Esophageal Disorders

↳ mc dz is GERD + hiatus hernia...

15 cm بعيدة عن ال mouth

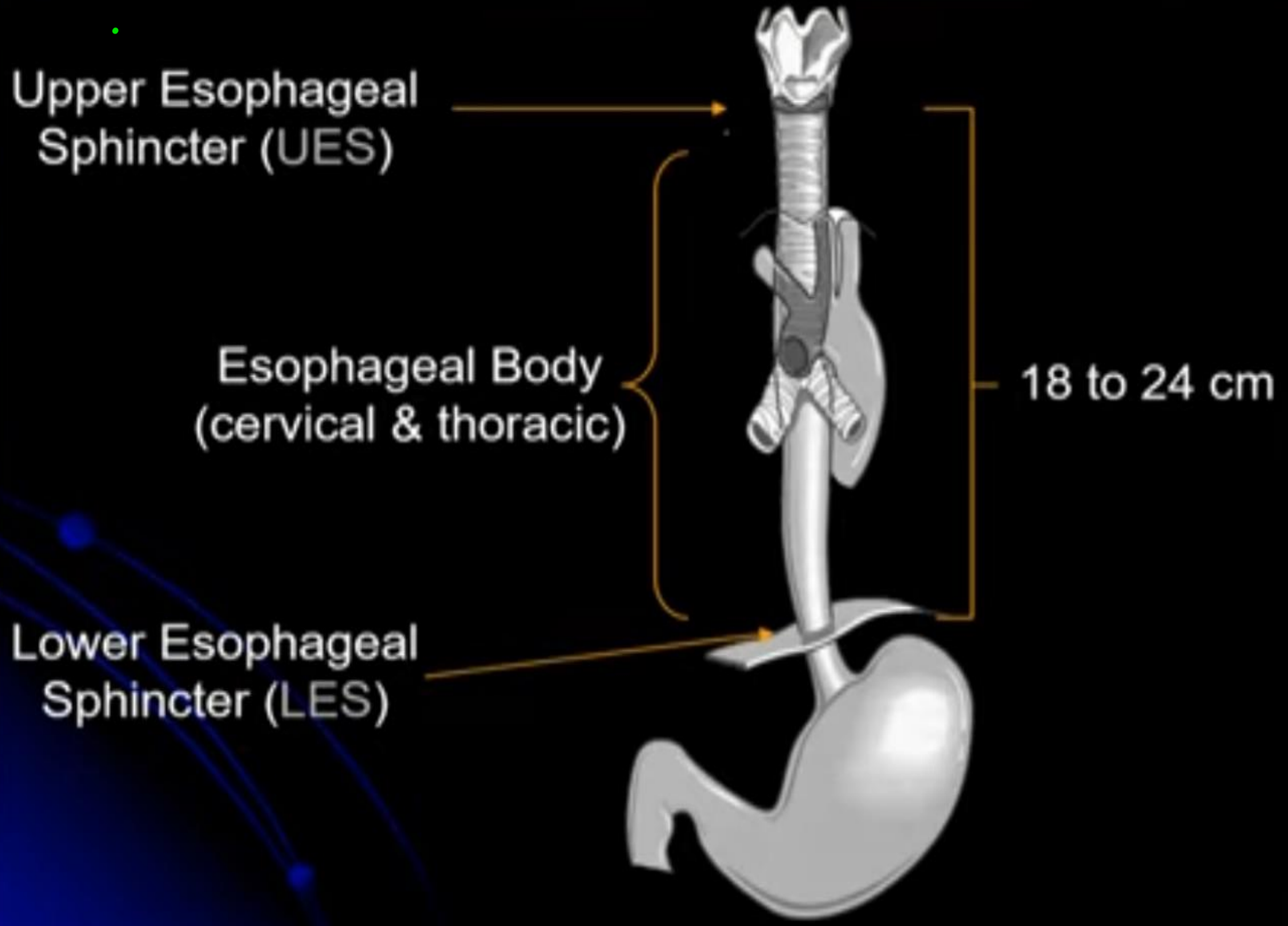
* esophagus length:- 25 cm
  ↳ begin at the end of the pharynx [at the lower border of the C6 - cricoid cartilage]...

* the length of stomach = the length of esophagus = the length of dudenum = 25 cm...

E J Arteen
FRCSI

Anatomy of esophagus

* esophegeal opening [T10]
بيضل فيها ال abdominal esophegus



Upper Esophageal Sphincter (UES)

Esophageal Body (cervical & thoracic)

18 to 24 cm

Lower Esophageal Sphincter (LES)

* The narrowing of the esophagus:- الاماكن يلي ممكن يعلق فيها الاكل

1- in the upper esophegeal sphincter there is 2 muscles → cricopharengeal muscle / → thiropharengeal muscle → sphincter بيلزم رح يتكون sphincter حتى يسكر upper esophegus

↳ 7 inch from the tooth

↳ open just in eating - vomiting...

2- stricture at the level of the arch of aorta [when the esophagus cross the arch of aorta]... [9 inch from the tooth]

3- stricture when the esophegus cross the Bronchus... [11 inch from the tooth]

4- stricture in the lower end of the esophegus... [25 inch from the tooth]

* The Branches of 1st part of the sub Clavian A:-

① Thyro cervical trunk...
② vertebral A...
③ Internal mamary A → 1.5 cm lateral and post. to the lateral border of the sternum and end at 6 costal cartilage by dividing into sup. epigastric and musculophrenic artery...

↳ join with inf. epigastric at the level of umblicus behind the rectus muscle...

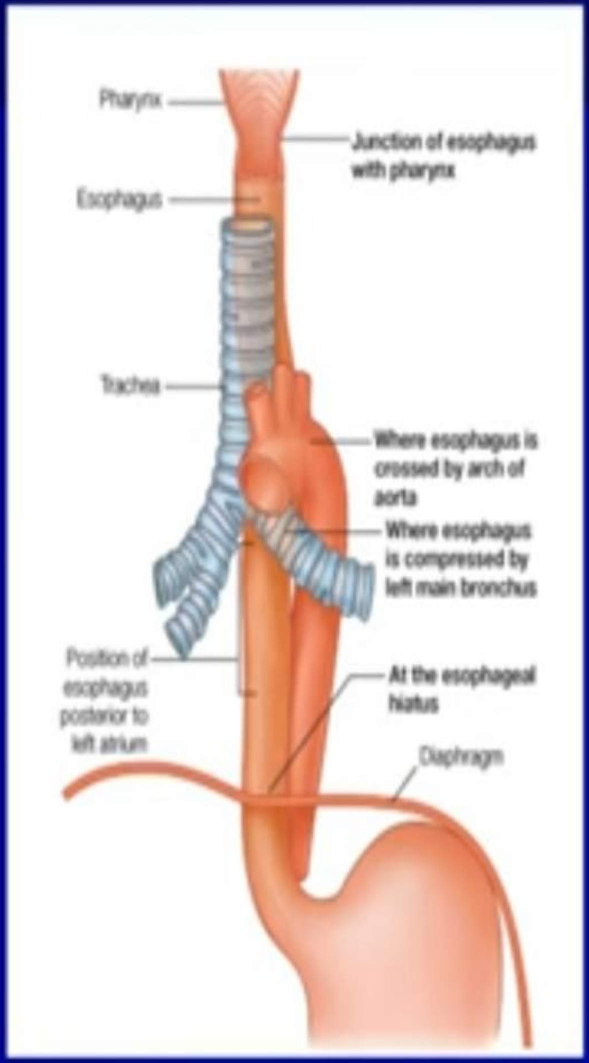
↳ originate from ext. iliac

* The lf gastric artery originate from the coeliac trunk...

↳ smallest branch of coeliac trunk...

