GI

Pathology

LEC no.1

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Diseases of the esophagus-1

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Anatomy and histology:

Muscular tube extending from the epiglottis superiorly to the GEJ.

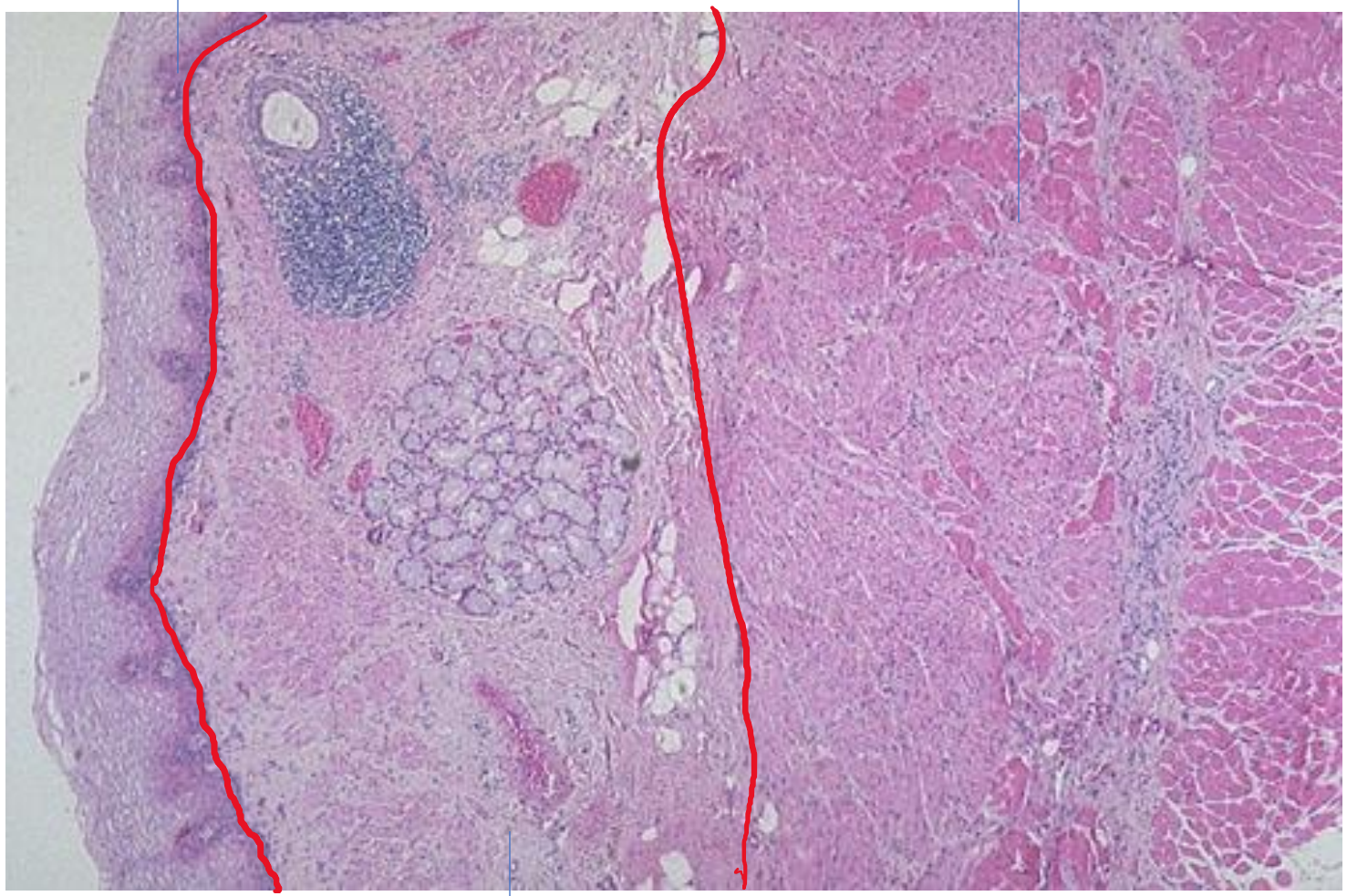
Lined by stratified squamous epithelium.

GEJ: Gastroesophageal Junction (Junction=Sphincter)

Normal esophageal mucosa color:
-Tan to Pale Pink (In contrast with the gastric mucosa which appears in Light Brown color)

Stratified squamous epithelium

Muscular propria



Submucosa

Diseases that affect the esophagus

- **1. Obstruction: mechanical or functional.**
- **2. Vascular diseases: varices.**
- **3. Inflammation: esophagitis.**
- 4. Tumors.

1-Mechanical Obstruction

- Congenital or acquired.

- Examples:
- Atresia
- Fistulas
- Duplications
- Agenesis (v rare)
- Stenosis.

Atresia,Fistula,and Duplications present shortly after birth & they are non-compatible with eating,drinking or even swallowing

These 4 are usually congenital

Agenesis is a very rare condition in which the esophagus is not developed at all

Stenosis is acquired in most cases

Atresia

A condition in which a part of esophagus is non-canalized (the upper (proximal) & lower (distal) sections of esophagus do not connect)

- Thin, non-canalized cord replaces a segment of esophagus.

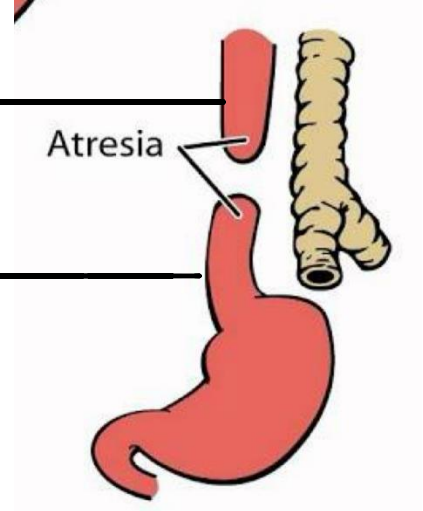
Will interfere with the swallowing process causing mechanical obstruction

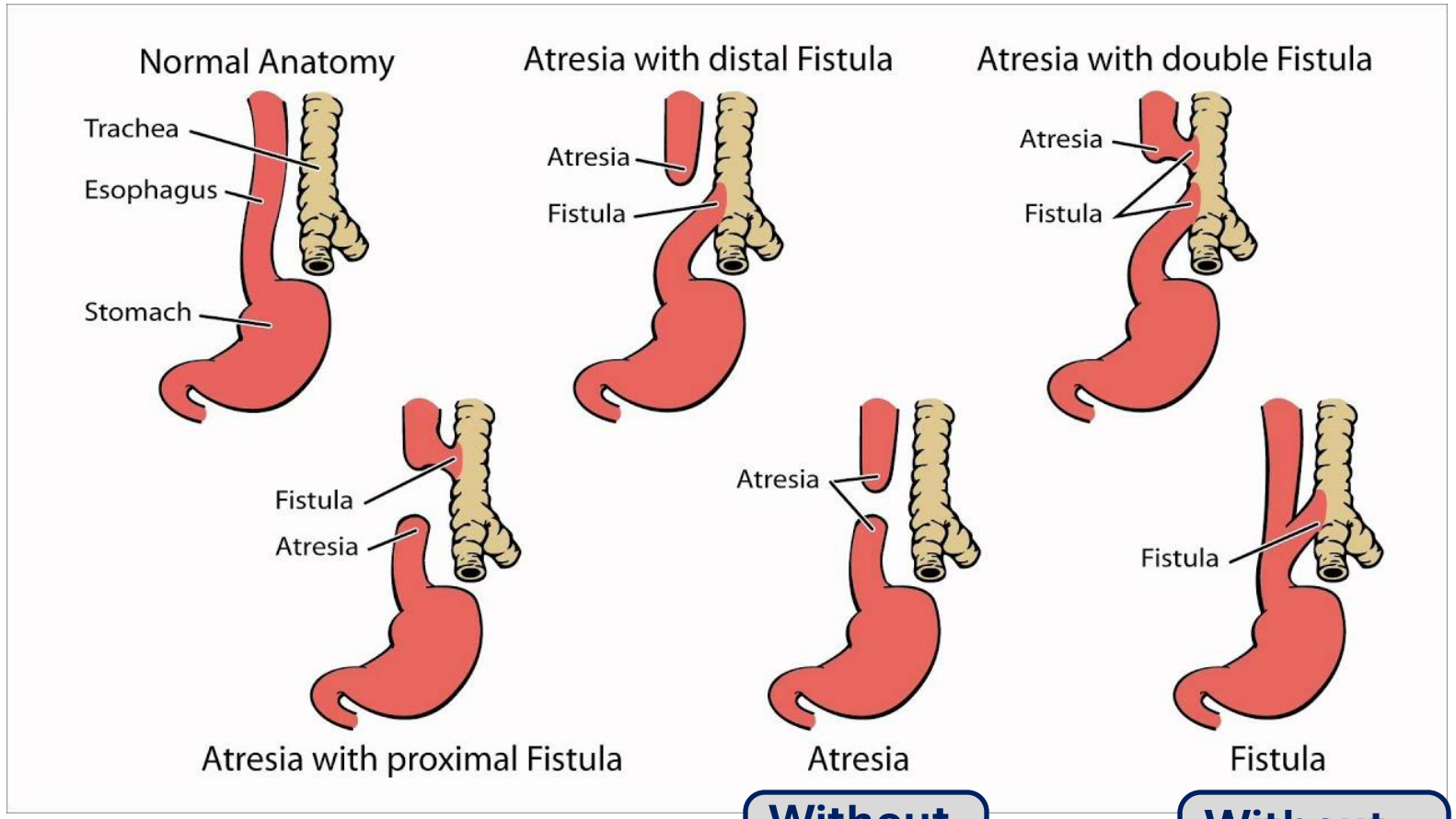
- Most common location: at or near the tracheal bifurcation
- +- fistula (upper or lower esophageal pouches to a bronchus or trachea).

