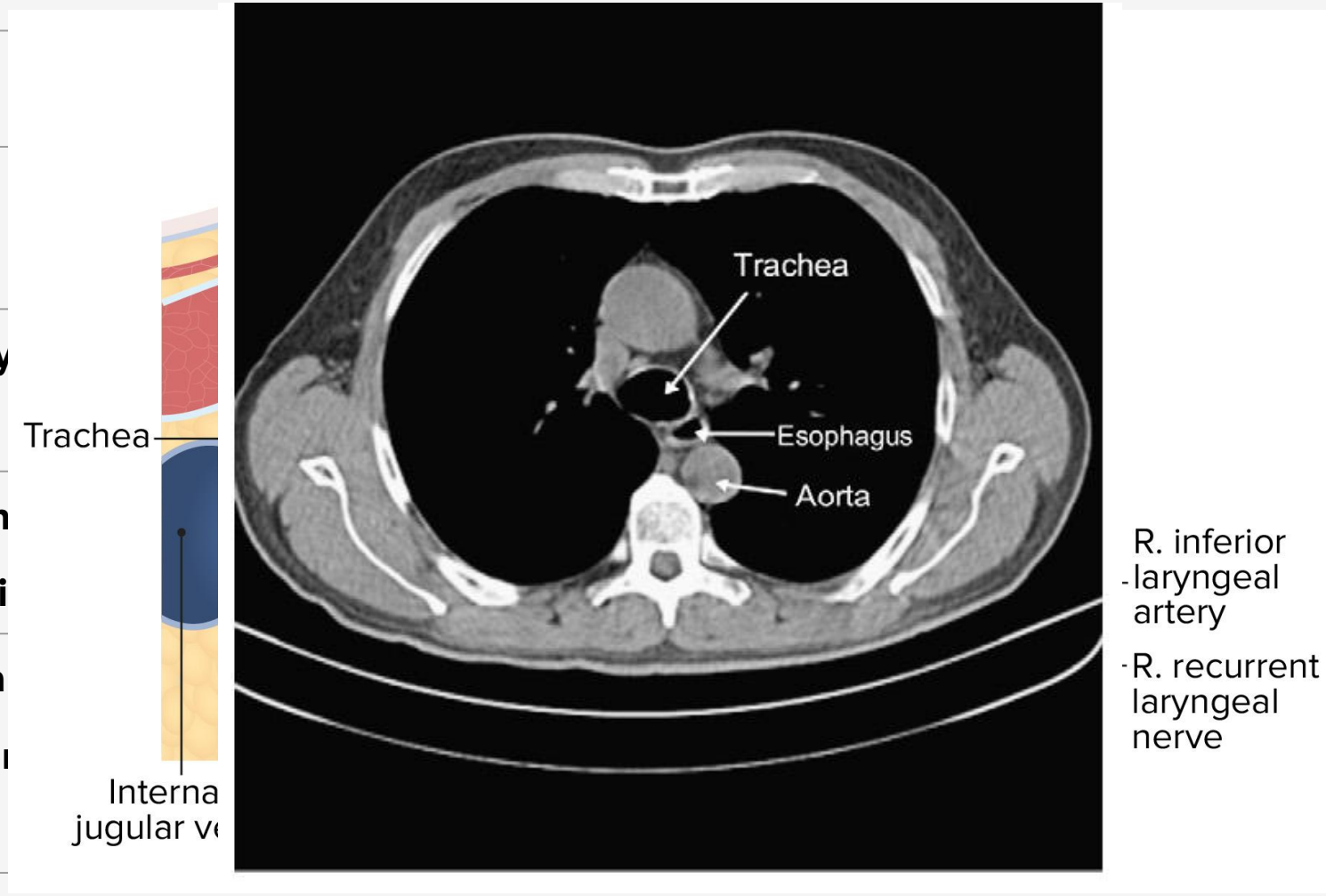


Arterial Supply, Venous, & Lymphatic Drainage

	Arterial Supply	Venous Drainage	Lymphatic Drainage
Upper Third	Inferior thyroid artery	Inferior thyroid vein	Deep cervical nodes
Middle Third	Branches from the descending thoracic aorta	Azygos veins	Superior and posterior mediastinal nodes
Lower Third	Branches from the left gastric artery	Left gastric vein (A tributary of the portal vein)	Nodes along the left gastric blood vessels and the celiac nodes

Portal - Systemic Venous Anastomosis & the Esophagus (Note)

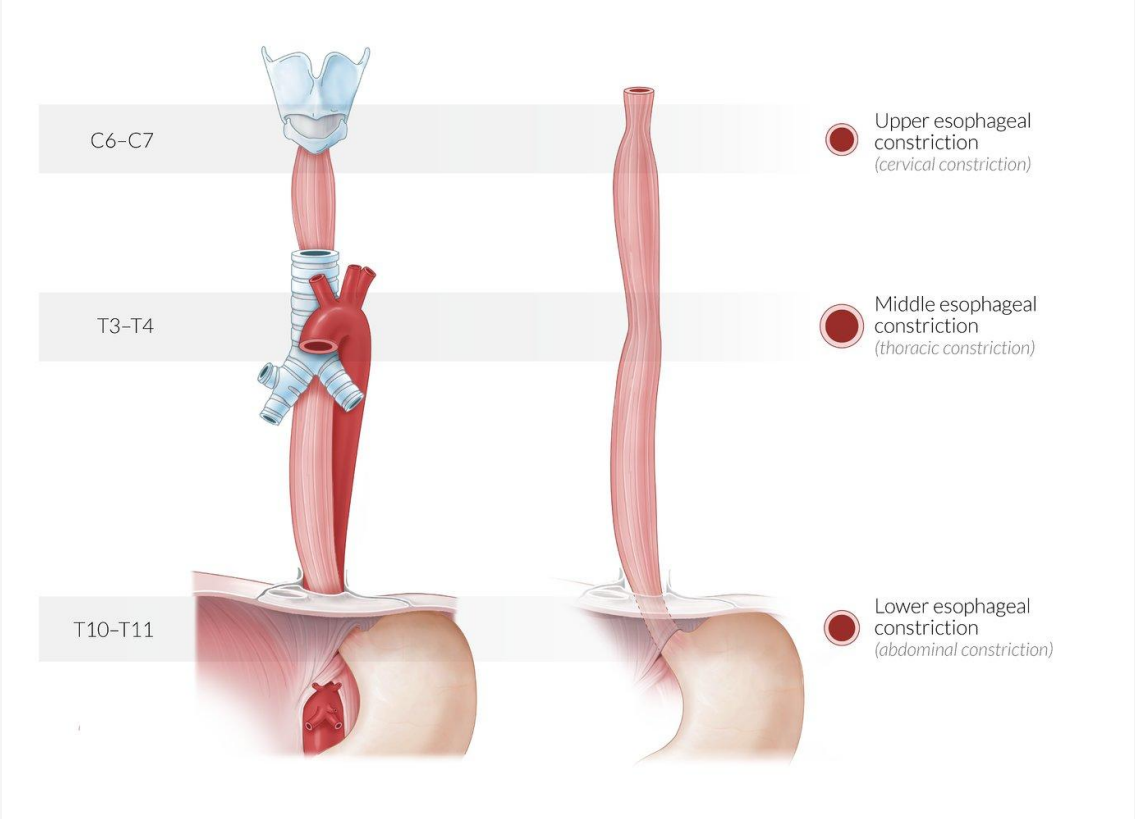
The esophageal tributaries of the azygos veins (systemic veins) anastomose with the esophageal tributaries of the left gastric vein (components of the hepatic portal system).

Portal vein become obstructed (e.g., in cirrhosis of the liver), portal hypertension develops, resulting in dilatation and varicosity of the portal-systemic anastomoses.

Varicose esophageal veins may rupture during the passage of food, causing hematemesis (vomiting of blood), which may be fatal.