NARROW AREAS OF THE ESOPHAGEAL LUMEN

- The esophagus is narrowed at four sites: *7-9-11-15 inch* from incisor teeth.
- At the beginning, behind the cricoid cartilage of the larynx.
- Where it is crossed by arch of aorta in superior mediastinum.
- Where the left bronchus in posterior mediastinum cross the front of the esophagus.
- Where the esophagus enters the stomach.
- These three sites may offer resistance to the passage of a tube down the esophagus into the stomach.


Pharynx
Junction of esophagus with pharynx
Esophagus
Trachea
Where esophagus is crossed by arch of aorta
Where esophagus is compressed by left main bronchus
Position of esophagus posterior to left atrium
At the esophageal hiatus
Diaphragm

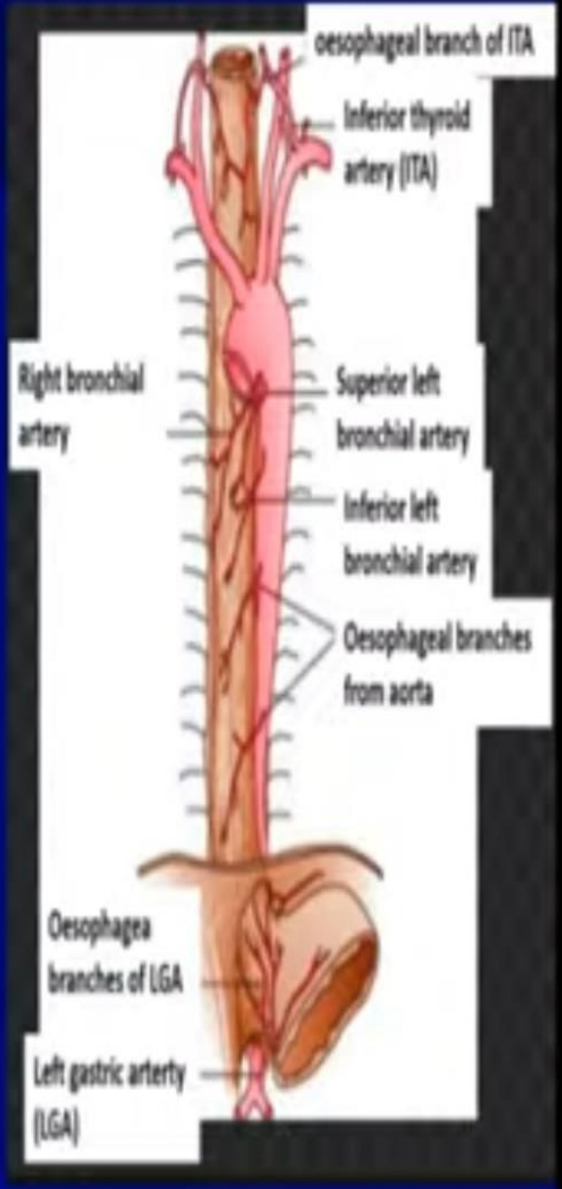
ESOPHAGUS

- **Blood Supply : *Segmental***
- ✓ **Cervical part** : Inferior thyroid artery. originate from the thyrocervical trunk from 1st part of subclavian A.
- ✓ **Thoracic part:** Bronchial, and descending thoracic aorta.
- ✓ **Abdominal part:** Left gastric artery. ↳ most important part...
- Anterior LT and posterior RT *nerves* (vagi) and sympathetic branches of the thoracic part of the sympathetic trunk supply the esophagus.

multiple

mainly single...

in 30-40% more than one nerve...


oesophageal branch of ITA
Inferior thyroid artery (ITA)
Right bronchial artery
Superior left bronchial artery
Inferior left bronchial artery
Oesophageal branches from aorta
Oesophagea branches of LGA
Left gastric artery (LGA)

* The cervical esophegus end in the supra sternal notch... [if there is tumor in this part → it's squmous cell carcinoma]...
  - at the neck...

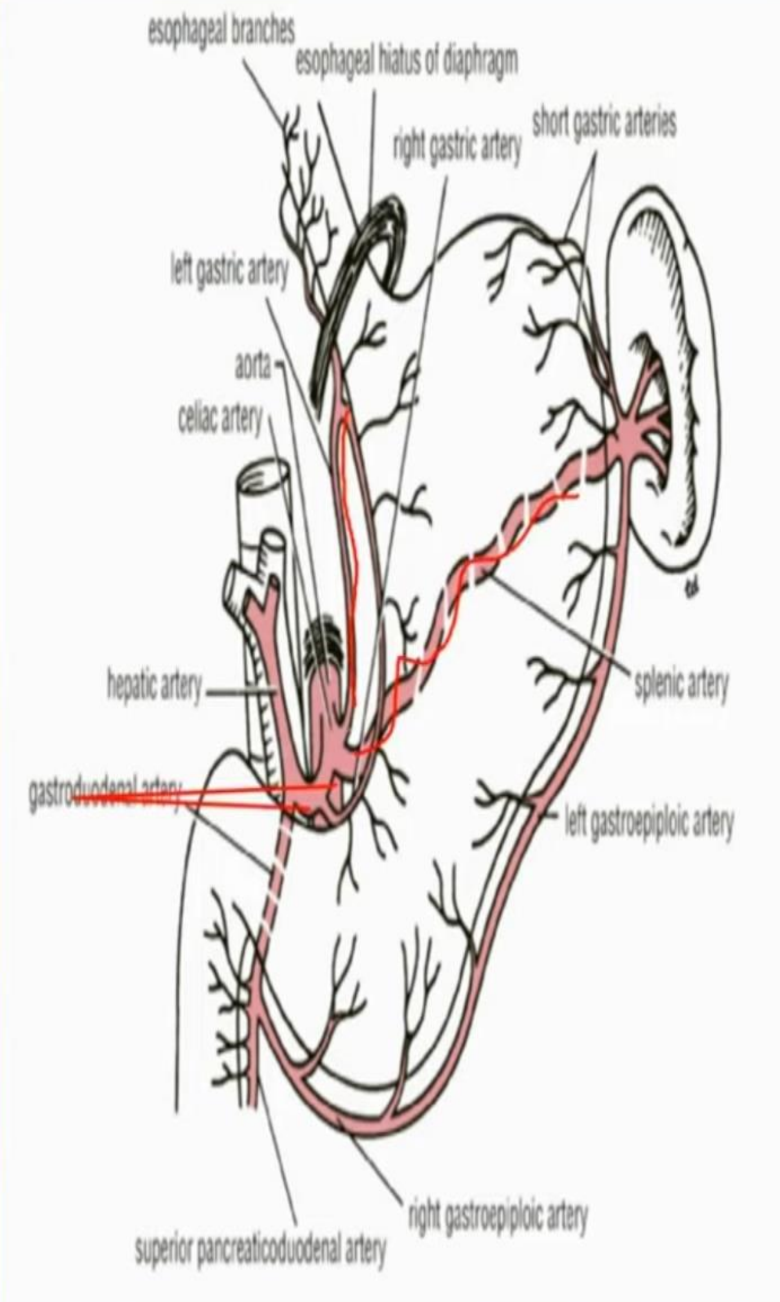
* The Thoracic esophegus [the longest part] divided into
  - upper thoracic esophegus...
  - middle thoracic esophegus...
  - lower thoracic esophegus...