Atresia can be associated with Fistula , which can connect upper or lower pouches with the trachea or bronchus with consequent risk of aspiration or aspiration pneumoniae

For understanding: Aspiration is when something you swallow enters your airway or lungs

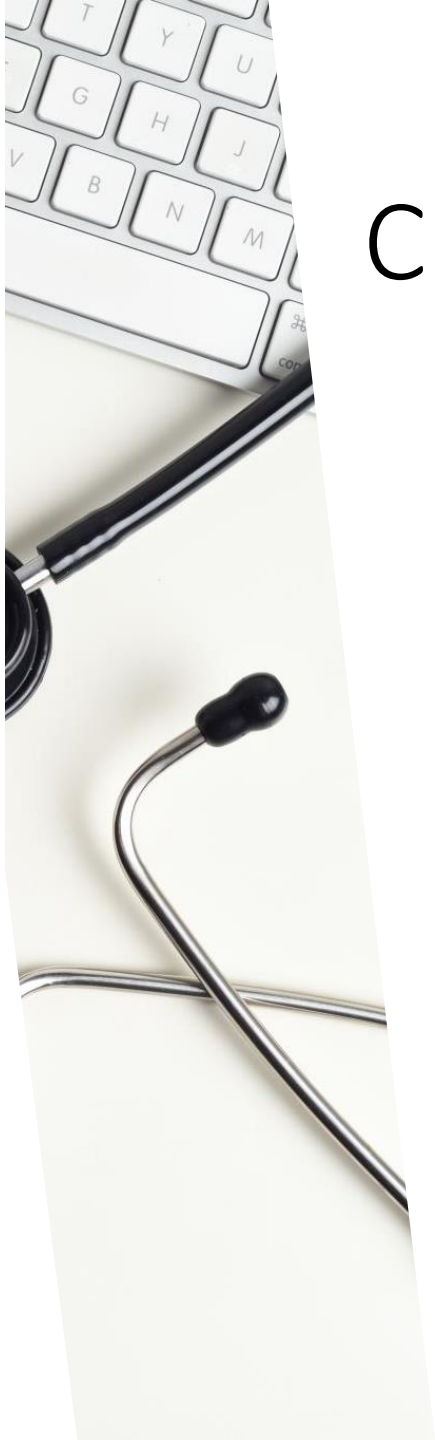
The white area between the two pouches is the non-canalized cord





Without fistula

Without Atresia



Clinical presentation:

- Shortly after birth: regurgitation during feeding
- Needs prompt surgical correction (rejoin).

Rejoining parts of esophagus to be able to eat & swallow

- **Complications if w/ fistula:**
- Aspiration
- Suffocation اختناق
- Pneumonia
- Severe fluid and electrolyte imbalances.

All due to inability to eat and nutritional problems

Esophageal stenosis

- Acquired>>>Congenital.
- Characterized by:

Fibrous thickening of the submucosa & atrophy of the muscularis propria.

Causing impedence of food flow into esophagus

- Due to inflammation and scarring

Upon a previous injury

- **Causes:**
- Chronic GERD.
- Systemic sclerosis.
- Irradiation
- Ingestion of caustic agents

GERD: Gastroesophageal Reflux Disease

Chronic GERD is Associated with ulcers that are repaired by fibrosis leading to stenosis& narrowing of esophagus

Systemic sclerosis is due to fibrosis of submucosa

Caustic agents: Acids and Alkaline causing chemical esophagitis, which can be more complicated later on by fibrosis & stenosis

Clinical presentation

- Progressive dysphagia.
- Difficulty eating solids that progresses to problems with liquids.

Functional obstruction: You don't see something that interferes with the passage of food, but there is an abnormality in innervation & movement (peristalsis)

2-Functional Obstruction

Efficient delivery of food and fluids to the stomach requires coordinated waves of peristaltic contractions.

Esophageal dysmotility: discoordinated peristalsis or spasm of the muscularis.

Achalasia: the most important cause.

Achalasia

- Triad:
- Incomplete LES relaxation
- Increased LES tone
- Esophageal aperistalsis.

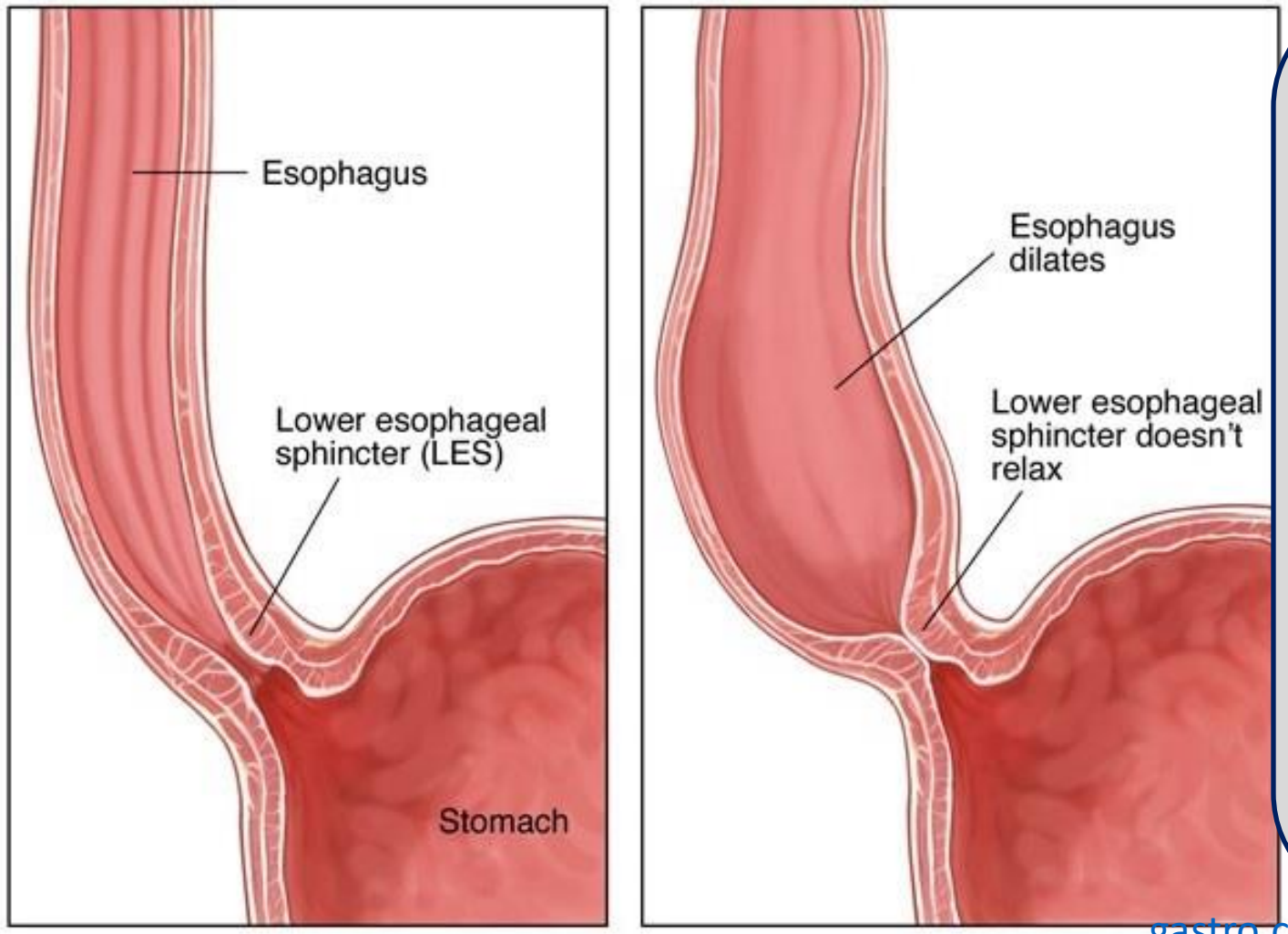
Incomplete Lower Esophageal Sphincter → Sphincter is Semi-closed

Aperistalsis= No peristaltic movement

LES :
lower esophageal sphincter

- Primary >>>secondary.

Typical feature of achalasia



-Increased tone of LES & incomplete relaxation: Sphincter will be semi-closed (won't be open & won't be fully relaxed upon arrival of food) causing accumulation of food at esophagus.