Esophageal Constrictions

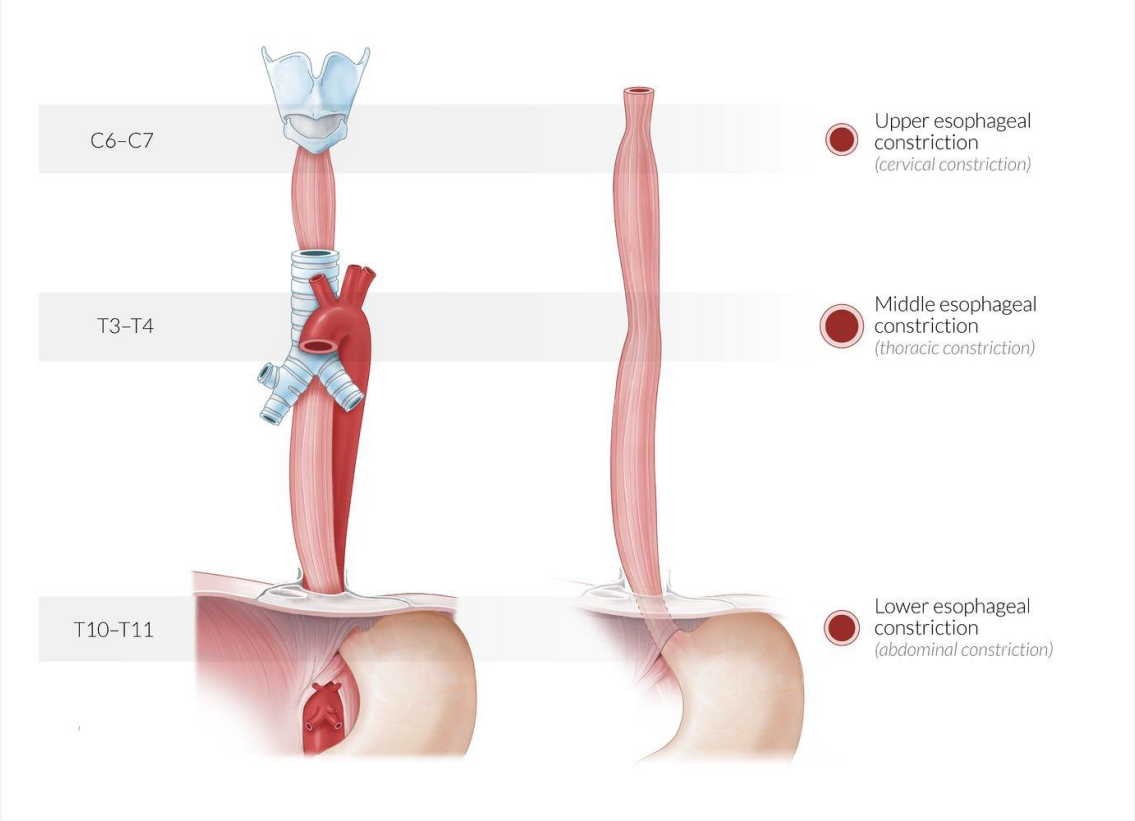
- **First** is where the pharynx joins the upper end (15 cm) from the upper incisor teeth.
- **Second** is where the aortic arch and the left bronchus cross its anterior surface, (25 cm).
- **Third** occurs where the esophagus passes through the diaphragm into the stomach, (41 cm, Esophageal hiatus).



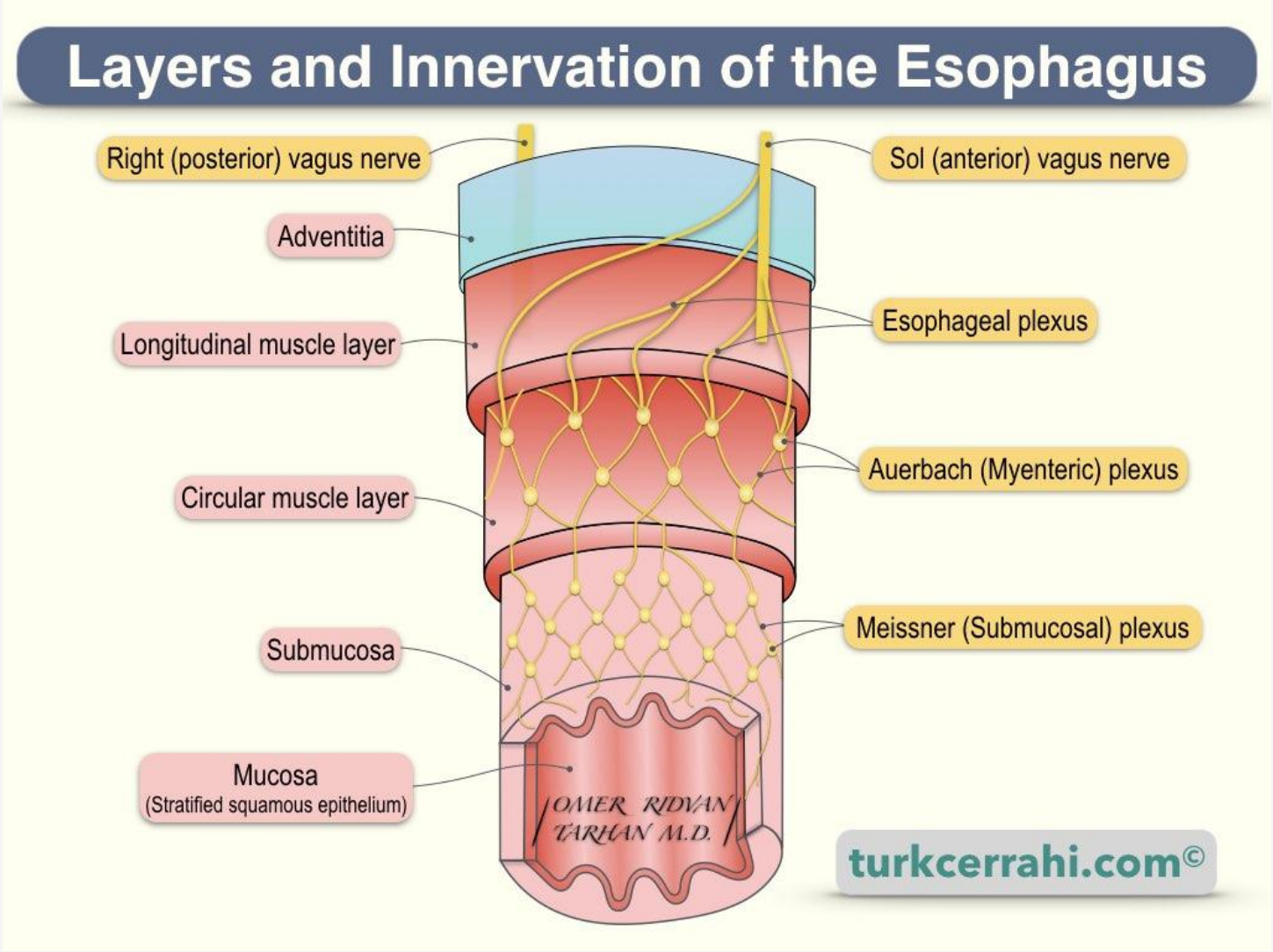
Esophageal Constrictions (Cont.)

These constrictions have clinical importance:

- ➔ Sites where swallowed foreign bodies can lodge.
- ➔ It may be difficult to pass an esophagoscope.
- ➔ Strictures develop here after the drinking of caustic fluids.
- ➔ The common sites of carcinoma of the esophagus.



Esophageal Layers & Innervation



Esophageal Contractions:

➔ **Primary peristalsis:**

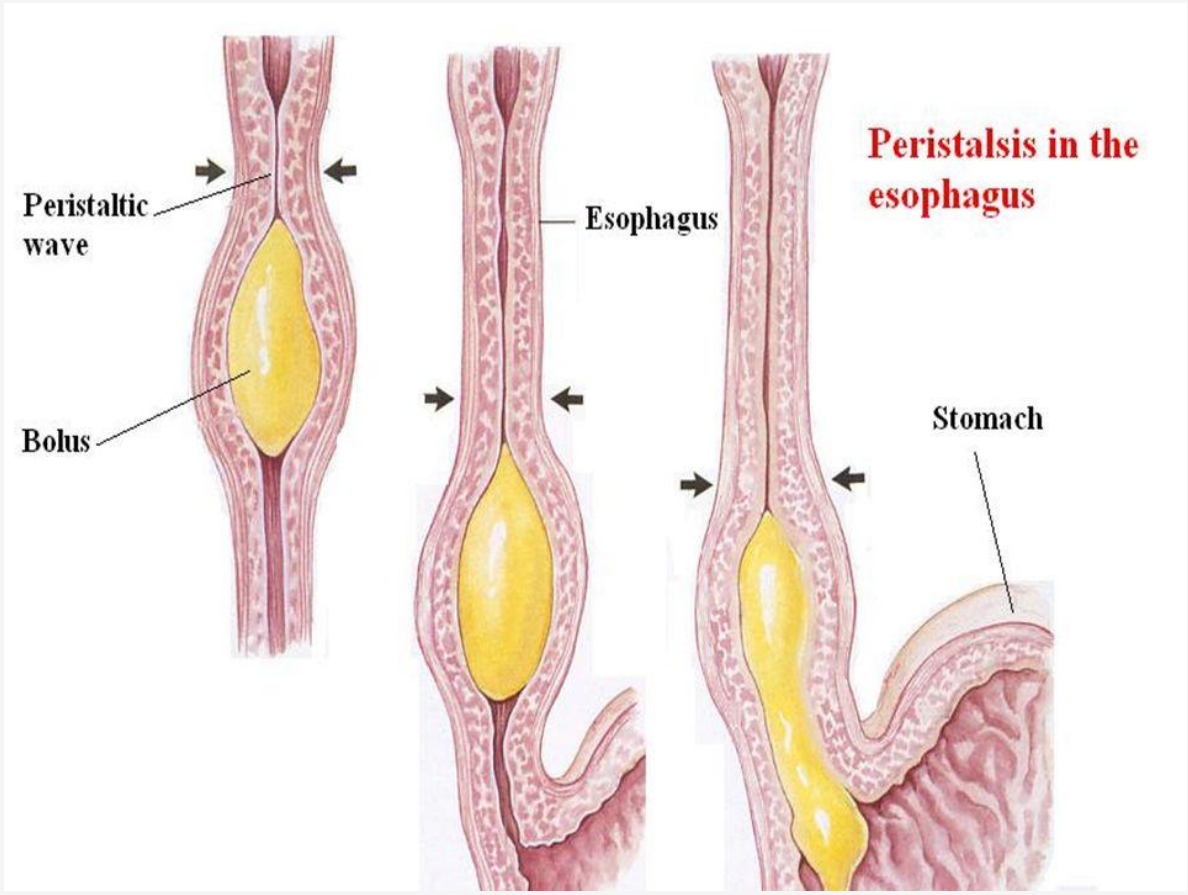
- Involuntary, preceded by swallowing, follow UES closure, 5 sec duration.