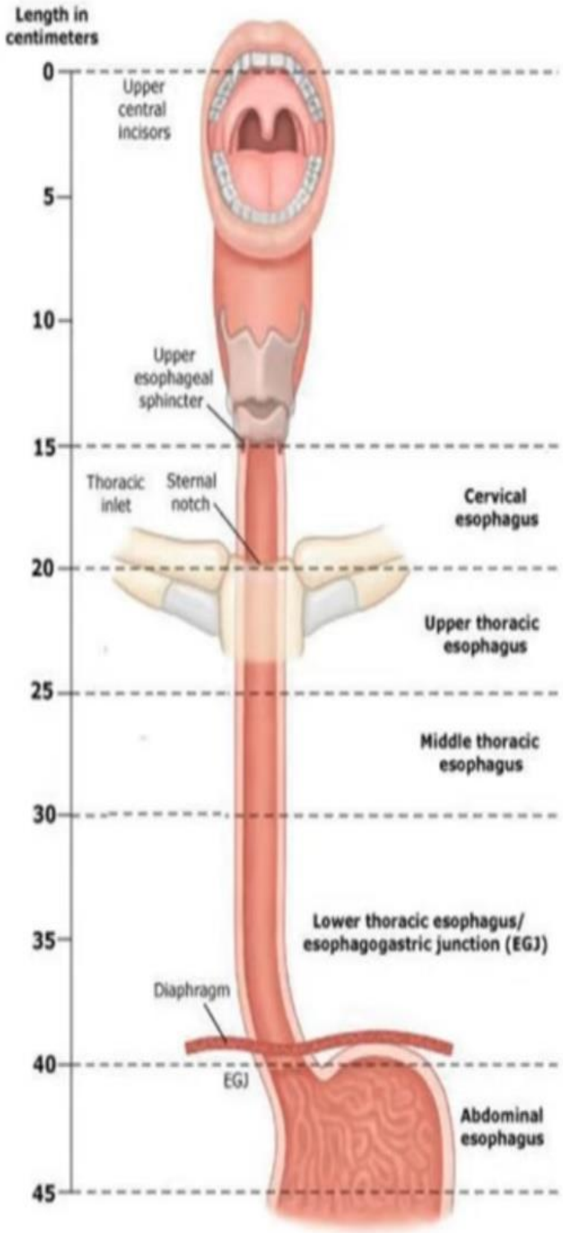
* The Abdominal esophegus enter from the esophegeal opening..
  - 5cm but if it < 2cm → ↑ risk of GERD [defective esophagus]...

* ↑ abdominal esophagus length → ↓ risk of GERD..

* The mini Brain of the gut more important than extrensic autonomic nervus system...
  - if it defected lead to motility problem...
    ↓
    due to myenteric and Auerbach plexus distruction..
  - sympathatic and parasympathatic [responsible for movment + contraction]...

* The SI cancer → delayed diagnosis [the length of SI : 6m - rare tumor 2% - liquid content ..: السبب]
  لذلك التشخيص بيكون late يعني مابيصير IO..


esophageal branches
esophageal hiatus of diaphragm
right gastric artery
short gastric arteries
left gastric artery
aorta
celiac artery
hepatic artery
splenic artery
gastroduodenal artery
left gastroepiploic artery
right gastroepiploic artery
superior pancreaticoduodenal artery


Length in centimeters
0
5
10
15
20
25
30
35
40
45
Upper central incisors
Upper esophageal sphincter
Thoracic inlet
Sternal notch
Cervical esophagus
Upper thoracic esophagus
Middle thoracic esophagus
Lower thoracic esophagus/ esophagogastric junction (EGJ)
Diaphragm
EGJ
Abdominal esophagus

Motility Disorders of esophagus

↳ due to myenteric and Auerbach plexus distruction..

- **Primary** more important than 2ry..
  - **Esophageal Body**
    - Achalasia. [تشخيص سهل]
    - Diffuse esophageal spasm.
    - Nutcracker esophagus.
    - Nonspecific esophageal dysmotility. [تشخيص صعب]
  - **LES**
    - Achalasia.
    - Hypertensive LES.
- **Secondary :** Severe esophagitis , Scleroderma (C.T dz) , Diabetes , Parkinson's , Stroke.

lead to periphral neuritis in the LL...

lead to loss of esophegeal motility...

lead to gastro paresis...

*The normal lower esophegeal pressure is:- 20 mmHg...
* In GERD + Hitus Hernia the LES p. become < 5 mmHg...

* The LES pressure in the Achalasia become > 25 mmHg...

note:-
- The Bile reflux worse than the acidic reflux
زعبت غير

Achalasia

The commonest motility esophegeal disorder...
diagnosed by Barium sallow [94% sensitive]

so lead to ↑P. in the LES

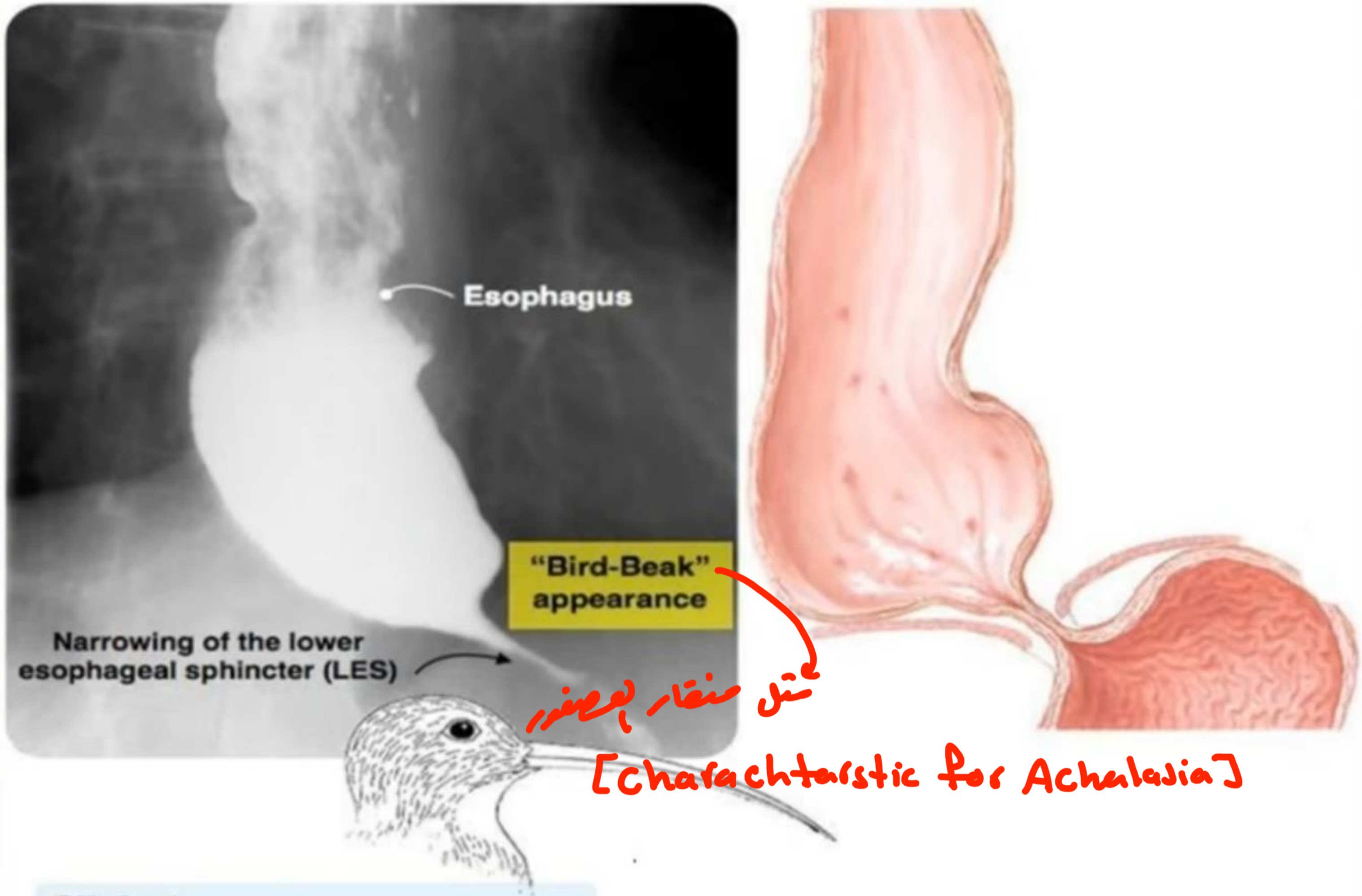
- Achalasia means ***"Failure to Relax"*** Incomplete LES relaxation *with* aperistalsis of body of esophagus .
- First clinically recognized esophageal motility disorder.
- *Epidemiology*
  - 1-2 per 200,000 population. [rare]
  - usually presents between ages 25 to 60. [Bi modal in young and in old age]
    - the pt end in surgery !!
    - عكسه بيتعالج بدو احتاج غير ال surgical
  - Male = female ***" Bimodal Presentation".***
  - Caucasians > others.
  - Average symptom duration at diagnosis: 2-5 years
  - Premalignant : cancer 8% after 20 years.
    (usually sq. cell carcinoma... / and may be adenocarcinoma...