-The sphincter is semi-closed, while esophagus is dilated (due to accumulation of food)

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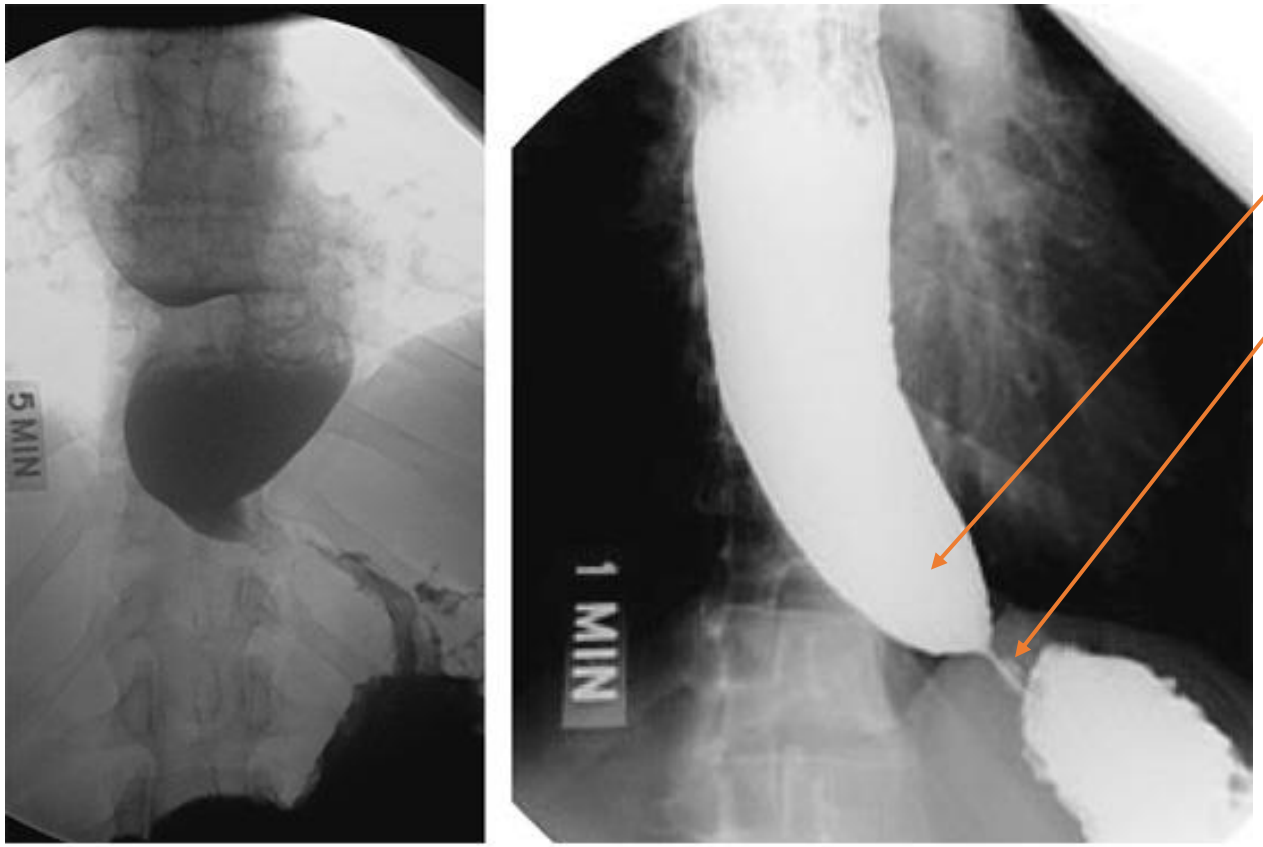
Barium swallow test:
We ask the patient to drink barium then we take X-ray images



Source: Longo DL, Fauci AS, Kasper DL, Hauser SL, Jameson JL, Loscalzo J: *Harrison's Principles of Internal Medicine, 18th Edition*: www.accessmedicine.com

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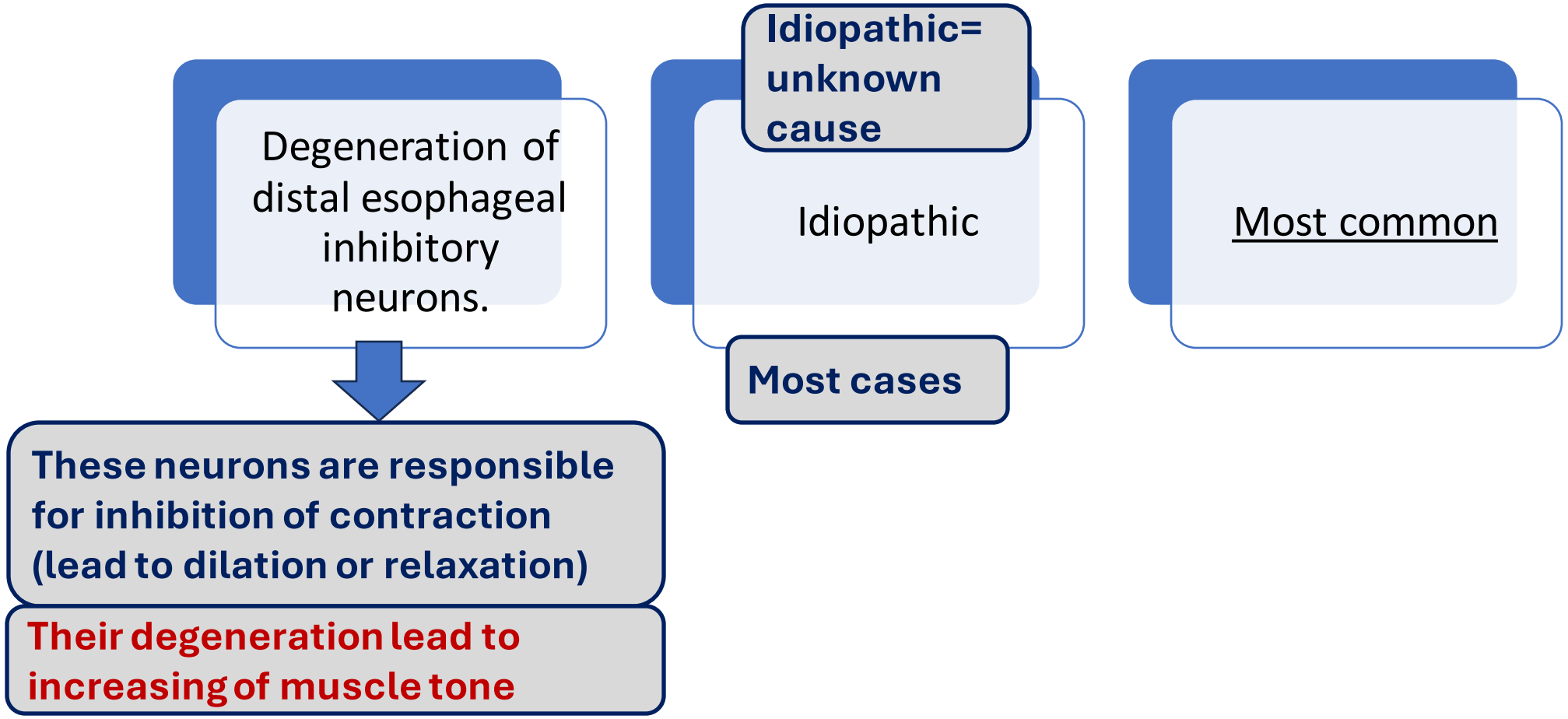
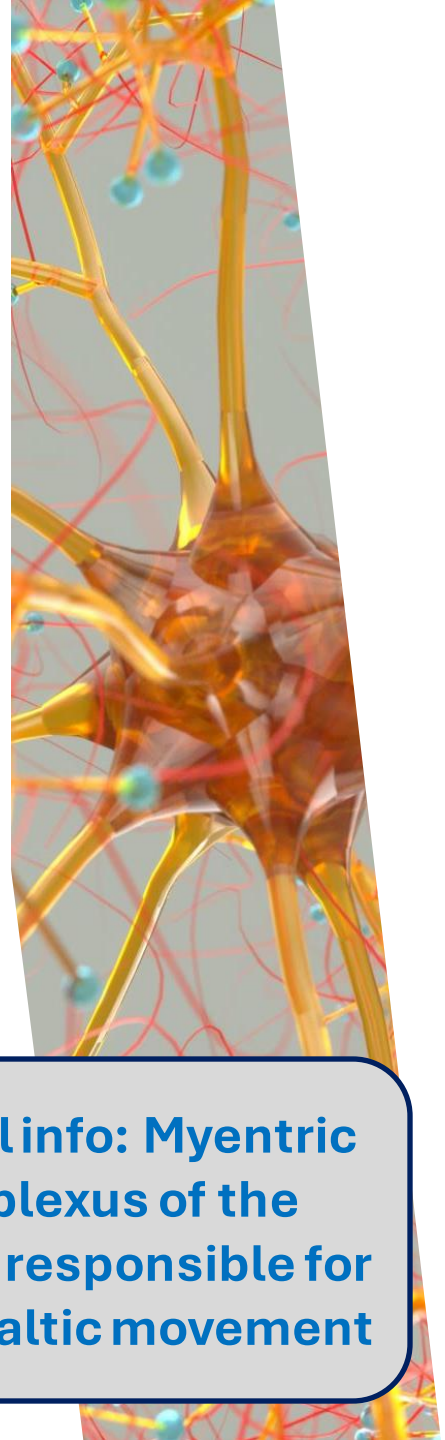
We can see that:
-The esophagus is dilated and filled up with barium
-LES appear as a string as it's semi-closed

Primary achalasia





Secondary achalasia

Less common

- Loss of neural innervation due to damage in:
- **Esophagus.**
- **Vagus nerve** **Which innervates esophagus**
- **Dorsal motor nucleus of vagus**

- **Chagas disease**, Trypanosoma cruzi infection>>destruction of the myenteric plexus>> failure of LES relaxation>> esophageal dilatation.

Additional info: Myentric plexus is plexus of the gut and is responsible for the peristaltic movement

Clinical presentation

- Difficulty in swallowing
- Regurgitation
- Sometimes chest pain.