➔ **Secondary peristalsis:**

- Not preceded by swallowing, stimulated by Esophageal irritants (acids).

➔ **Tertiary contraction:**

- Non propulsive contraction, can be spontaneous or follow deglutition.



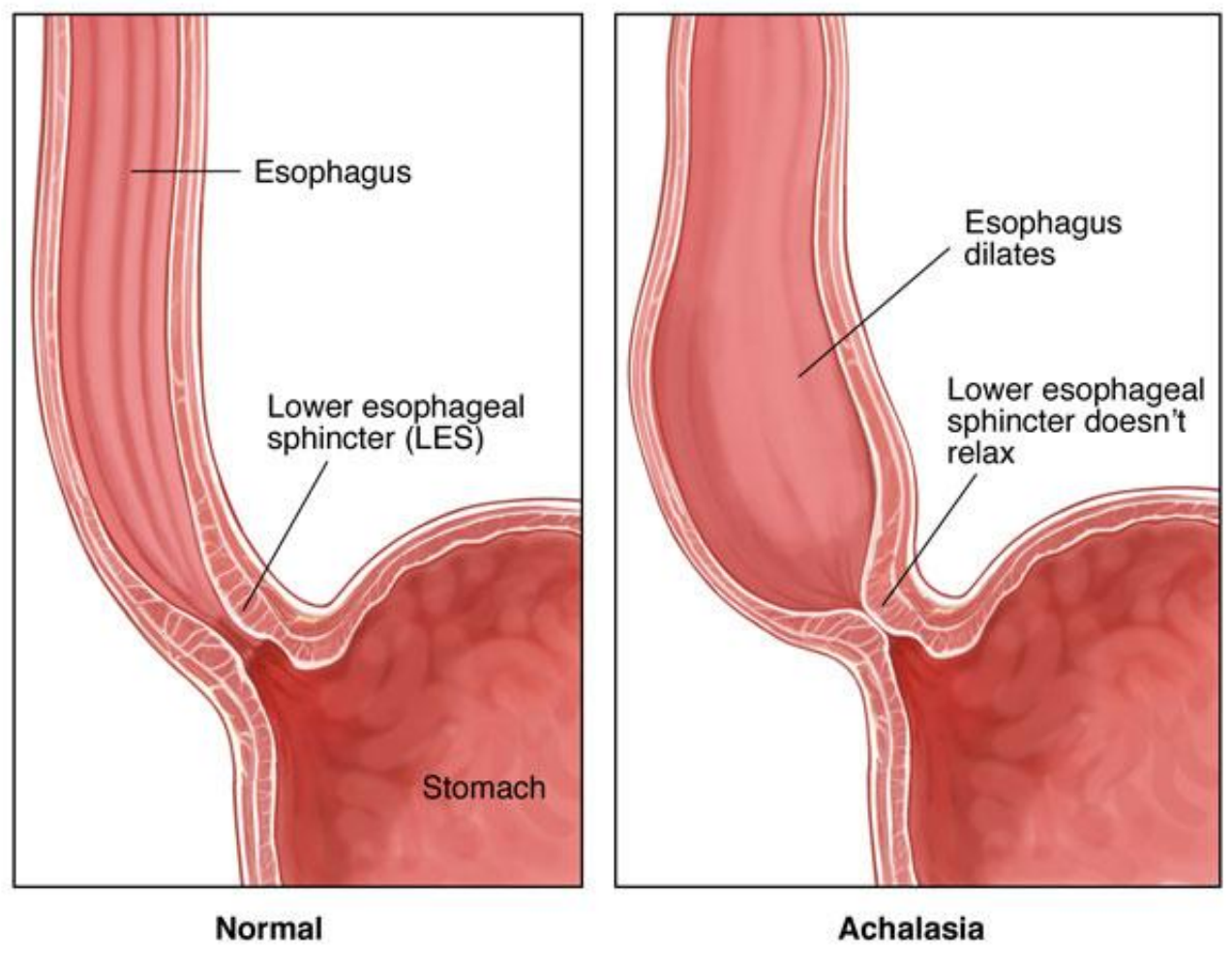
Pathology - Achalasia

Let’s start seriously now 🤓

Introduction

Achalasia is an esophageal motility disorder characterized by the absence of esophageal peristalsis and impaired relaxation of the lower esophageal sphincter (LES) in response to swallowing.

During achalasia, the LES fails to open up during swallowing, thus cause a backup of food within the esophagus to open up.



Etiology

Generally, the causes are unknown. Here is some of the pathophysiologies::

1. It may be due to patchy inflammatory reaction leading to destruction of postganglionic neurons of Auerbach's plexus at the lower end of esophagus.

2. It may be due to acquired degeneration and loss of the vagal fibres & ganglion cells of Auerbach's plexus at the lower end of oesophagus.

3. It may be autoimmune disorder as there is infiltration of the esophagus by lymphocytes.

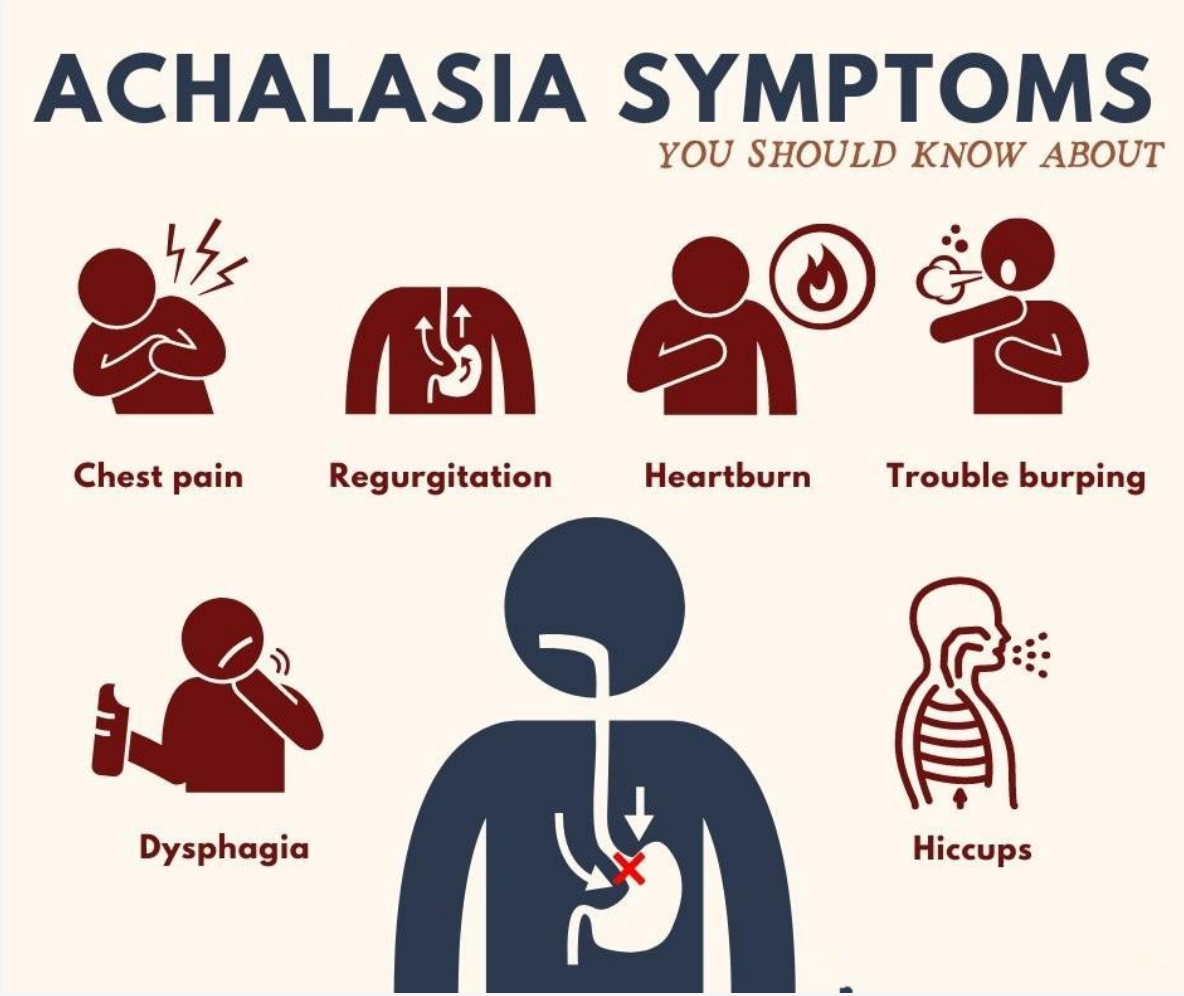
Pathology & Features

Achalasia is presented grossly as:

1. Esophagus above is dilated (firstly funnel but later on sigmoid shaped).
2. Mucosa is inflamed, congested, oedematous, and ulcerated due to stasis and esophagitis.
3. The esophagus always contains stagnant offensive fluid.