* excess belching due to psycological cause maily or GERD...

* if the pt unable to belch it's esophegeal motality disorder, Achalasia...

[so we should do manometry or Barium swallow]...

Achalasia



شكل منقار العصفور

[charachtarstic for Achalasia]

Clinical

- Dysphagia (solids, liquids)
- Difficulty belching
- Chest pain
- Regurgitation of undigested food
- Dyspepsia
- Aspiration

Etiology

* ↓ nitrous oxide lead to :-

1- spasm of LES...

2- Hirschsprung dz [spasm of lower part of the rectum and sigmoid]...

3- infantile pyloric stenosis

- The pathological changes seen in achalasia consist of myenteric inflammation with injury and loss of ganglion cells and fibrosis of myenteric nerves.

fx : relax the sphincter...

↓ LES relax

- *Nitrous oxide synthetase enzyme deficiency* and reduction in the synthesis of nitric oxide and vasoactive intestinal polypeptide.

in any motility disorder...

- The probable aetiology of the disease is thought to be an *autoimmune-Mediated Destruction* of inhibitory neurons .

* The Achalasia has dual disorder → the LES fail to relax...
→ Aprestalsis to the distal 2/3 of the esophagus..

.. [distal 2/3 ← smooth الـ في فعلاً بتكون Achalasia الـ تأثير striated muscle بيكون upper 1/3 الـ انه صحيح]

Clinical presentation

- Classical triad: ↘ to solid + liquid...
  - ① Solid Dysphagia 90-100% (75% also with dysphagia to liquids).
  - ② Post-prandial regurgitation 60-90%.
  - ③ Weight loss .

  → classical triad
- Chest pain 33-50% .
- Heart burn 25-45% . due to dilated esophagus → ① fermintation of food lead to heart burn... ② ingestion to citrus food.. الحمضيات
- Nocturnal cough and recurrent aspiration . ↳ common in Achalasia and GERD...
- Difficulty belching.

These symptoms in GERD indication for surgery..

* The dysphagia in the esophegeal cancer occur only to solid ... → late diagnosis..

والسبب :- انه حتى يصير dysphagia
لازم يكون صار obstruction
at least to 2/3 of the
leumn + لما تصير ال يغير
بغير طبيعية الاكل حتى
يسهل عليه البلع
so presented late -
in inoprable stage...

* Barium meal for stomach...
* Barium swallow for esophagus..
* Barium enema for colon...
* Barium full through for SB...
- SB enema → orally...
  ↳ more acurret...
- SB full through → from NG tube...

Diagnosis

- Barium Esophagogram (swallow) .
- Oesophageal Manometry ***(Gold Standard)***. MCQ !!
  ↳ we see failure of LES relaxation in the Achalasia...
  ↳ 2-3cm / 20mmHg normally...
- Upper Endoscopy OGD to exclude pseudo-achalasia arising from a tumour at the gastroesophageal junction.

to exclude the malignancy ←

* for any Dysphagia pt we do Barium swallow firstly then endoscope...
فبنخاف يصير perforation وبالتالي بنعمل Barium swallow وبنشوف أماكن
ال stricture وبنعمل plain for the endoscope

* 95% of the ↑Ca^{+2} due to:-
1- Hyper Parathyrodism...
2- osteolytic Bone metz...

* mc 5 cause of Bone metz:-
1- Breast cancer...
2- lung cancer...
3- prostate cancer...
4- kidney cancer...
5- ovarian cancer...

Treatment options

for old age + pre op حتى تاخ لحد ما يجي موعد عملية

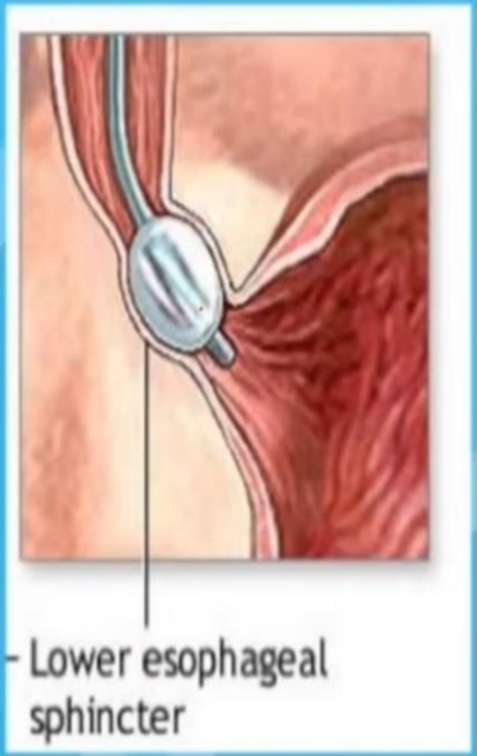
- **Pharmacotherapy:** *The goal of treatment for achalasia is the relief of the functional obstruction of the lower esophagus by relaxation of the LES.*
- ① *Calcium channel blockers and long acting nitrates* ② *sublingually.* or oral befor 30 min of eating

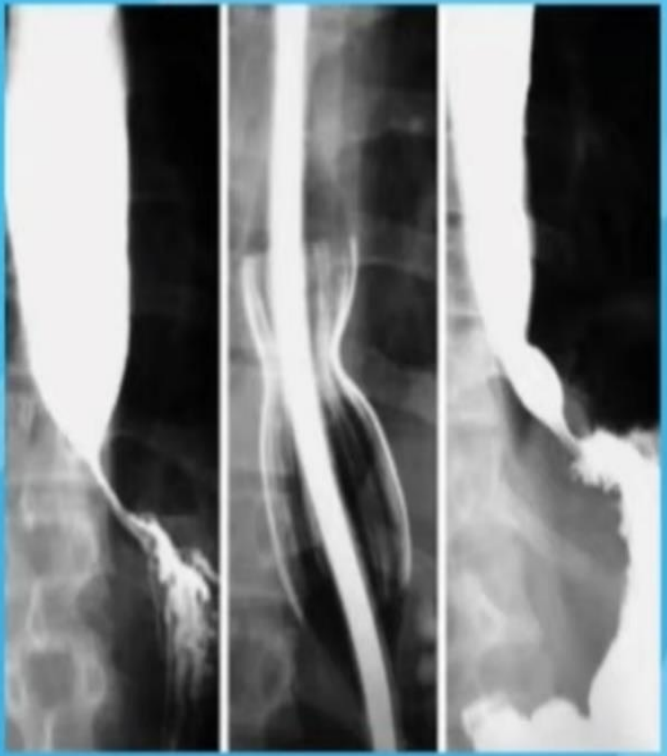
  أفضل والسبب أنه تأثيرها أسرع وأفضل ..
- Short duration of action, the incomplete symptom relief.
- Side-effects such as peripheral edema, headache, and hypotension occur in up to 30%.
- Only used in *early disease and short time* while waiting for surgery.