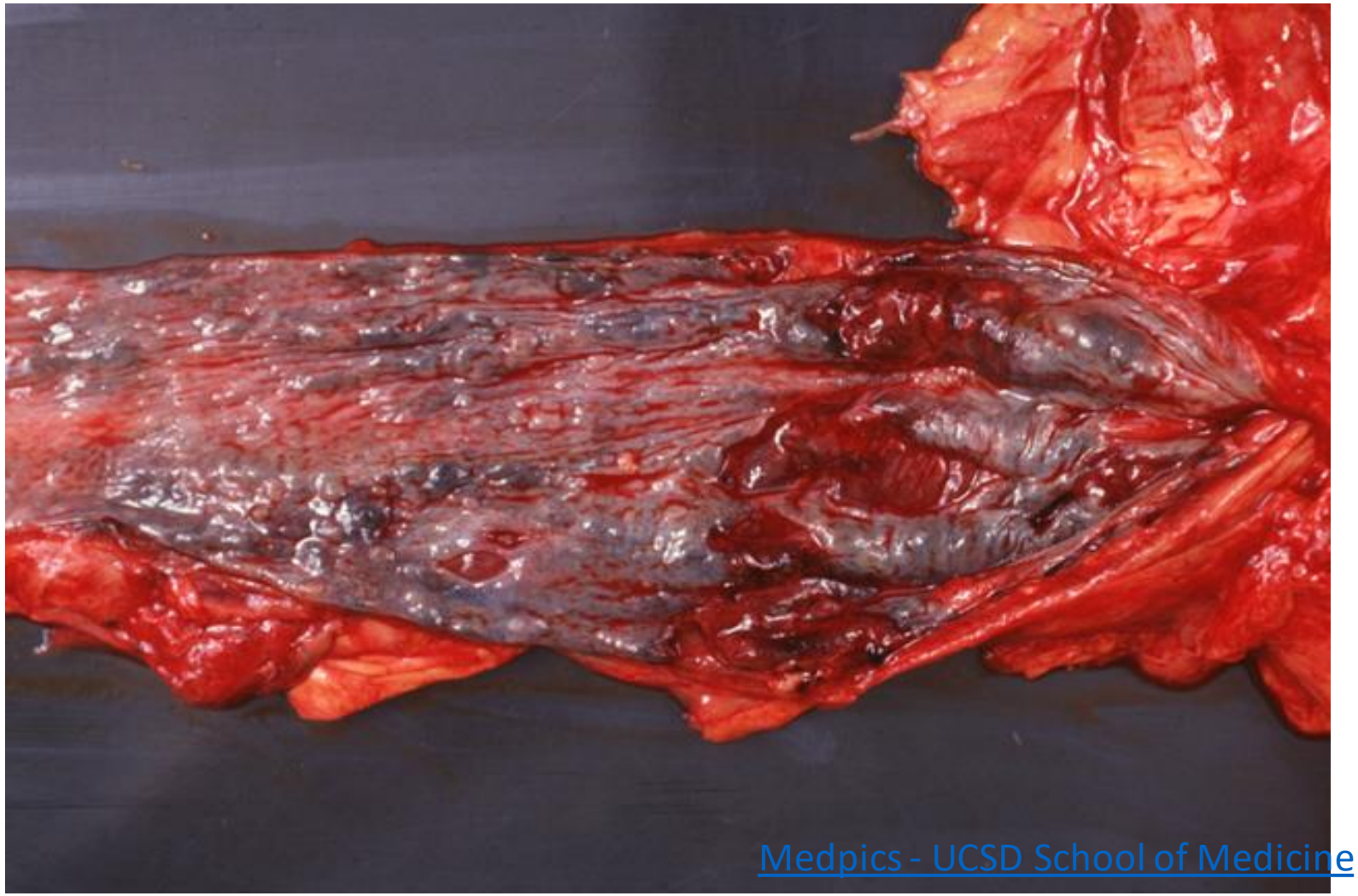
Due to aspiration

3-Vascular diseases: Esophageal Varices

دوالي المريء

- Tortuous dilated veins within the submucosa of the distal esophagus and proximal stomach.
- Diagnosis by endoscopy or angiography.

This is a distal esophagus, and these blackish vessels are dilated veins



Medpics - UCSD School of Medicine

Pathogenesis:

- **Portal circulation**: blood from GIT>>portal vein>>liver (detoxification)>>inferior vena cava.
- Diseases that impede portal blood flow >> portal hypertension >>esophageal varices.
- Distal esophagus : site of Porto-systemic anastomosis.
- **Portal hypertension**>>collateral channels in distal esophagus>>shunt of blood from portal to systemic circulation>>dilated collaterals in distal esophagus>>varices

Pathogenesis is usually due to portal hypertension

Additional info for understanding: Collateral circulation is an alternate(back-up) circulation in your body that can take over when another vein or artery is damaged

-GI system is characterized by the presence of portal circulation.

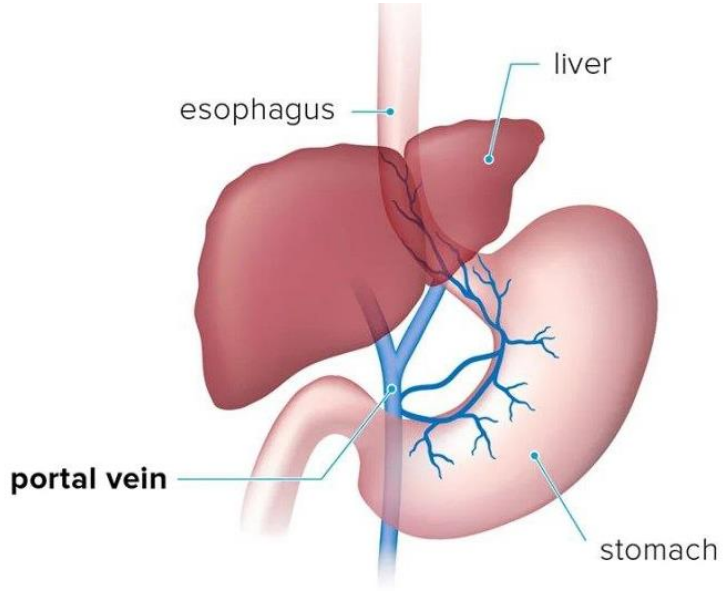
-What is a Portal Circulation?

It's a process in which the blood that is collected from GI tract will go through the portal vein to the liver (for detoxification), then the blood will go through hepatic vein into inferior vana cava.

-Any disease that impede the portal circulation will lead to portal hypertension.

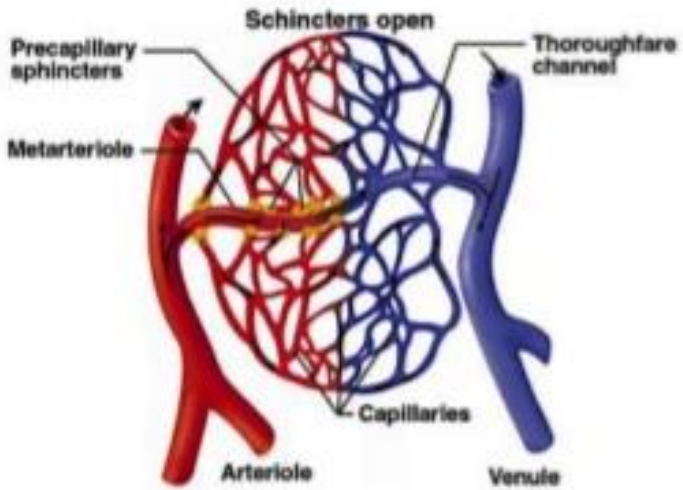
-Portal hypertension will cause shunt of blood from portal to systemic circulation through areas in which we have collateral anastomosis between the portal & systemic circulation & one of these sites is the Distal esophagus which will be dilated and appear as varices