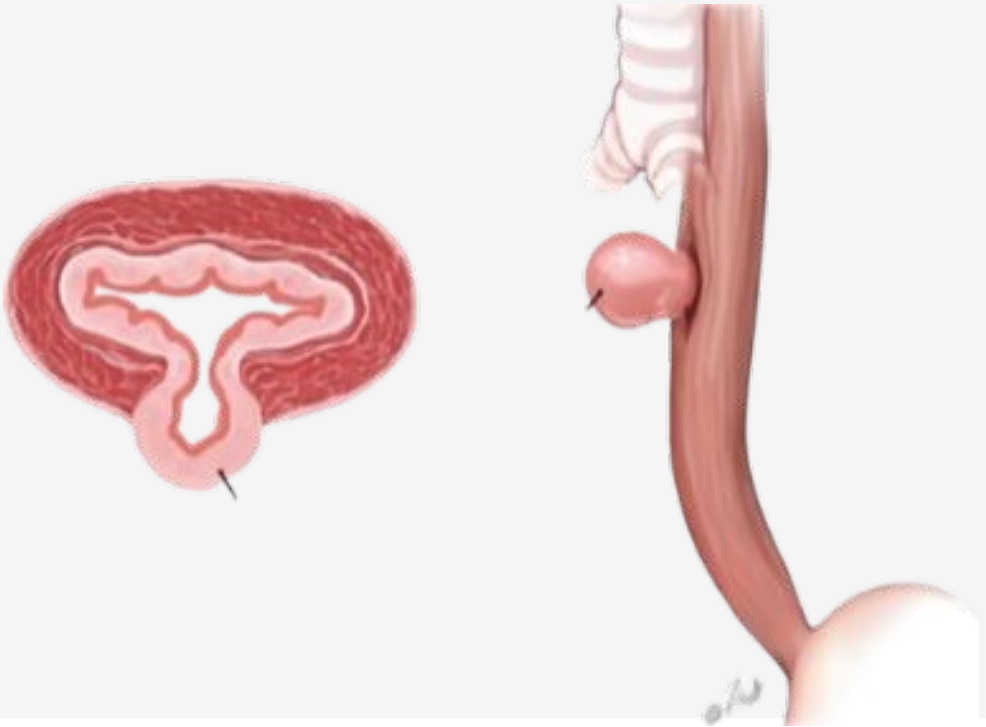
Signs & Symptoms

- **Trouble swallowing,** both liquid and solid food; food seems to hang up in your chest.
- Food or liquid comes back up into your throat **(regurgitation)**, especially when you are lying down; it is often mixed with saliva and mucous.
- **Chest pain** or discomfort.
- **Weight loss**.



Complications

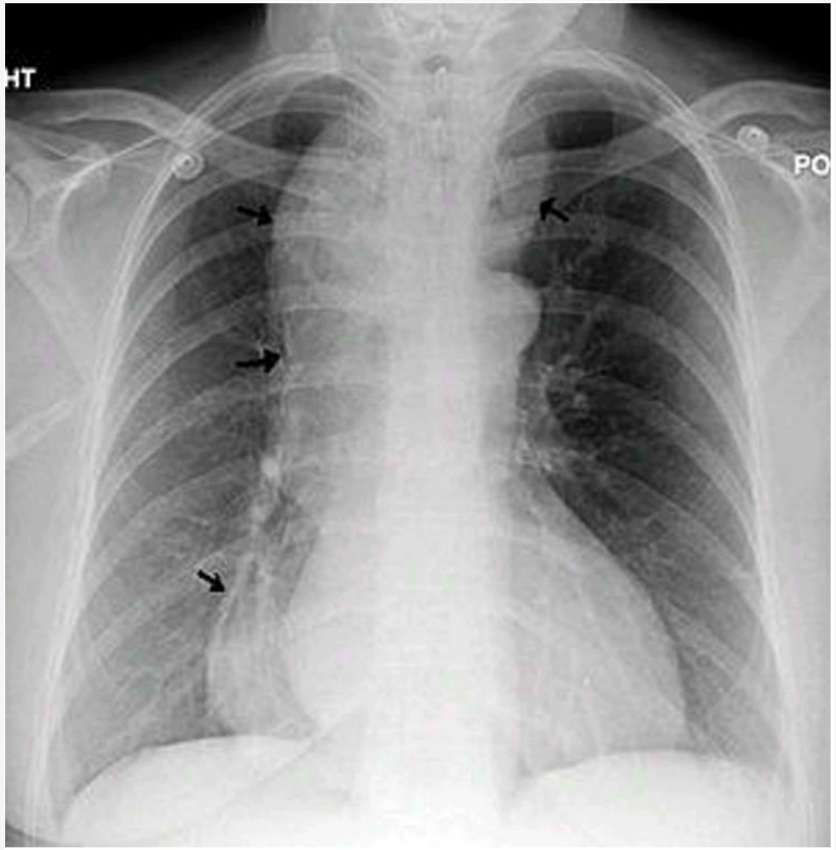
- ➔ Esophagitis - ulceration & bleeding.
- ➔ Respiratory complications due to aspiration of esophageal content.
- ➔ Dehydration, anaemia, and loss of weight are rare (due to intermittent course) and occurs only in long standing severe cases.
- ➔ Carcinoma of oesophagus (5%) after 20 years.
- ➔ Diverticula of the esophagus in long standing severe cases.



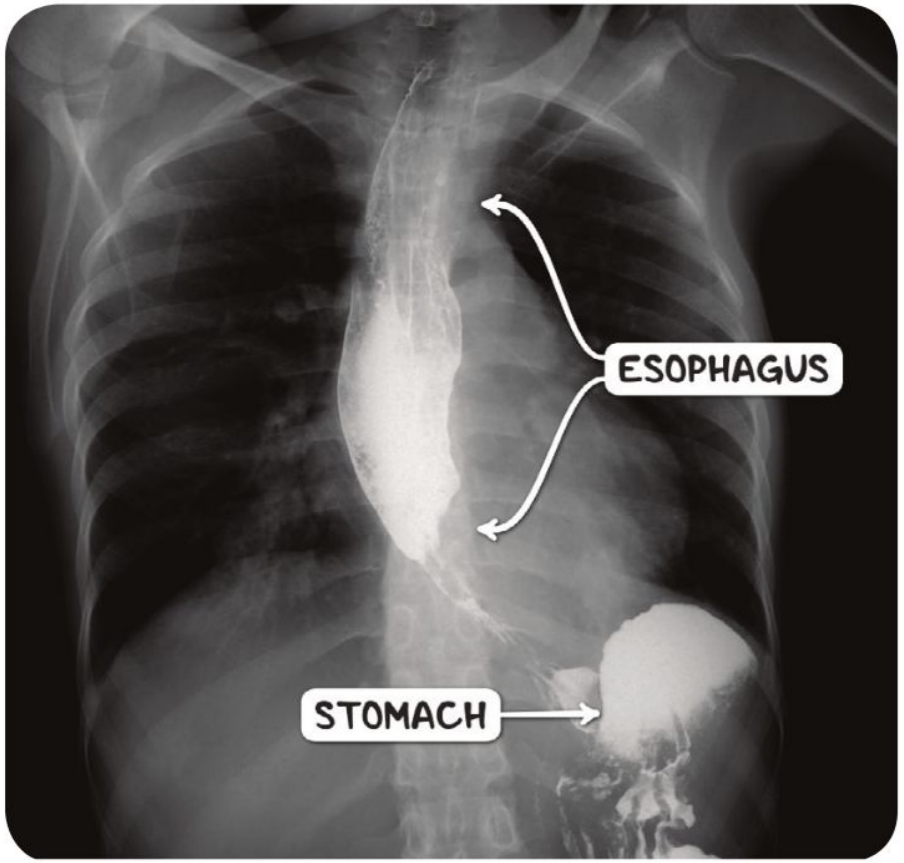
Clinical Picture

- ➔ Usually occurs in patient 20-40 years & equal in males & females.
- ➔ Dysphagia.
- ➔ Patient is usually fairly nourished.
- ➔ Chest pain & odynophagia.
- ➔ Severe continuous retrosternal pain.
- ➔ Regurgitation of foul smelling saliva & undigested food specially by night.
- ➔ Halitosis.

Investigations



Plain chest X-ray



A barium swallow demonstrating the bird's beak sign in achalasia. The proximal esophagus is dilated.