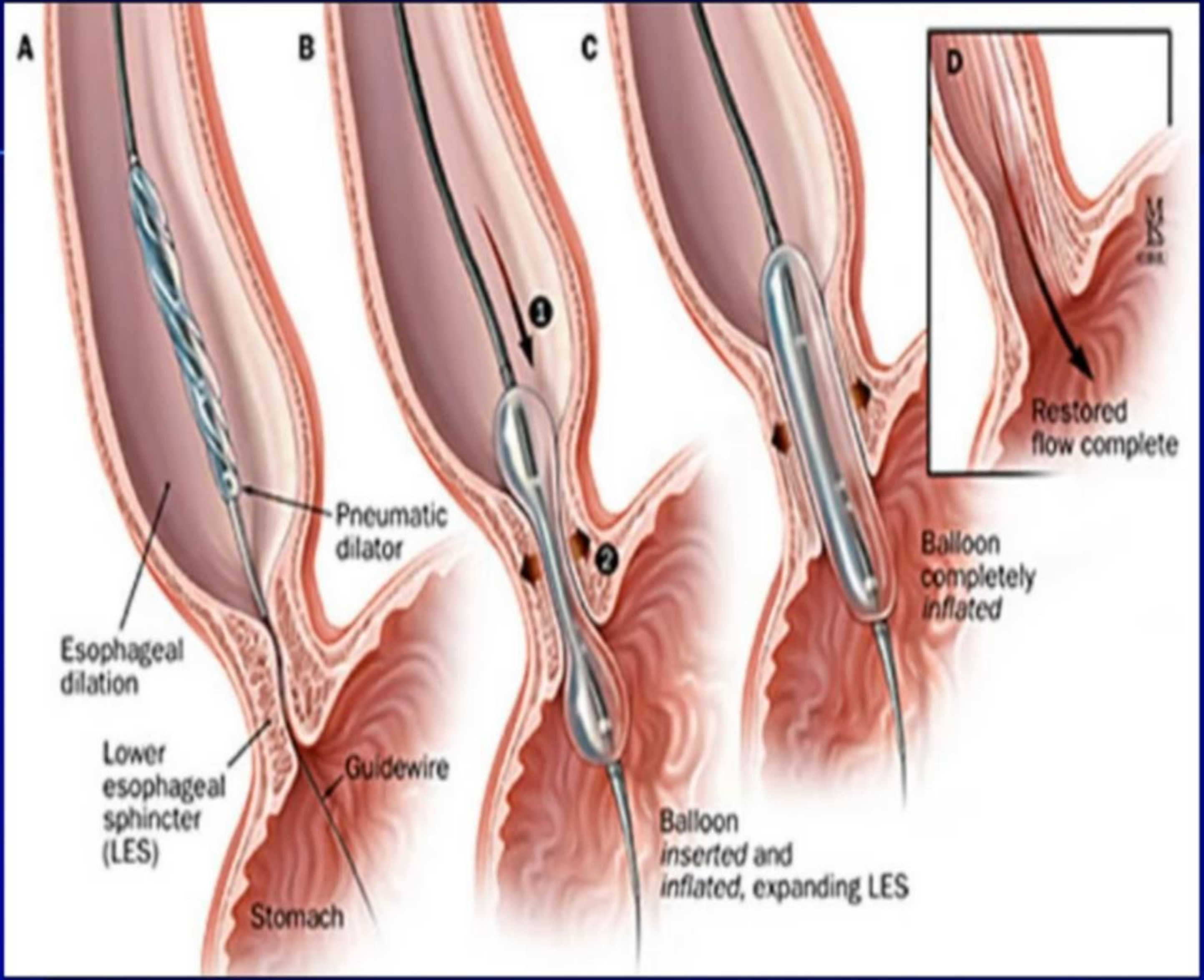
* BTX inject in the LES [in 4 quadrant]...

side effect: 50% recurrance after 6 month - 70% recurrance after 1year - 100% recurrance after 2year...

- Pneumatic balloon dilatation of the LES






A
B
C
D
Pneumatic dilator
Esophageal dilation
Lower esophageal sphincter (LES)
Guidewire
Stomach
1
2
Balloon *inserted* and *inflated*, expanding LES
Balloon completely *inflated*
Restored flow complete

بواسطة البالونه

Pneumatic Dilatation

← بتخاف من esophegeal perforation...

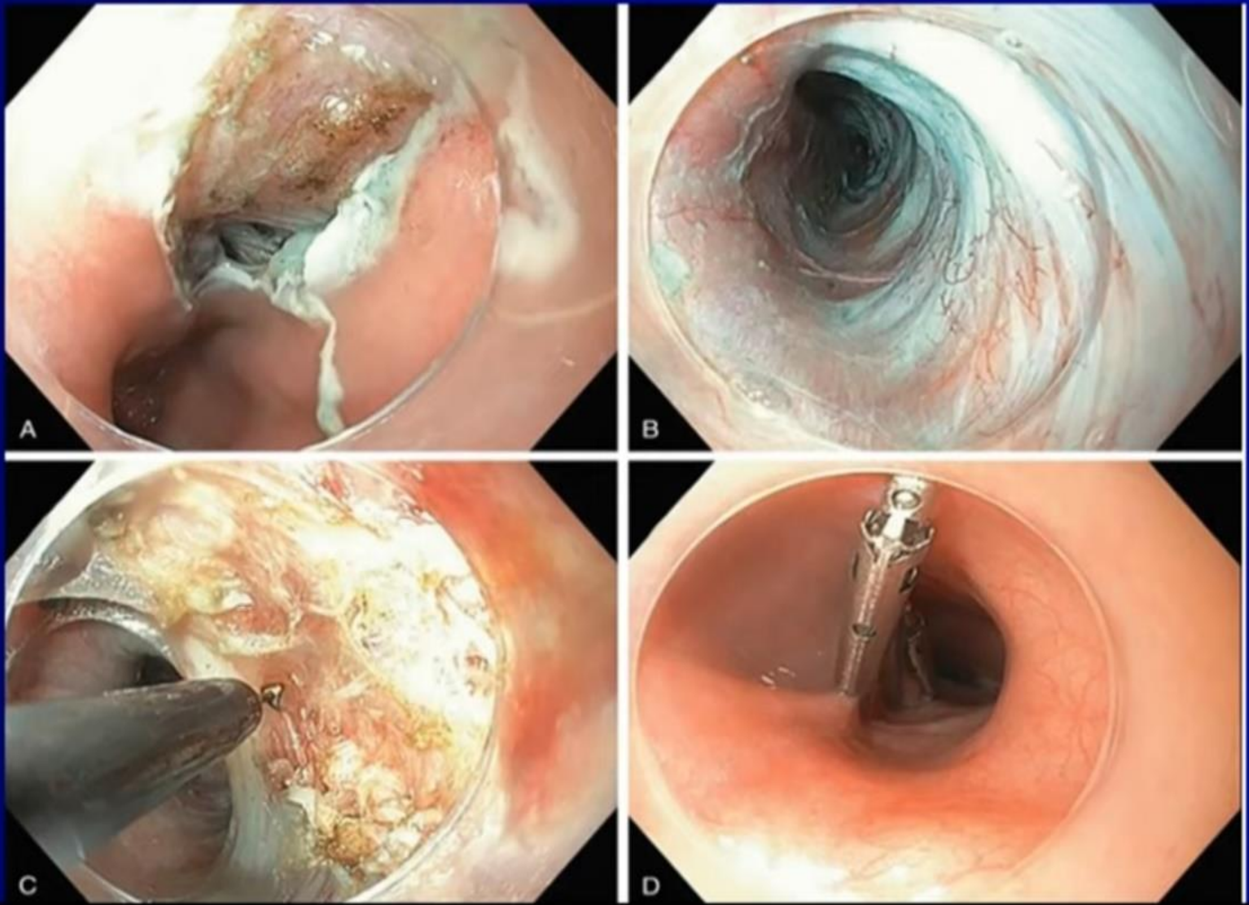
- Pneumatic Endoscopic Dilatation is currently considered the ***Most Effective Nonsurgical Treatment For Achalasia.***
- Repeated dilatations.
- Better results in elderly.
- Patient benefit from first time will have better over all results .
- *Complications :* Include esophageal perforation, intramural hematoma, and gastroesophageal reflux.