Additional figure

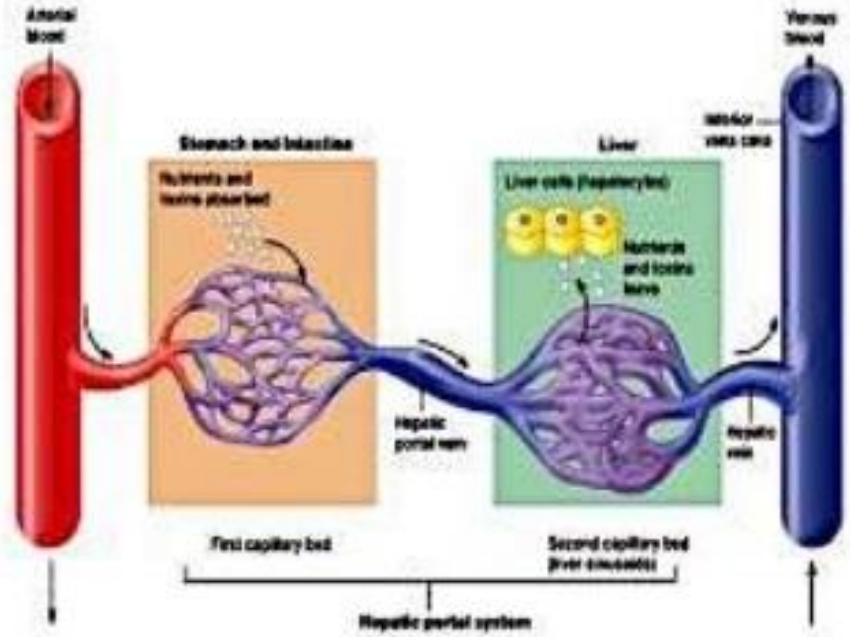


Portal system

Usual circulation



Portal circulation



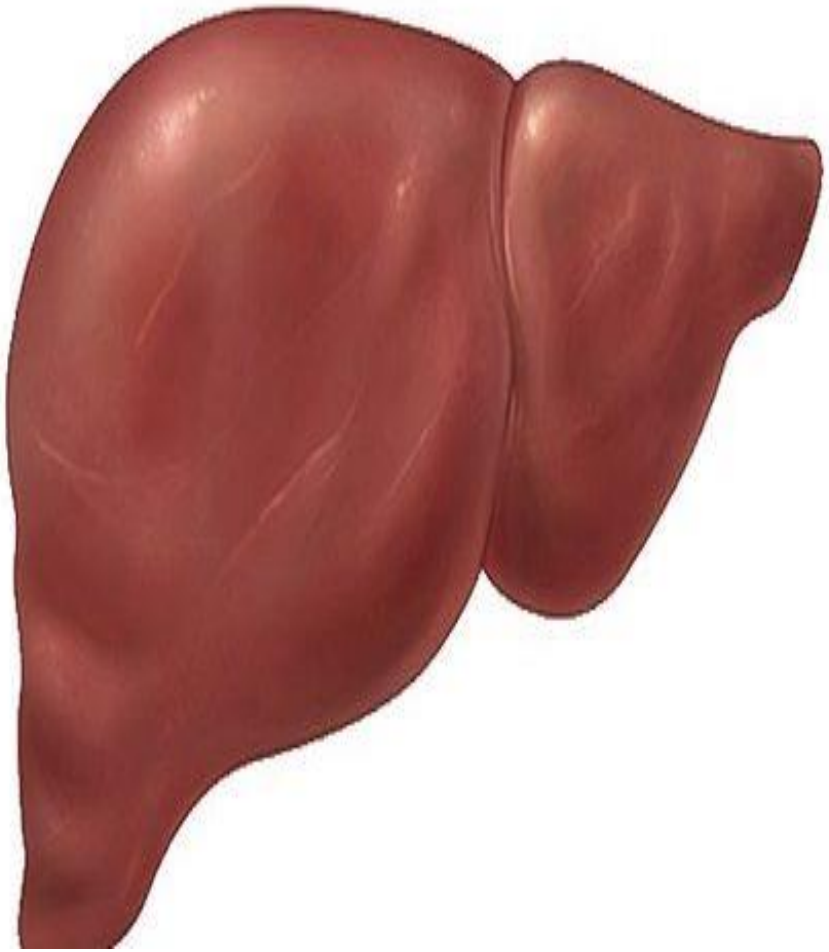
https://www.slideshare.net/rongon28us/hepatic-portal-vein-and-portocaval-anatomosis

Causes of portal hypertension

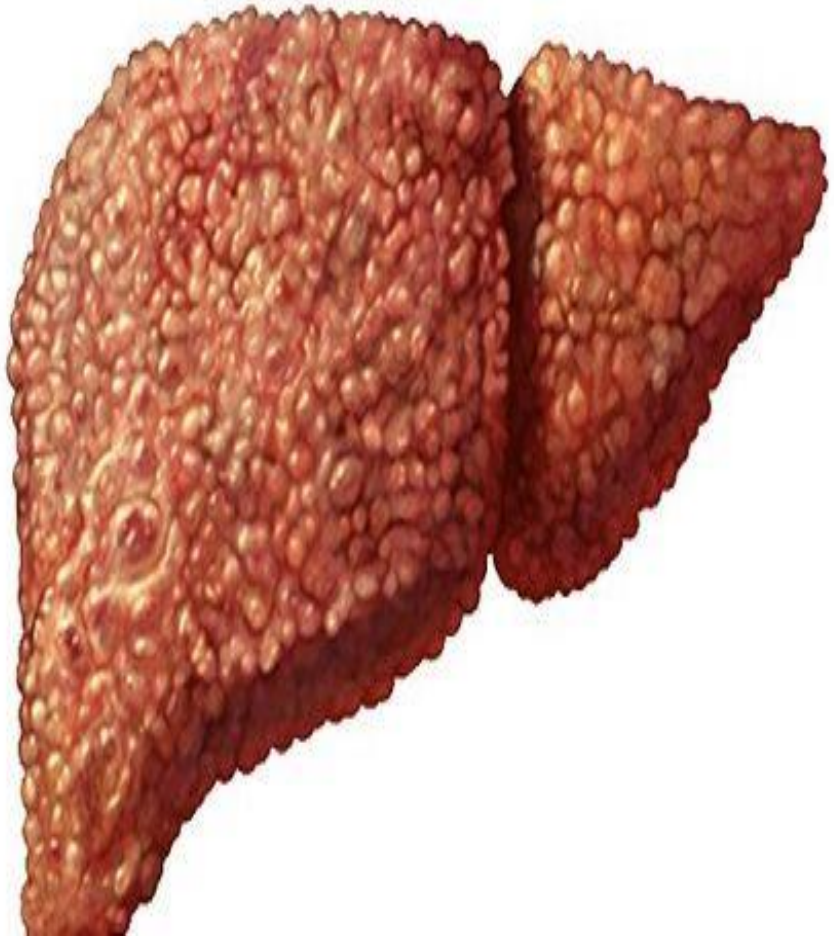
- <u>Cirrhosis is most common</u>
  Alcoholic liver disease.
- Hepatic schistosomiasis 2nd most common worldwide.

Alcoholic liver disease is the most common cause of cirrhosis worldwide

Normal Liver

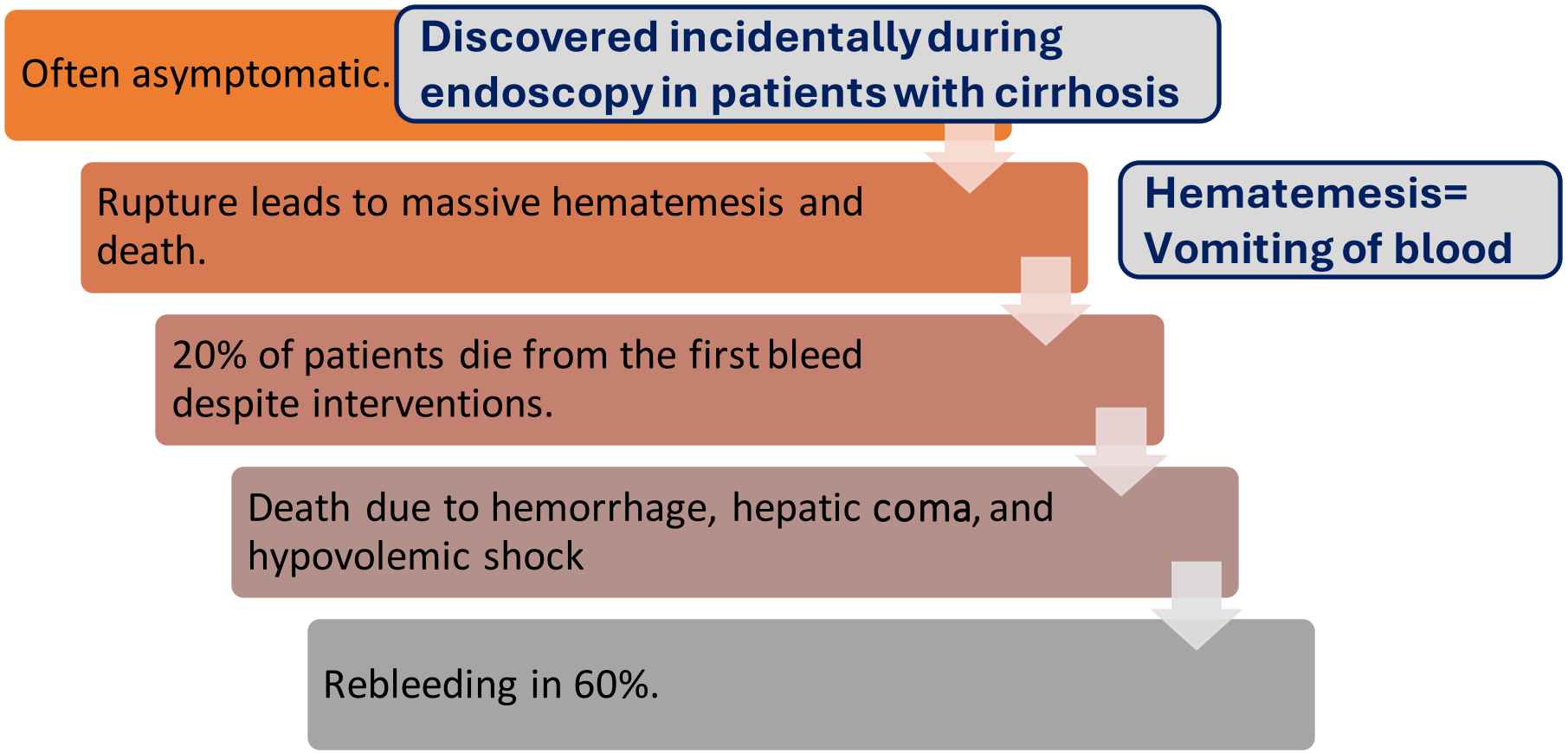


Liver with Cirrhosis



Cirrhosis → transform into nodular liver → Portal Hypertension & Chronic liver disease