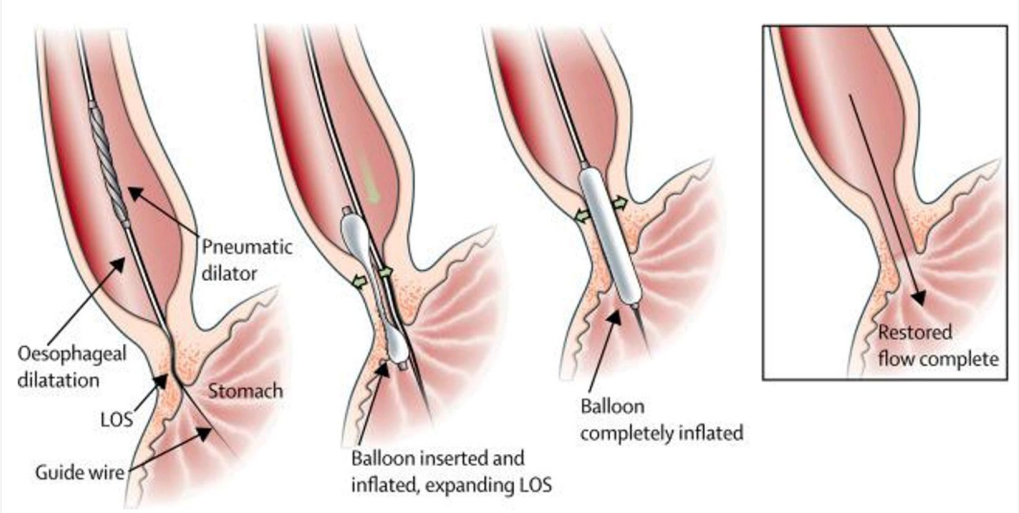
Treatment

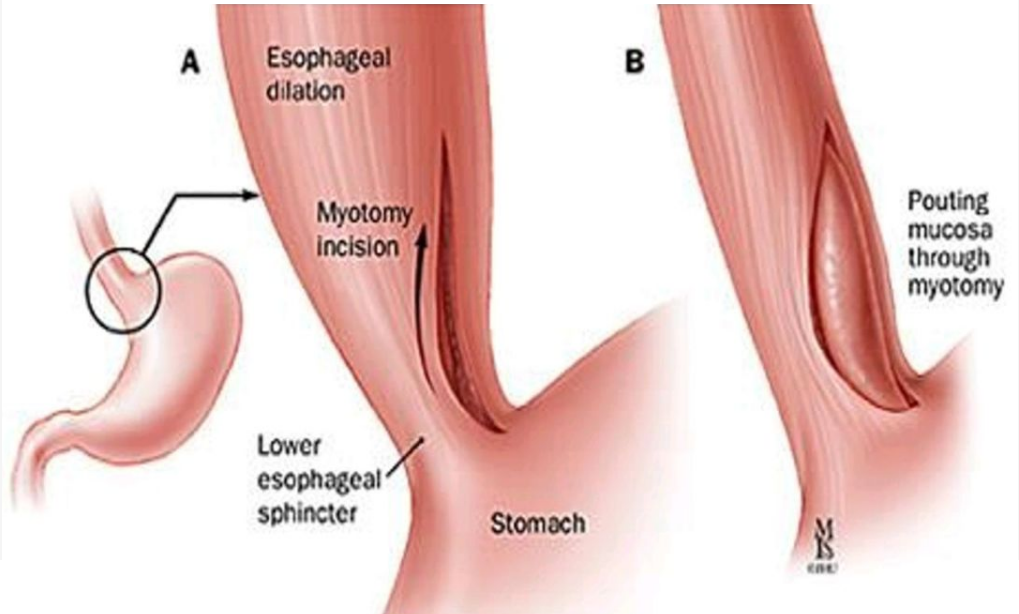
➔ **Mild Cases:**

- Medical Treatment.
- Dilatation of the lower esophageal sphincter & cardia by hydrostatic or pneumatic bag.
- Recently, injection of botulinum toxin.

➔ **Severe Cases:**

- The safest, most reliable and fastest treatment is laparoscopic Heller's operation (esophago-cardiomyotomy).





Pathology - Adenocarcinoma

Diseases never finish 🤒

Introduction to Esophageal Tumors

Esophageal cancer/tumors are either **adenocarcinoma** or **squamous cell carcinoma**, with other types being very rare.

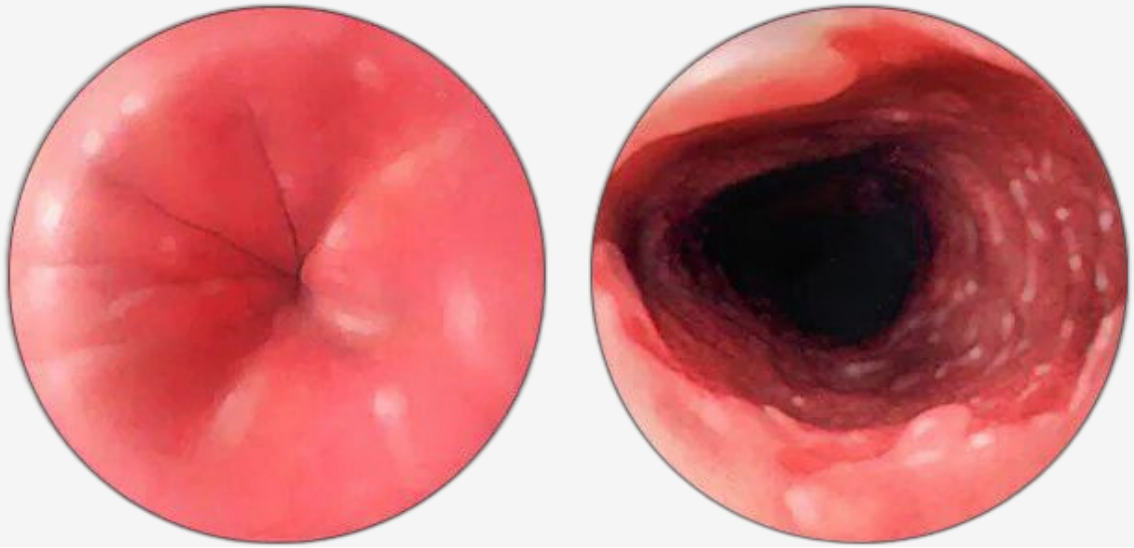
Both types have increased risk with smokers and are often presented late with advanced disease/mets.

Worldwide, squamous cell carcinoma is more common, but adenocarcinoma is on the rise.

Esophageal Adenocarcinoma

Esophageal adenocarcinoma is common with Barrett's esophagus as GERD causes the esophagus to form glandular epithelium. It is also common with obesity. Esophageal Adenocarcinoma occurs in the distal 1/3 of the esophagus and may invade the adjacent gastric cardia.

Because many of these tumors arise in the distal esophagus, spread to paraesophageal, celiac axis, and splenic hilum lymph nodes is common. Patients present with pain or difficulty in swallowing, progressive weight loss, chest pain, or vomiting.



Esophageal Adenocarcinoma (Cont.)

- **Histologically:** Tumors produce mucin and form glands.
- **Endoscopically:** Flat or raised patches, later tumors may form large exophytic masses.
- **Prognosis of adenocarcinoma:**
  - **Advanced stages:** overall 5-year survival rate is less than 25%.
  - **Early stages:** 5-year survival approximates 80%.

By the time signs and symptoms appear, the tumor usually has invaded submucosal lymphatic vessels. They exhibit an aggressive behavior, with frequent transmural invasion and lymphatic spread. Metastases to the lung and liver are most frequent.

Pathology - Squamous Cell Carcinoma

Things are getting worse ☹️

Esophageal Squamous Cell Carcinoma

Half of SCC occur in the middle third of the esophagus, and lymph nodes involvements depend on site:

1. Upper 1/3 favors cervical lymph nodes.
2. Middle 1/3 favors mediastinal, paratracheal, and tracheobronchial nodes.
3. Lower 1/3 spreads to gastric and celiac nodes. Distant spread to lung and liver is common.

Esophageal Squamous Cell Carcinoma (Cont.)

- **Clinical Features:** begin insidiously and include dysphagia, odynophagia, and obstruction.
- **Endoscopically:** Small, gray- white plaque like thickenings. Advanced lesions grow into tumor masses. It can infiltrate and spread within the esophageal wall, and cause thickening, rigidity, and luminal narrowing.
- **Microscopically:** Most squamous cell carcinomas are moderately to well differentiated.
- **Prognosis of Squamous Cell Carcinoma:** The overall 5-year survival remains a dismal 9% and depends on whether the cancer was detected early or not.

Pathology - Clinical Management of Esophageal Cancers

Investigating the disease is our mission

Clinical Presentation

Patients are commonly males older than 50 years with history of tobacco and alcohol consumption.

Dysphagia is the most common presenting complaint in patient with esophageal cancer. It starts as intermittent dysphagia then persistent progressive. Dysphagia progress from difficulty swallowing solid food then liquids and finally reach a point when the patient cant swallow his own saliva.

Dysphagia might be accompanied with other symptoms that caused by the obstruction such as odynophagia, chest pain, weight loss and pulmonary symptoms.

Insidious onset symptoms present with nonspecific retrosternal discomfort or indigestion.

Diagnosis & Diagnostic Procedures

- **Esophagoscopy and biopsy:**
  - These are always indicated in patients with esophageal stenosis.
- **Biopsy and cytology:**
  - Establishes a diagnosis in 95% of patients with malignant strictures.
- **Double-contrast esophagram:**
  - It is used to evaluate the esophageal mucosa and mural submucosa for abnormalities. It can show small lesions, distortion of the esophageal lumen, or esophagus constrictions.

Tumor Evaluation

➔ **Barium Swallow**

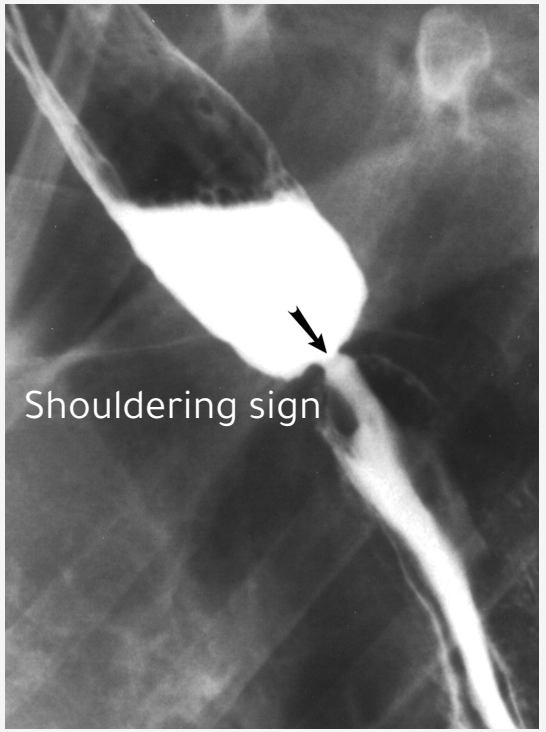
- The first procedure to evaluate the tumor, determine the tumor location and degree of obstruction.