POEM

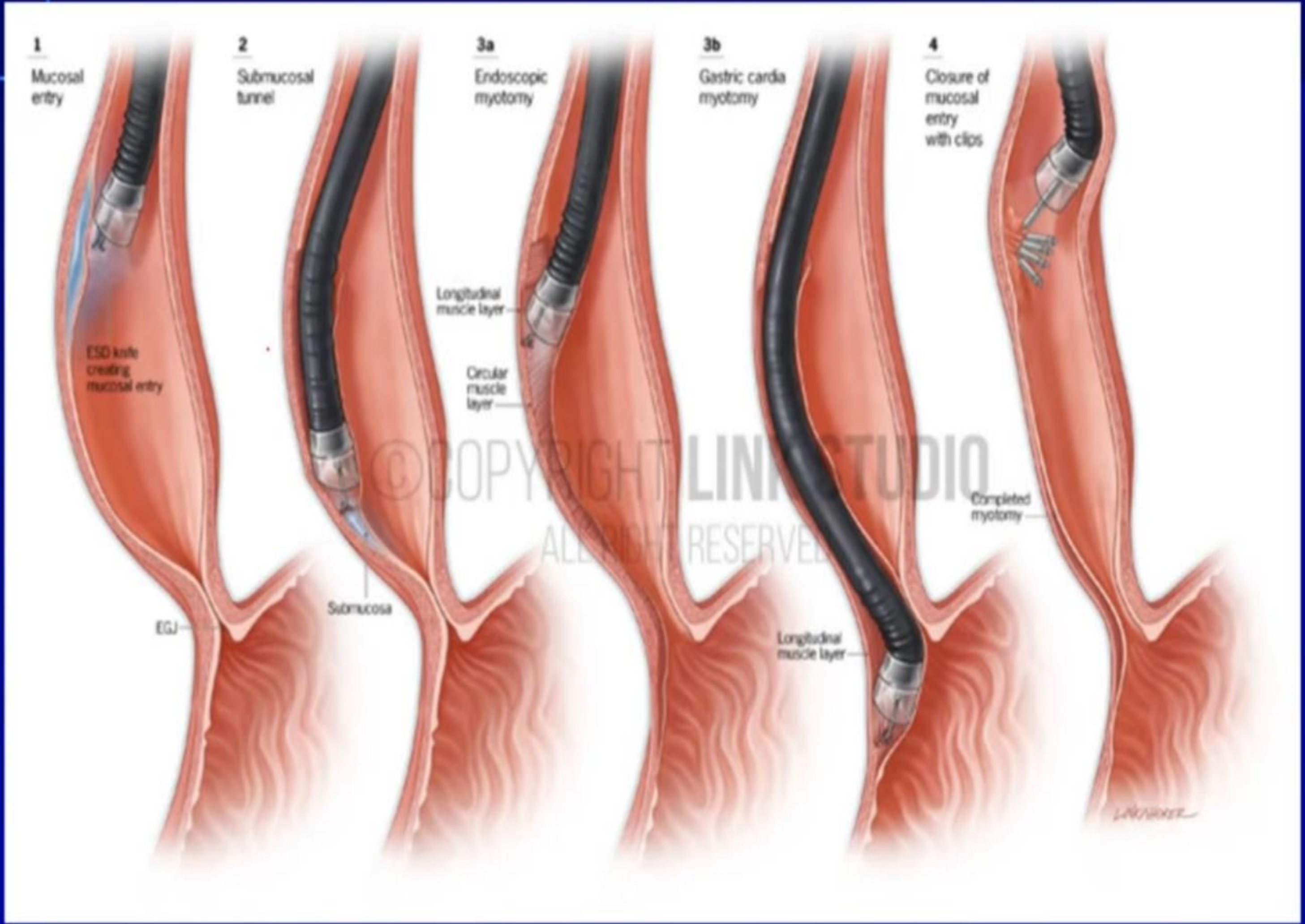
side effect:- we can't do antireflux surgery :(

نفتح فتحة في esophagus منضل تحت submucosal وبعديه نقص ال Hypertrophic muscle يعني بنعمل release to these muscle...

- Per Oral Endoscopic Myotomy(POEM).



POEM



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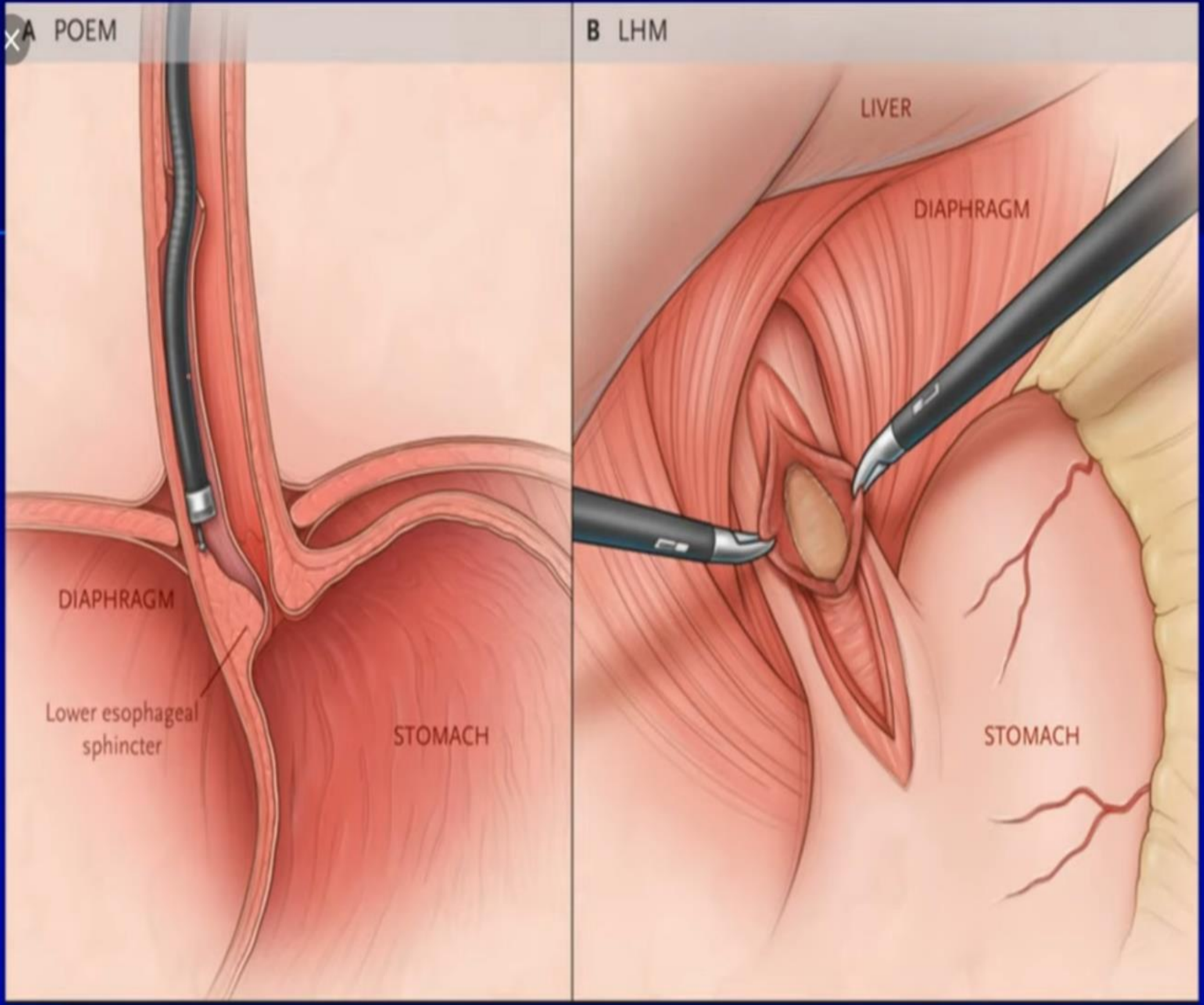

A POEM
B LHM
DIAPHRAGM
Lower esophageal sphincter
STOMACH
LIVER
DIAPHRAGM
STOMACH

Surgical Treatment of Achalasia

- The goal of surgery is to alleviate the distal oesophageal obstruction by division of the circular muscle fibers comprising the LES.

open 4-6cm in lower esophagus + 1cm in the stomach + open the serosa [advintia] of the esophagus + inner circular and outer longtiudinal muscle

... pulge ← mucosa ال بطلع

Heller

- *Myotomy:* Can be accomplished via laparotomy, thoracotomy, and laparoscopically and thoracoscopically.