Clinical Features

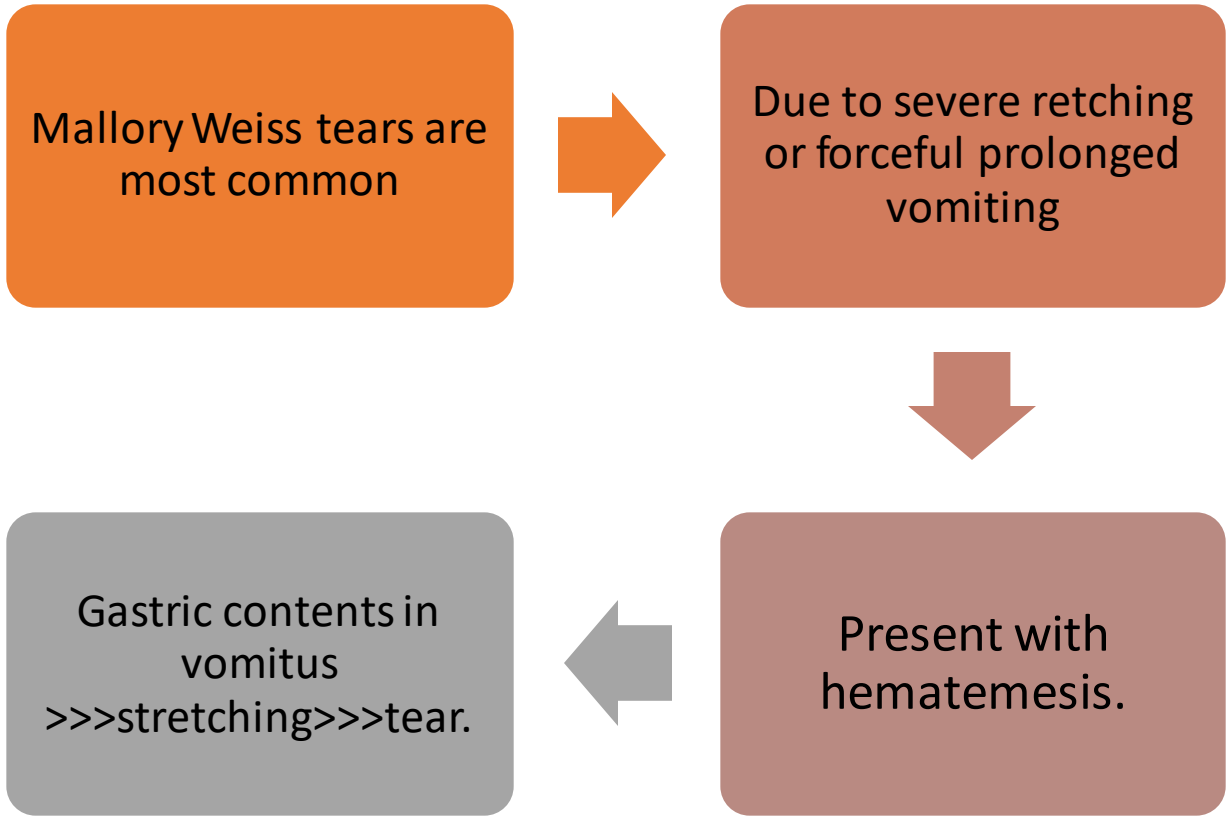


4-ESOPHAGITIS

Inflammation of esophageal
Caused by:

- Esophageal Lacerations.
- Mucosal Injury
- Infections
- Reflux Esophagitis
- Eosinophilic Esophagitis

Esophageal Lacerations



-During vomiting which is severe & prolonged in this case, there will be no time for esophagus to relax. Consequently, a large amount of gastric content will pass through esophagus causing distension & stretching of esophagus.This lead to a tear presented with hematemesis (Fresh red colored blood)

-Additional info:Hematemesis(Blood vomiting) can vary from red to brown, in case of esophageal lacerations it appears as fresh red colored blood

Linear lacerations

longitudinally oriented

Cross the GEJ.

Superficial **Only on mucosa**

Heal quickly , no surgical intervention

The tears heal spontaneously

Clinical presentation of a patient: Vomiting of fresh red colored blood after forceful vomiting

Chemical Esophagitis

- **Damage to esophageal mucosa by irritants**
- Alcohol,
- Corrosive acids or alkalis
- Excessively hot fluids
- Heavy smoking
- Medicinal pills (doxycycline and bisphosphonates)
- Iatragenic (chemotx, radiotx , GVHD)

Biphosphonates are a major cause of medicine pill esophagitis due to large size of tablets that could be stuck in esophagus
-Solution: We ask the patient to drink plenty of water & stay in an upright position for a while

GVHD: Graft Versus Host DIsease

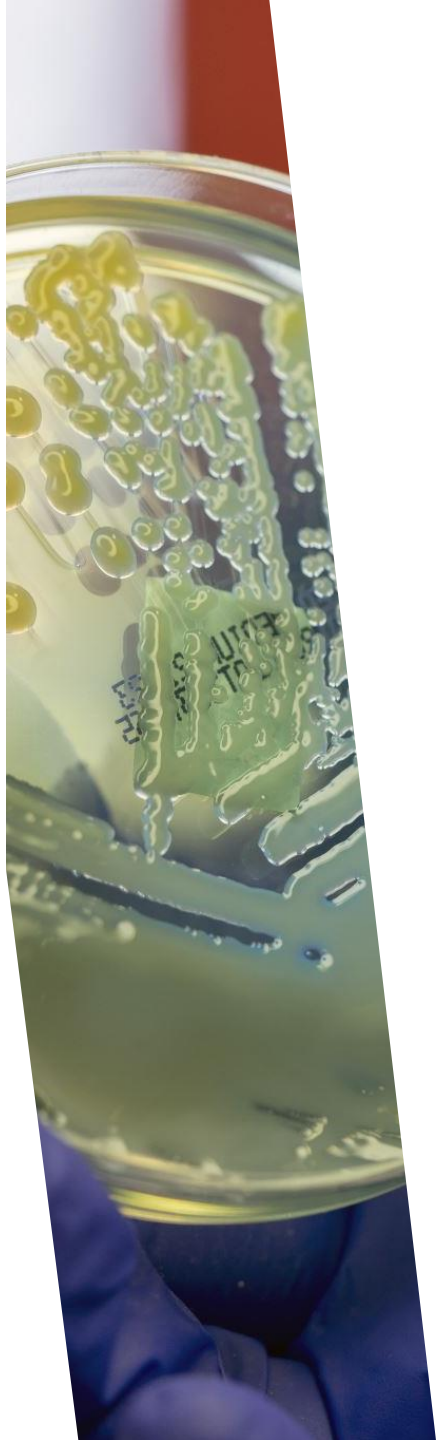
Clinical symptoms & morphology

- Ulceration and acute inflammation.
- Only self-limited pain, odynophagia (pain with swallowing).

Complications:

- Hemorrhage, stricture, or perforation in severe cases

Stricture can lead to stenosis



Infectious esophagitis

- Mostly in debilitated or immunosuppressed.

- Viral (HSV, CMV)
- Fungal (candida >>> mucormycosis & aspergillosis)
- Bacterial: 10%.

Bacteria is less common, and can be secondary to viral or fungal infection

- Candidiasis :

- Adherent.
- Gray-white pseudo membranes
- Composed of matted fungal hyphae and inflammatory cells

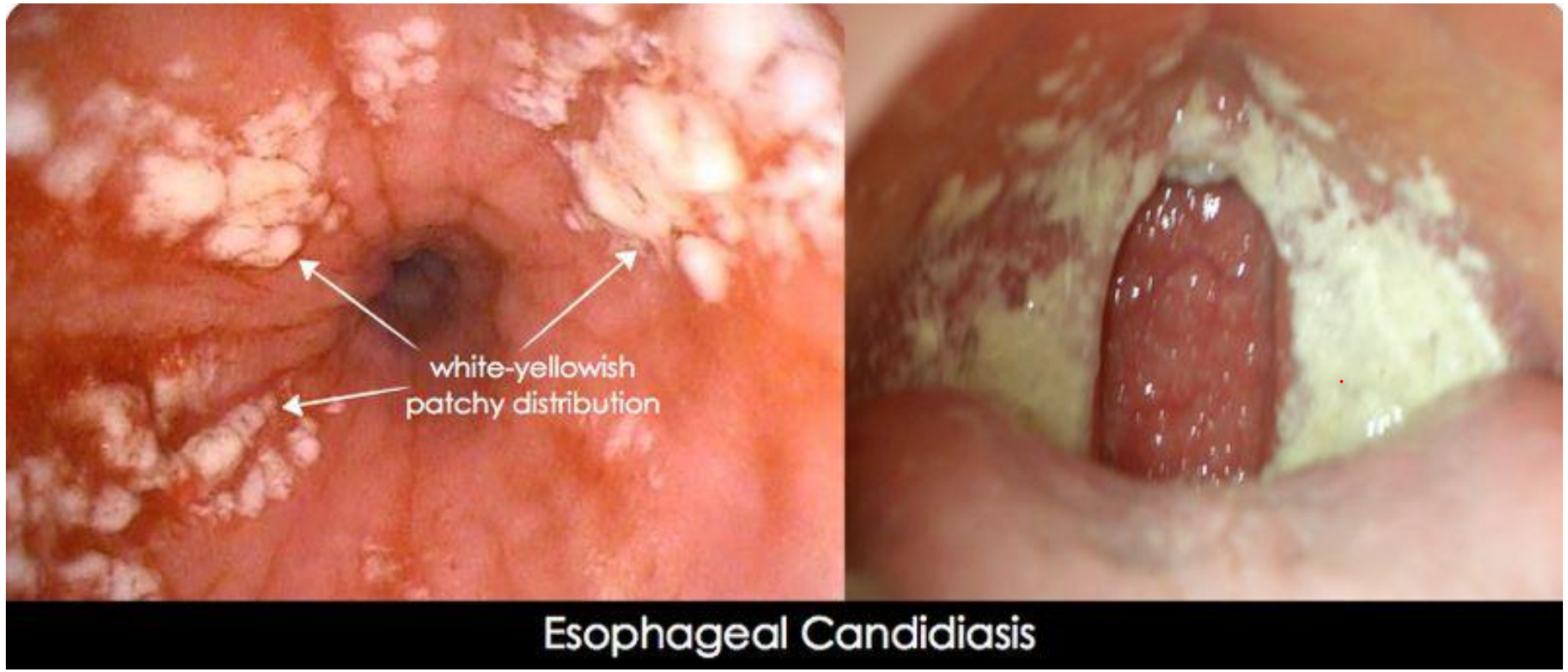
-Adherent to the esophageal mucosa and seen during endoscopy