➔ **Ultrasound**

- Determine the level of invasion both locally and to the regional lymph nodes.

➔ **Bronchoscopy:**

- It is done to exclude the airway involvement and assessment of Recurrent Nerve function (assessing the vocal cords).



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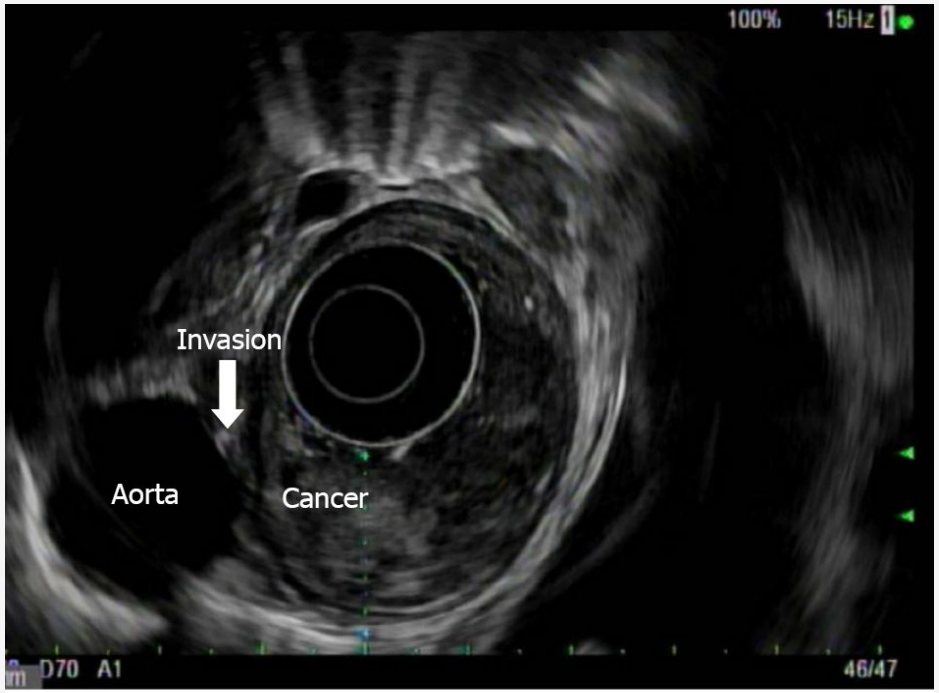
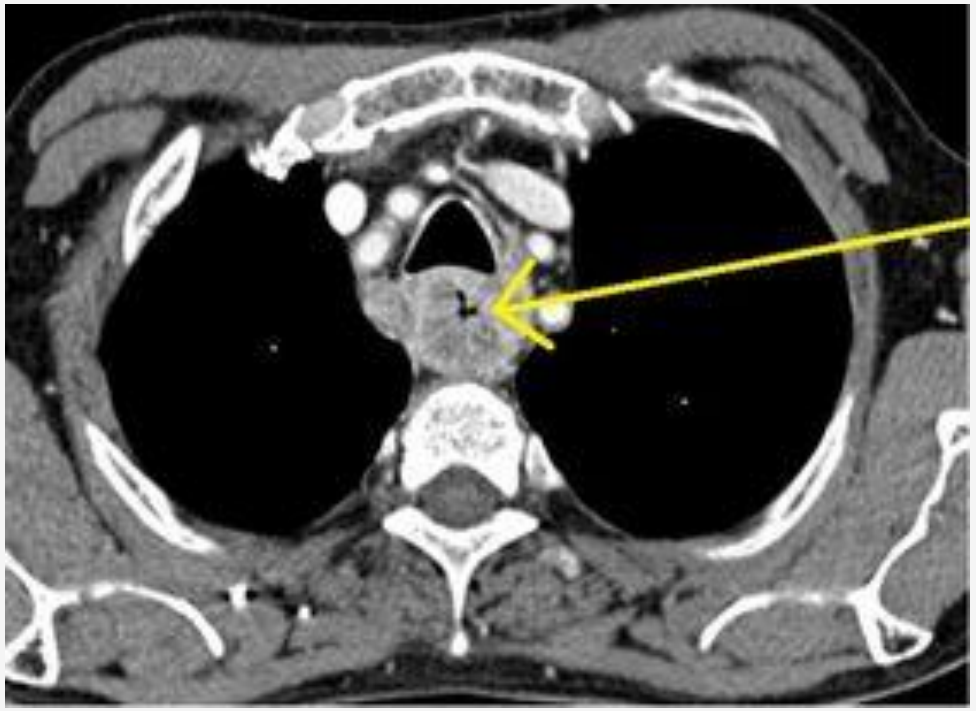


DOI: 10.4253/wjge.v14.i4.205 **Copyright** ©The Author(s) 2022.

Tumor Evaluation (Cont.)

- **Chest X-ray:** Findings are masses, enlarged lymph nodes (particularly mediastinum), airway obstruction (In the posterior mediastinum) and pleural effusion (due to esophagus obstruction).
- **CT scans:** They are a more detailed and precise imaging modality and can determine Tumor Location and Size, Lymph Node Involvement ,Invasion of Nearby Structures , Metastasis and Assessment of Blood Vessels.
- **Other studies**
  - Like MRI to evaluate mediastinal structures, and bone & brain scans to detect metastatic disease.



Pathology - TNM Classification of Esophageal Cancers

AJCC 6th Edition

Staging of Primary Tumors (T)

- **Tx:** There's no information about the primary tumor, or it can't be measured.
- **T0:** There is no evidence of a primary tumor (It cannot be found).
- **Tis:** The cancer cells are only growing in the layer of cells where they started (In situ growth) or the presence of high-grade dysplasia in tissues.
- **T1:** Tumor invades lamina propria, muscularis mucosa or submucosa.
- **T2:** Tumor invades muscularis propria.
- **T3:** Tumor invades adventitia.
- **T4:** Tumor invades adjacent structures (e.g., aorta, tracheobronchial tree).

Staging of Regional Lymph Nodes (N)

- **Nx:** Regional nodes cannot be assessed.
- **N0:** No regional lymph nodes infiltration.
- **N1:** Regional lymph nodes infiltration.

Staging of Distant Metastasis (M)

- **M0:** No distant metastases.
- **M1:** Distant metastases.

Tumors of the lower thoracic esophagus:
M1a Metastasis in celiac lymph nodes
M1b Other distant metastasis

Tumors of the midthoracic esophagus:
M1a Not applicable
M1b Nonregional lymph nodes and/or other distant metastasis

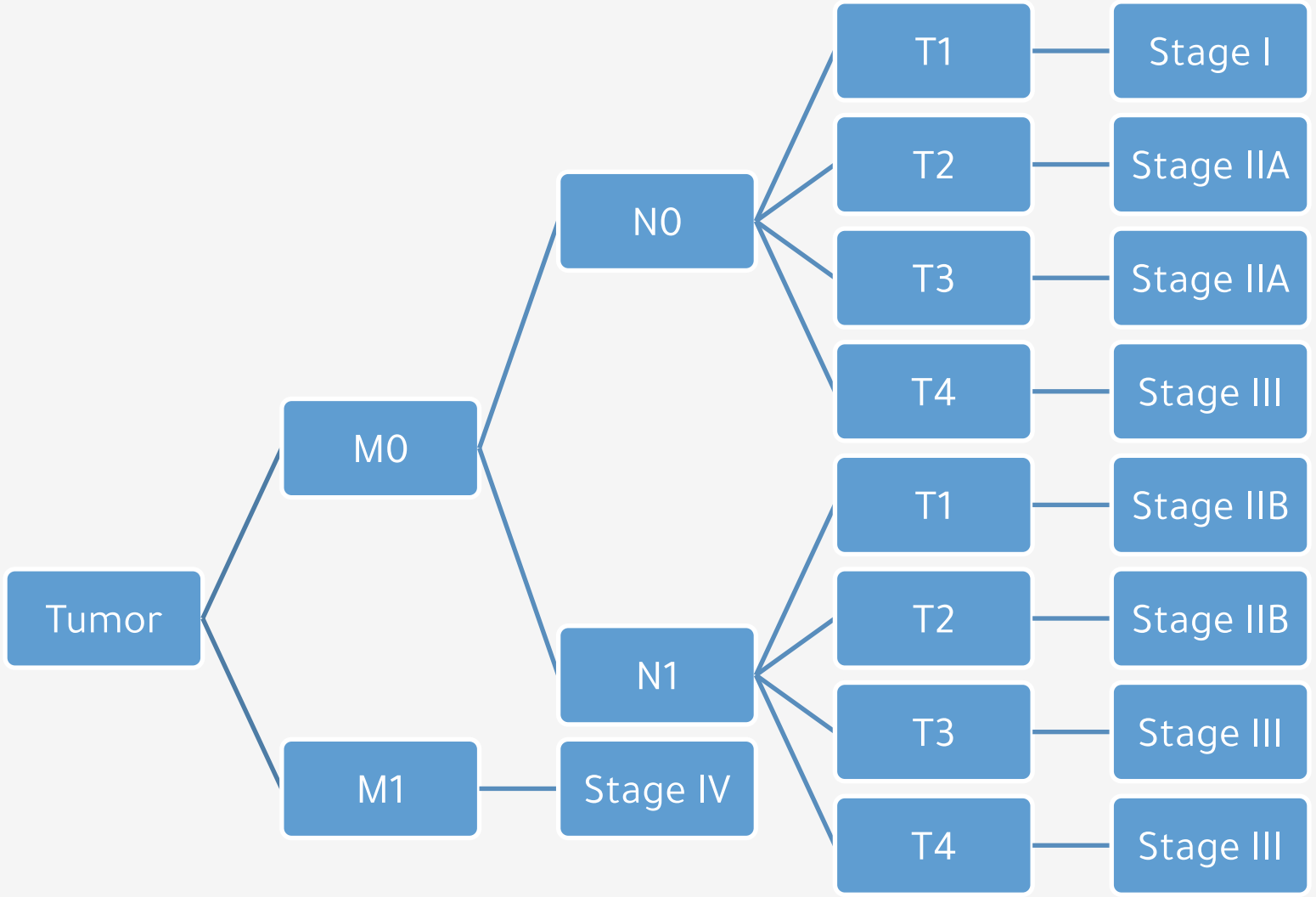
Tumors of the upper thoracic esophagus:
M1a Metastasis in cervical nodes
M1b Other distant metastasis