[ant./180°]

- Myotomy should include partial fundoplication to decrease incidence of reflux.

* The 3 layers of the stomach:-
- outer longitudinal...
- middle circular...
- inner oblique...

∴ Achalasia في ال esophegeal and gastric mucosa ال بيصير الخطر ←

has 3 muscle layer...

↳ thin so more likely to perforate...

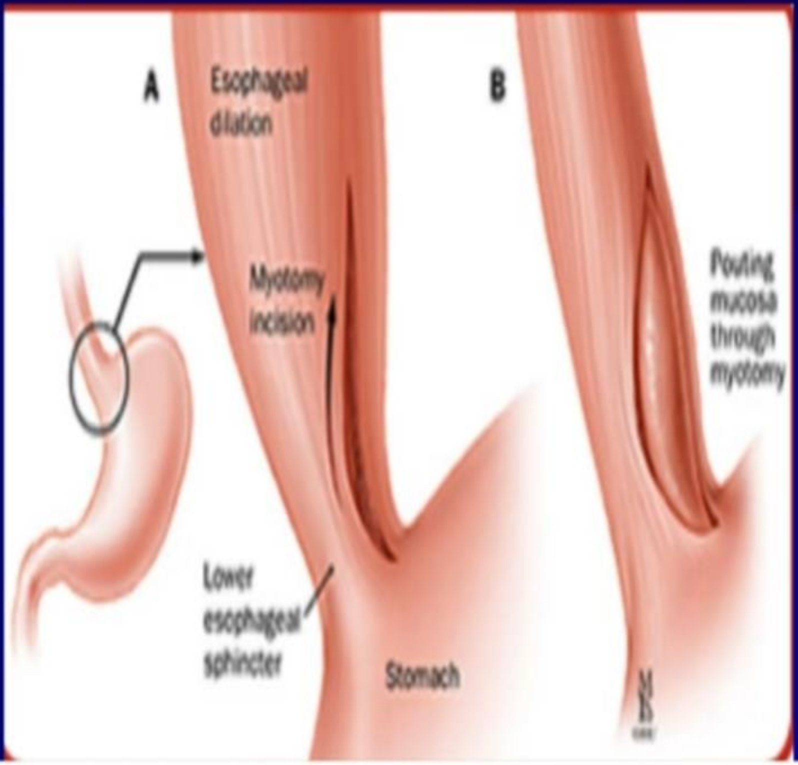
Hypertrophid

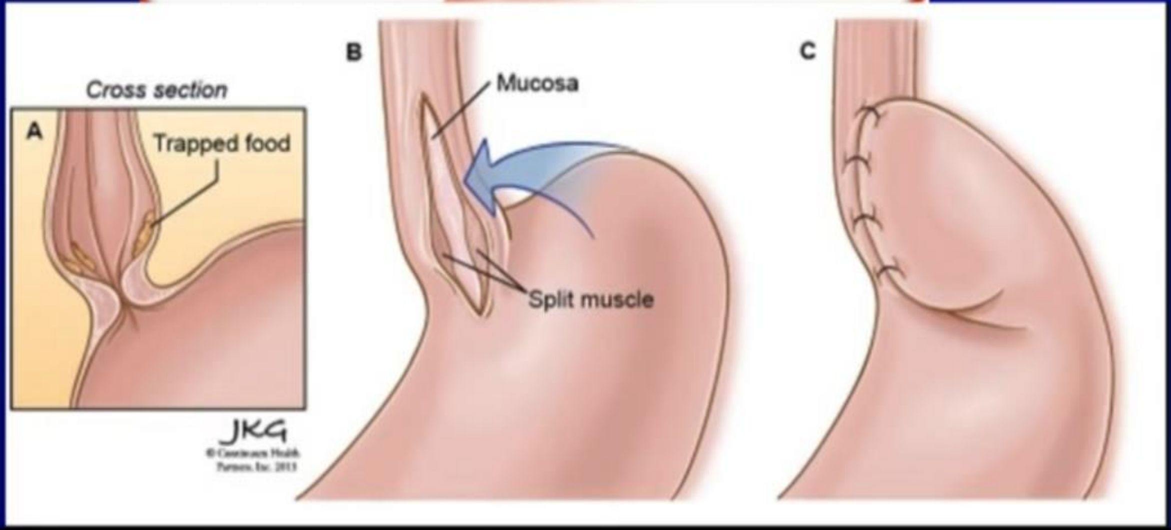
[outer longtuidnal- inner circular] 2 muscle layer

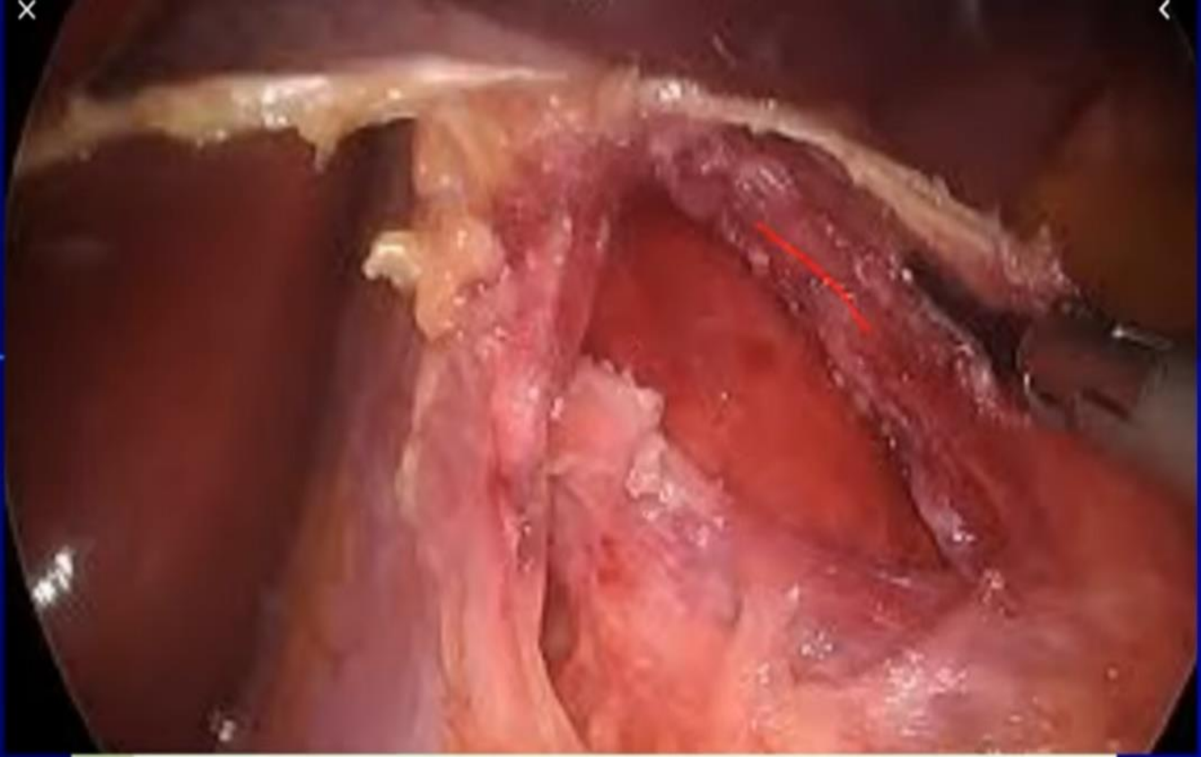
↳ lead to esophegeal contraction...

when it contract lead to shortening the esophagus...