They can be seen microscopically upon biopsy examination

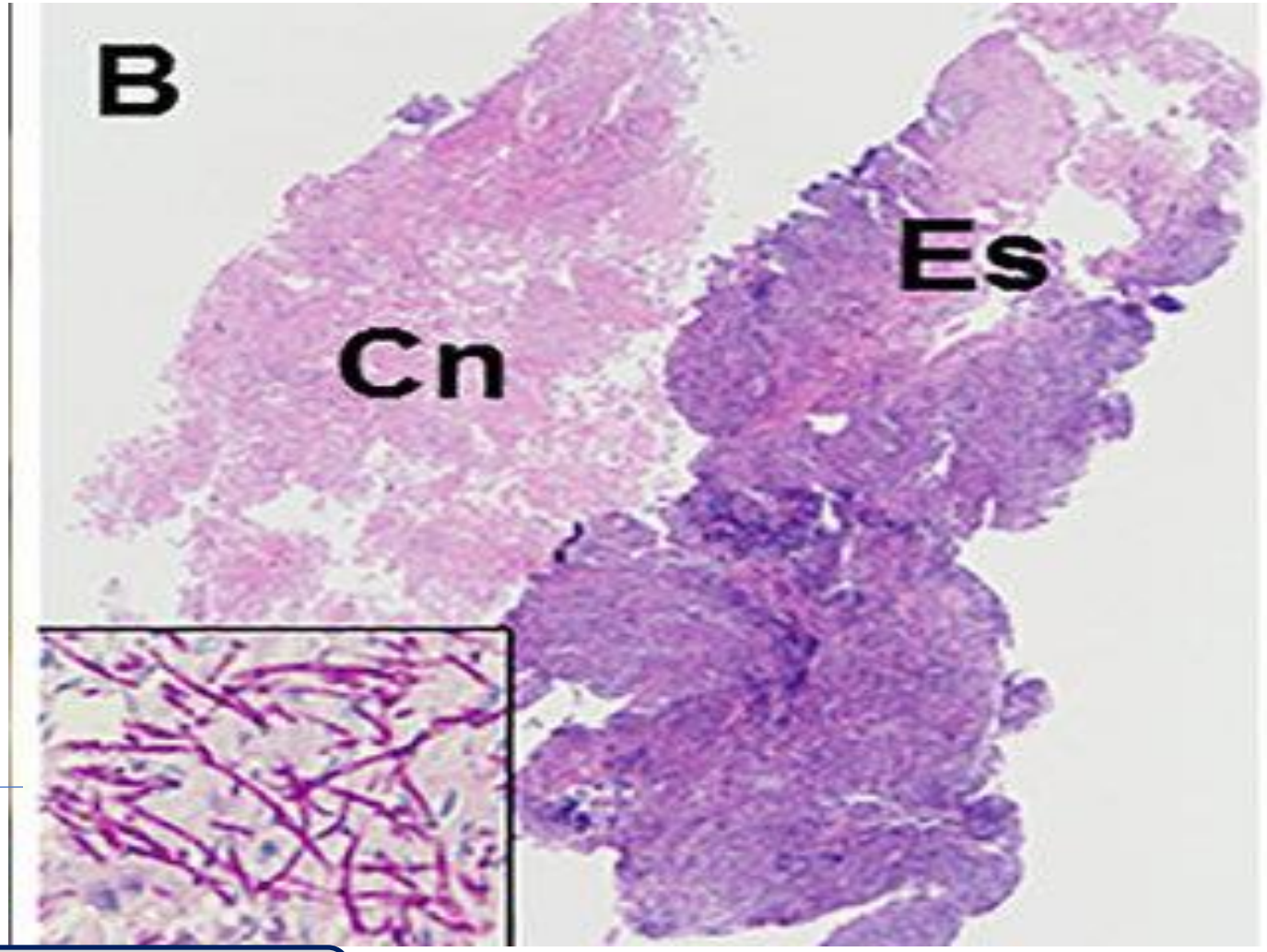
-This infection can extend to oral mucosa causing oral thrush

-Esophagus

-Oral mucosa with an oral thrush



https://www.pinterest.com/pin/374291419013418659/



Hyphae

-We use periodic acid schiff stain to highlight fungal hyphae

www.researchgate.net/publication/285369734_Esophageal_Candidiasis_as_the_Initial_Manifestation_of_Acute_Myeloid_Leukemia

- Herpes viruses
- Punched-out ulcers

Can be seen by endoscopy

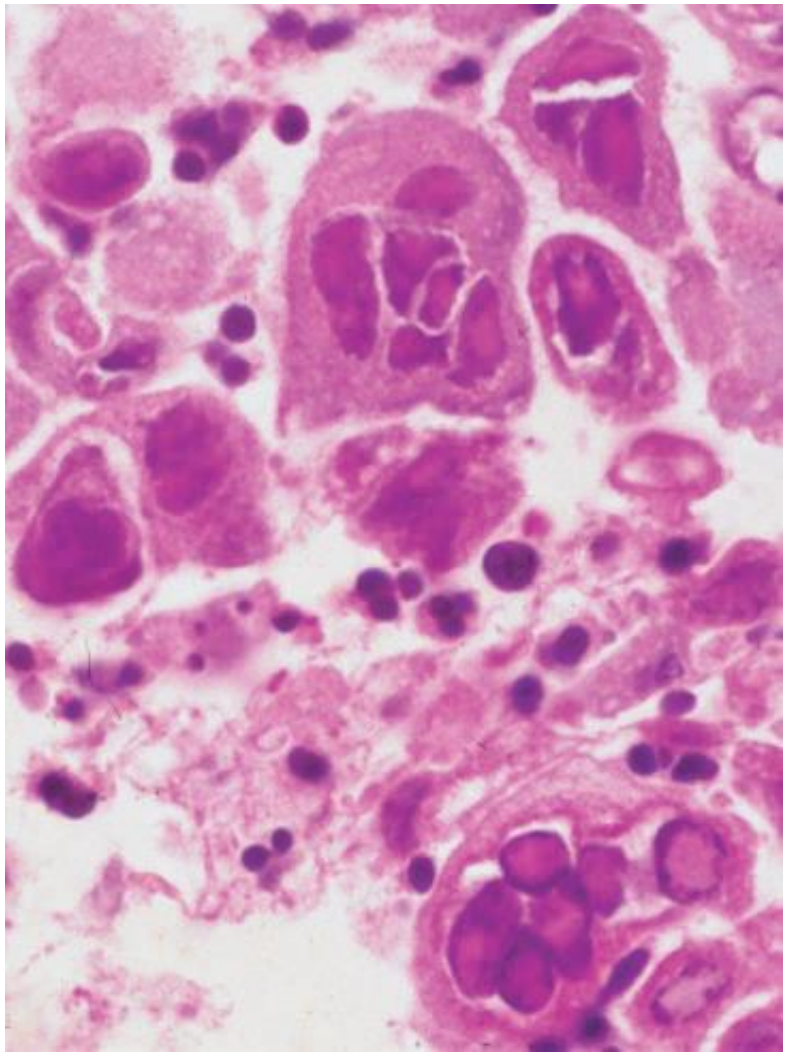
- **Histopathologic:**
- Nuclear viral inclusions
- Degenerating epithelial cells ulcer edge
- Multinucleated epithelial cells.