Stage Grouping

STAGE GROUPING

Stage 0	Tis	N0	M0
Stage I	T1	N0	M0
Stage IIA	T2	N0	M0
	T3	N0	M0
Stage IIB	T1	N1	M0
	T2	N1	M0
Stage III	T3	N1	M0
	T4	Any N	M0
Stage IV	Any T	Any N	M1
Stage IVA	Any T	Any N	M1a
Stage IVB	Any T	Any N	M1b

Stage Grouping (Cont.)



Clinical Spot

Manage cases with ease 😌

Treatment

Achieving a cure is precluded in cases where there is local tumor invasion or in the case of distant metastatic disease.

Esophageal cancer is usually a **systemic disease** at the time of diagnosis; and local therapy is not enough to eradicate this malignancy.

The primary objective of therapy for esophageal carcinoma has traditionally been focused on **palliation**, specifically restoring the patient's ability to swallow.

Option 1: Surgery

Esophageal cancer is known to spread in the submucosal lymphatics well beyond the gross extent of the tumor, and the maximum proximal and distal margins of resection beyond gross tumor are therefore desirable to minimize the possibility of recurrent tumor at the anastomotic suture line.

Resection provides the best palliation for most patients with localized carcinoma.

We follow some preoperative preparation:

- ➔ Pulmonary physiotherapy.
- ➔ Abstinence from cigarette smoking.
- ➔ Antibiotics.
- ➔ Oral hygiene.
- ➔ Barium enema.

Option 1: Surgery (Cont.)

- **Left thoracoabdominal incision:** Is the approach to distal esophageal cancer. The distal esophagus, proximal stomach, and adjacent lymph node bearing tissue are resected.
- **IVOR-LEWIS esophagectomy:** Is the approach for higher thoracic esophageal tumors. A high intrathoracic esophagogastric anastomosis is performed.
- **Transhiatal esophagectomy without thoracotomy:** Limited exposure of the intrathoracic esophagus increases the risk of hemorrhage and the inability to carry out a complete mediastinal lymph node dissection.
- **Laryngopharyngoesophagectomy:** For treatment of cancer involving the cervicothoracic esophagus.

Option 1: Surgery (Cont.)

- **Left thoracoabdominal incision:** Is the approach to distal esophageal cancer. The distal esophagus, proximal stomach, a
- **IVOR-LEWI** intrathoracic esophagog
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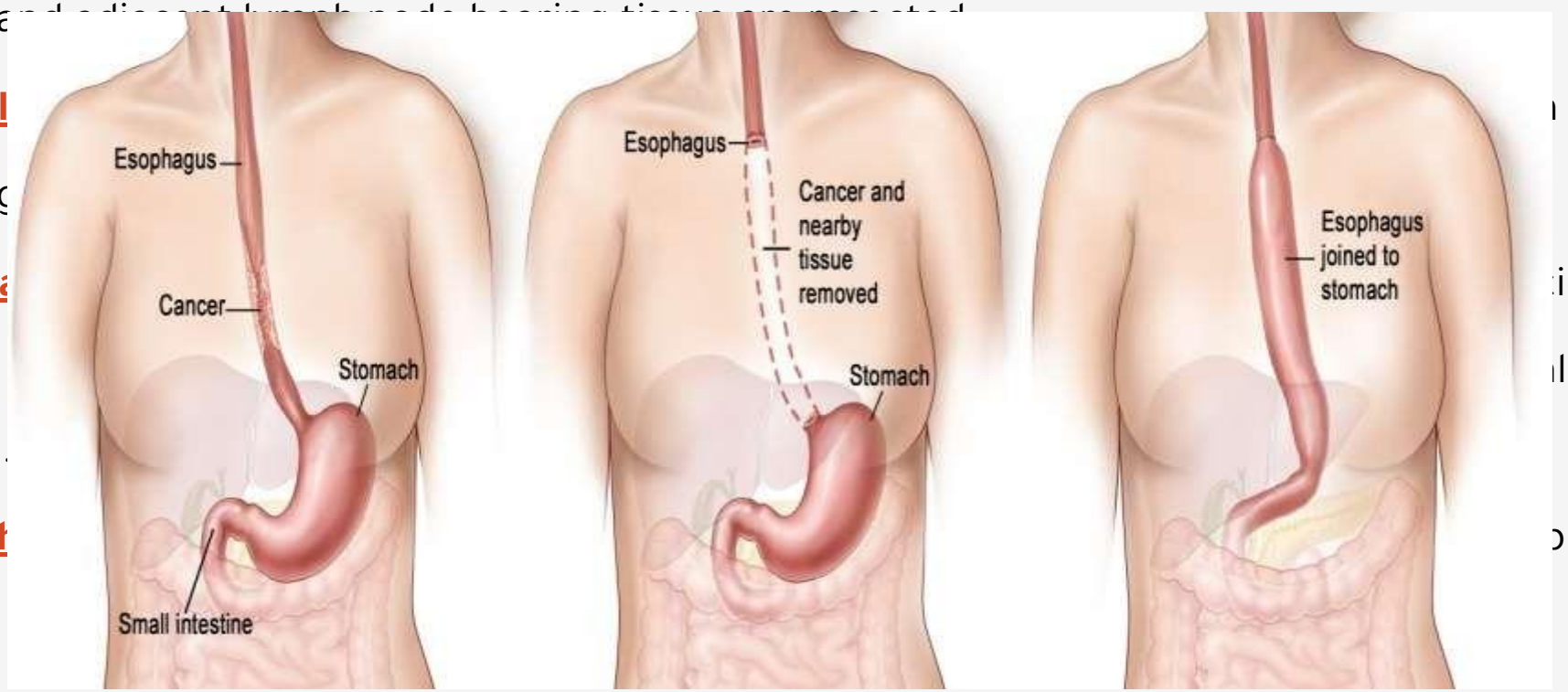


Option 2: Chemotherapy

No data proving that chemotherapy alone provides improved survival or palliation.

Two types of chemotherapy can be used:

➔ **Single-agent chemotherapy:**

- Used to treat many patients with esophageal cancer who present with distant disease.

➔ **Combination chemotherapy:**

- Used for metastatic or unresectable esophageal cancer, combination chemotherapy has been used preoperatively in a combined modality approach for esophageal cancer in hopes of controlling occult metastatic disease and improving the resectability rate.

Option 3: Radiotherapy

Although squamous cell carcinoma is radiosensitive, radiotherapy as a single modality of treatment seldom achieves cure. Radiation therapy is used in the treatment of esophageal carcinoma with one of three theoretical objectives: palliation, cure, or as an adjunct to esophagectomy.

Two types of radiotherapy can be used:

➔ **Palliative course of radiation**

- One half of patients with advanced cancer and severe dysphagia are able to swallow sufficiently after receiving a palliative course of radiation.

➔ **Supervoltage radiation therapy**

- This treatment regimen administers higher quantities of radiation over a period of 5-7 weeks, with the primary objective of achieving a curative outcome, with low 5-year survival rate.

Option 4: Transoral Intubation

Transoral intubation of esophageal cancer have been used to provide palliation.

Esophageal intubation carries an overall reported mortality that ranges from 3 - 15% and a complication rate of 20%.

Complications:

- ➔ Perforation of the esophagus.
- ➔ Migration of the tubes.
- ➔ Obstruction of the tubes by food or tumor overgrowth.

Exercise (1)

Let’s practice what we have learned 😁

Patient's History

A 64-year-old man presents to his primary care physician with a chief complaint of progressive difficulty swallowing over the past 4 months, as well as an unintentional 12 Kg weight loss last month. At first, the difficulty was only with swallowing solids but this progressed to liquids as well.

He states, he had been feeling well prior to this, with only a past medical history of heartburn he treats with over-the-counter medications. He reports mild alcohol intake (2 beers per week), with no tobacco or illicit drug history.

Vital signs are all within normal limits. Review of systems is only positive for dysphagia. His body mass index is 30, despite his reported recent weight loss. He is married with 3 healthy adult children. A retired accountant, he spends his time gardening, playing golf, and traveling.

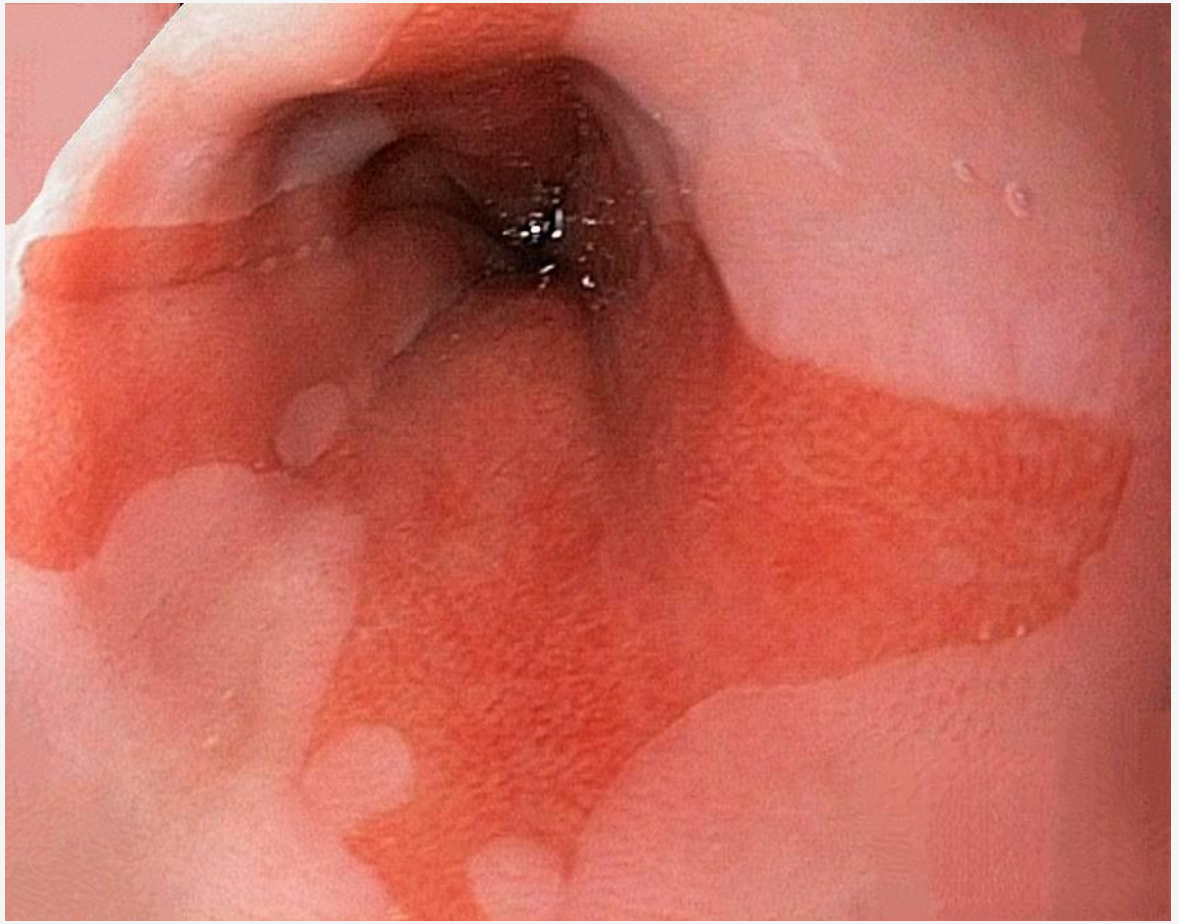
Patient's History (Explained)

Progressive difficulty swallowing over the past 4 months	**Esophagus** **Stomach** **Others**	**Obstruction: Narrowing, Tumors**
12 kg weight loss & 64 years of age	**Malignancy until proven otherwise.**	
Past medical history of heartburn	**GERD, Peptic ulcers, obstruction**	
Mild alcohol intake	**We could think about liver diseases**	

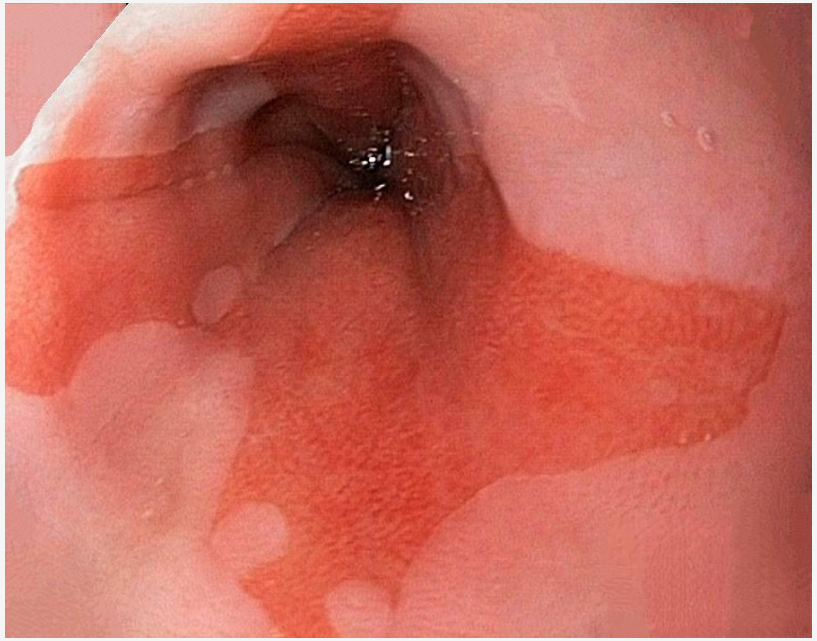
Patient's Physical Examination & Investigations

Physical examination reveals a well-nourished man with no apparent distress. His temperature was 36.6 c. Head, eyes, ears, nose, and throat exam was normal. Neck exam revealed, left supraclavicular lymphadenopathy. His chest was clear.

The abdomen was soft, non-tender, and non-distended. Also, Liver, Spleen, & kidneys were normal in size and non of the special tests was positive. The patient was sent to KHCC after having GI tumor markers positive.



Patient's Physical Examination & Investigations (Explained)

Neck exam revealed, left supraclavicular lymphadenopathy.	Gastric CA, Pancreatic CA
Liver, Spleen, & kidneys were normal in size and non of the special tests was positive.	Alcohol didn't affect the liver
GI tumor markers positive	Malignancy is likely
	1. Dilation in proximal & mid parts of esophagus. 2. Significant narrowing in the distal part. 3. "Bird-Beak" appearance. 4. Stomach looks abnormal.

What conditions to think about?

Based on the information provided, we could think about:

1. Barrett's esophagus.
2. Esophageal Tumors (Types?).
3. Gastric Tumors.
4. Others?!!

Exercise (2)

Here we go again, this is the last 🤯

Patient's History

A 56-year-old man was admitted to the medical service with an 8 months history of progressive dysphagia, initially to liquids and then solids, resulting in a 25 kg weight loss in 2 months. He also noted a mid-epigastric burning sensation.

He denied nausea, vomiting, bleeding, fever, chills, night sweats, or cough. The patient's past medical history was remarkable for coronary artery disease. The patient was given lansoprazole without improvement.

He had a history of hypertension, hypercholesterolemia. Family history was negative for gastrointestinal malignancies. He had a long history of heavy smoking (1.5 - 2.0 packs per day for 42 years) and heavy alcohol. There was no history of intravenous-drug abuse and no prior blood transfusions.

Patient's History (Explained)

8 months' history of progressive dysphagia	Esophagus Stomach Others	Obstruction: Narrowing, Tumors
25 kg weight loss & 56 years of age	Malignancy until proven otherwise.	
Mid-epigastric burning sensation	GERD, Peptic ulcers, obstruction	
Lansoprazole without improvement	Less likely GERD, or Peptic ulcers	
Family history was negative for gastrointestinal malignancies	This can't eliminate the probability of having cancer	
Long history of heavy smoking	Raises concerns about malignancy	
Heavy alcohol drinker	We could think about liver diseases	

Patient's Physical Examination & Investigations

Results of physical examination revealed a thin, ill-appearing man. His temperature was 37.3 c. Head, eyes, ears, nose, and throat exam was normal. Neck exam revealed, left supraclavicular lymphadenopathy.

His chest was clear. The abdomen was soft, non-tender, and non-distended. Also, Liver, Spleen, & kidneys were normal in size and non of the special tests was positive.

Patient's Physical Examination & Investigations (Explained)

Neck exam revealed, left supraclavicular lymphadenopathy.	Gastric CA, Pancreatic CA, other GI
Liver, Spleen, & kidneys were normal in size and non of the special tests was positive.	Alcohol didn't affect the liver
	1. Dilation in proximal & mid parts of esophagus. 2. Significant narrowing in the distal part. 3. "Bird-Beak" appearance. 4. Stomach looks abnormal.

What conditions to think about?

Based on the information provided, we could think about:

1. Strictures or Achalasia (Esophagus).
2. Esophageal Tumors (Types?).
3. Gastric Tumors.
4. Others?!!

The End Of Slides

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