-Here we can see punched-out ulcers

-Remember: The esophagus mucosa is normally pale-pink, but here we see the surrounding mucosa erythematous (red)

Semantic Scholar

-HSV infection histology: Multinucleated Cells,Viral nuclear inclusion,Degeneration of cells



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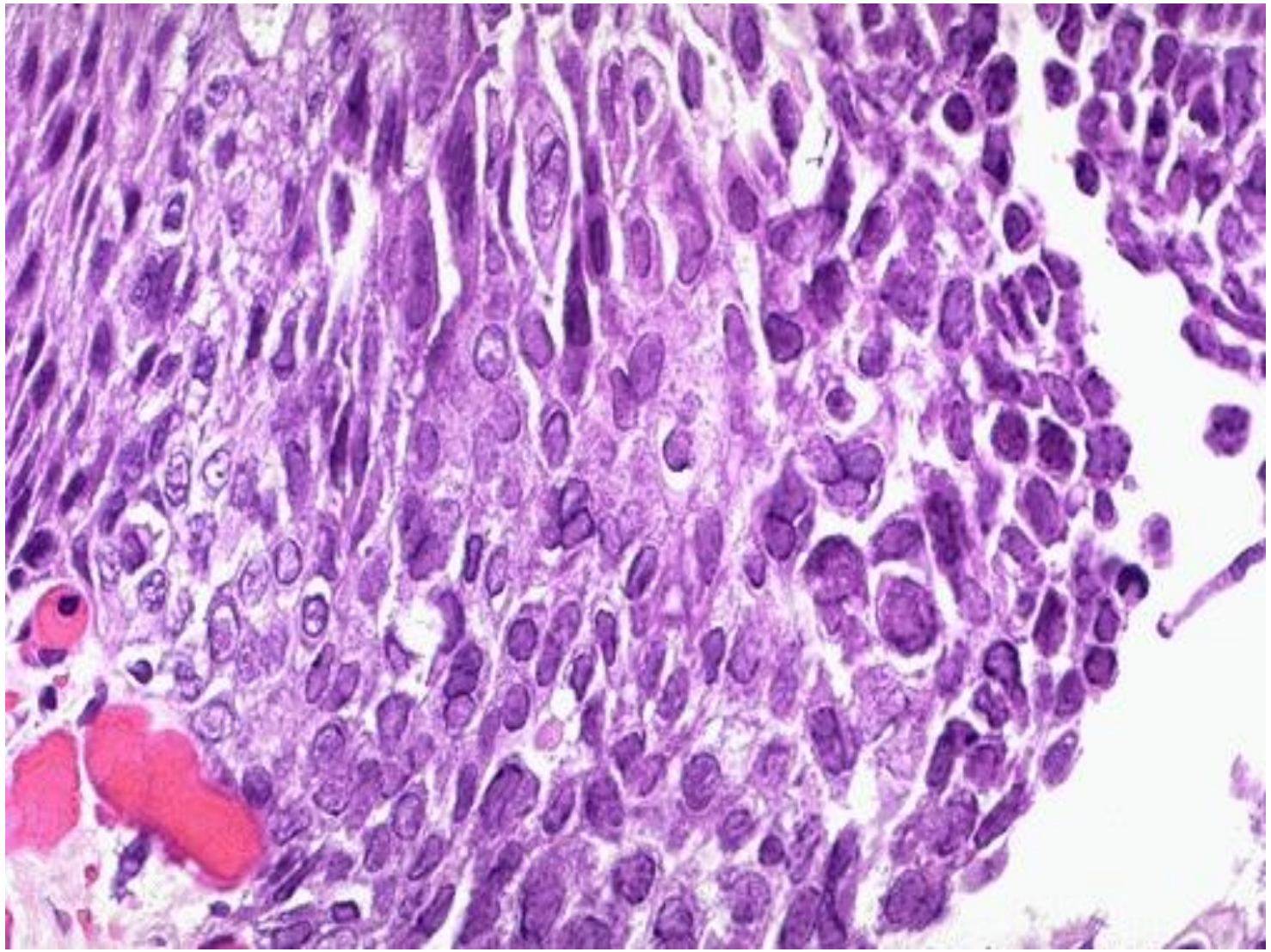
Histology:

-Multinucleated cells

-The nuclei are characterized by intranuclear inclusion (A typical feature of HSV biopsies)

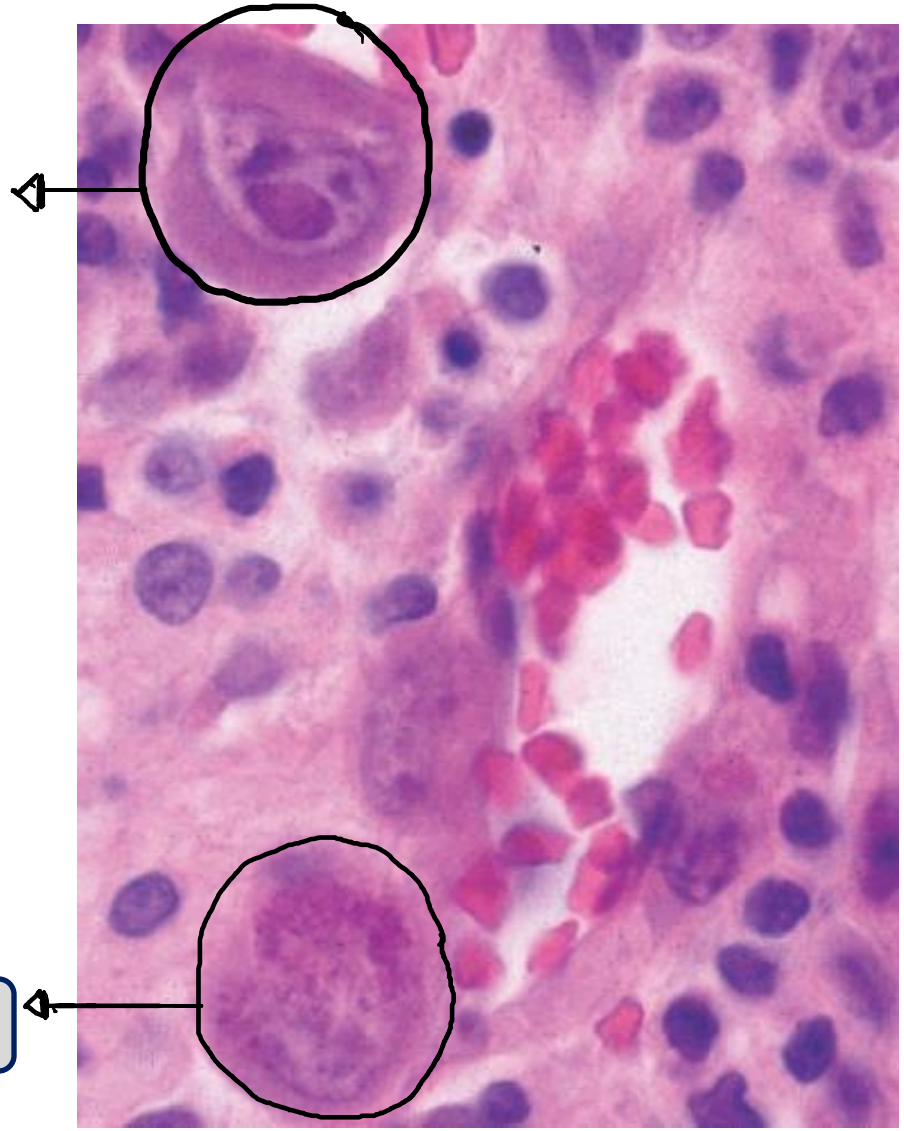


- **CMV :**
- Shallower ulcerations.
- Biopsy: nuclear and cytoplasmic inclusions in capillary endothelium and stromal cells.(Mega cells)

Cytomegaly=Mega cells=Large cells

-CMV infects Endothelial & Stromal Cells in addition to epithelial cells, unlike HSV which only infects epithelial cells

-Large Stromal cells with nuclear inclusion



Large Endothelial cell

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E-learning ACTIVITIES

- **Q A 45-year-old woman has noted difficulty swallowing for the past 6 months. On physical examination there are no abnormal findings. A barium swallow reveals an area of stricture (stenosis) in the lower esophagus just above the gastroesophageal junction. She has an upper GI endoscopy performed and biopsies of the lower esophagus are taken which show normal squamous epithelium with no acute or chronic inflammation or ulceration, only submucosal fibrosis . Which of the following is the most likely diagnosis?**
  A.Barrett esophagus
  B.Portal hypertension
  C.Systemic sclerosis
  D.Mallory-Weiss syndrome

  Answer: C

- **A 41-year-old man has a history of drinking alcohol for the past 20 years. He has had numerous episodes of nausea and vomiting in the past 5 years. He now experiences a bout of prolonged vomiting, followed by hematemesis. On physical examination his vital signs are stable. His heart has a regular rate and rhythm with no murmurs and his lungs are clear to auscultation. His stool is negative for occult blood. Which of the following should be suspected based on this presentation ?**
  A.Esophageal laceration
  B.Esophageal stricture
  C.Barrett esophagus
  D.Esophageal diverticulum
  E.Esophageal squamous cell carcinoma

  Answer:A

  A 35-year-old HIV positive woman known has had pain on swallowing for the past week. Upper GI endoscopy is performed. There are 3 sharply circumscribed punched out 0.3 to 0.8 cm ulcers in the lower esophagus. She is most likely to have infection with which of the following organisms?
  A.Cytomegalovirus
  B.Candida albicans
  C. Helicobacter pylori
  D.Herpes simplex virus

  Answer:D

."اللهُم مساكن طيبة وغُفران من الخطايا والذنوب ، وصَلاحاً في الدُنيا والآخرة" .

..مضىٰ مُعظمه وبقيَ أعظمه "
اللهم تداركنا بلطفك، وأعنّا على طاعتك،
وبلّغنا
ليلة القدر، وتقبّل منّا يا أرحم الراحمين

"اسأل الله أن يمسح على
قلوبنا قلبًا قلبًا، وينفخ في
أرواحنا من لدنه الطمأنينة ،
ويعطينا لحدّ الرضا والغِنى
والعزة"

V2:
Spelling mistake in Slides (11 & 33):
Strenosis —> Stenosis