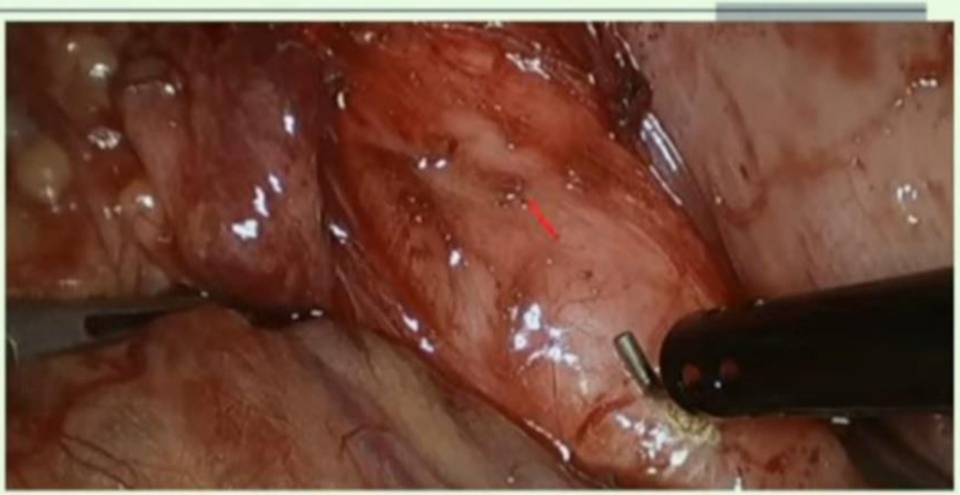
Heller's pyloro - myotomy







Laparoscopic Redo Heller Myotomy



Gastroesophageal Reflux Disease

when the Reflux make symptoms ↩

- ***Definition of GERD :*** "A Condition which develops when the reflux of stomach contents causes Troublesome Symptoms and/or Complications ."
- From a surgical perspective, GERD is the failure of the Anti-Reflux Barrier, allowing abnormal reflux of gastric contents into the oesophagus.
- The Anti-Reflux Barrier key components are the *LES, The Diaphragmatic Crura, and the Phreno-Esophageal ligament .*
- In Western countries it affects 10% to 20% of the population.
- Reflux may be daily weekly or monthly.

* The foods that lead to GERD:-

- chochlet...
- Coffee...
- high fat...
- citrus food...
- Soda...
- النعنع بالليمون ...
  - mint
- onion + تومة

[wt loss → ↓ GERD]

* The mint is anti-spasmotic so we don't give it in Hernia...

* The codeine phosphate use for dry cough...

  - side effect:- constipation... [so may used for diarrhea]...

* The erythromycin is antibiotic [macrolide]

  - lead to ↑ gastric motility so may used in delayed gastric empty pt...

Symptoms

- [مهم] **Typical (Esophageal) , Atypical (Extraesophageal).**
- **Typical :**
  - non Cardiac → we should exclude the angina...
  - Burning Chest Pain (Pyrosis) **80%.**
  - at night
  - Regurgitation of sour or tasteless fluid into the mouth (water brash) **55%.**
  - Sensation of a lump, or tightness in the throat (Globus Sensation) .
  - Pain on swallowing (odynophagia).
- resp. symptoms ← **Atypical :** Cough, Wheezing, Hoarseness, Sore throat, Postnasal drip, Dental erosion, and Ear pain.
- **Silent Reflux.** → ATypical symptoms without the Typical symptoms...
- **Alarming symptoms:** *Dysphagia, wt loss ,hematemesis .*

  → we should do endoscope...

Diagnosis of GERD

↳ the gold standard method of GERD diagnosis is 24hr pH monitore...
↳ capsule 5cm above the LES via wire less capsule or wire from the nose...
لمدة 24 hr دبشوف كم ع
صار GERD وكم مدة etc...

- ***EGD:*** Is likely the one study that ***All*** patients should have preoperatively.
- ***PH-metry:*** Important for patients when the diagnosis of GERD cannot be confirmed on EGD or diagnostic uncertainty exists.
- ***Oesophageal manometry:*** Frequently performed before surgery.
- ***Barium swallow :*** Frequently obtained test for better delineation of the anatomy.
- ***Other preoperative tests:*** have been examined, such as gastric emptying studies . to exclude the gastroparesis [gastric empty dz]...

حكينا ماغ تحا صورة ل
diverticulum

* long term PPI as good as surgery...

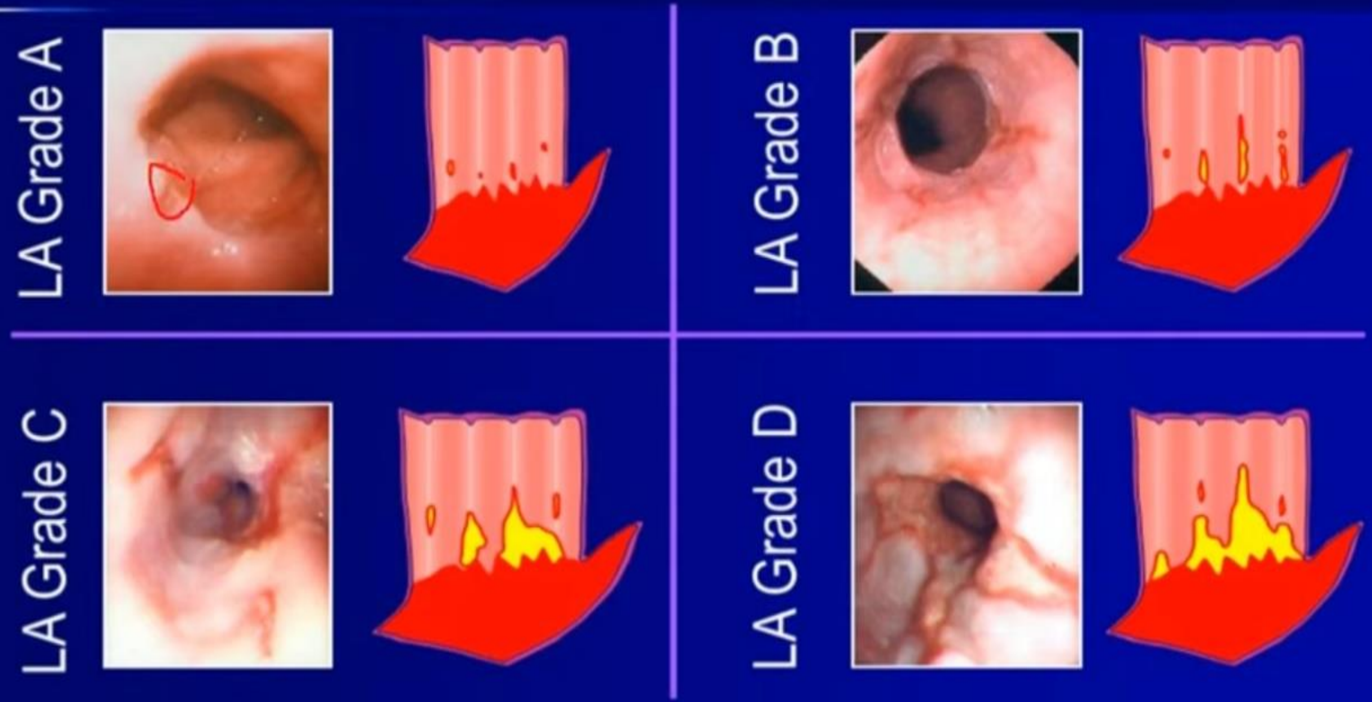
* Contra indication of long term PPI:- so the surgery is the ttt of choice...
  - Hypo magnesemia...
  - Arrhythemia pt...

* The endoscope to exclude the Hitus Hernia - esophagitis...
  - not related to the GERD...
  - normal in 50% of GERD pt [ونص غالباً ما ضهر اشي]...

* delayed gastric empty symptoms:-
  1- fullness...
  2- Bloating...
  3- not improved after surgical ttt...

للباطنة.. ⇐

LA Classification



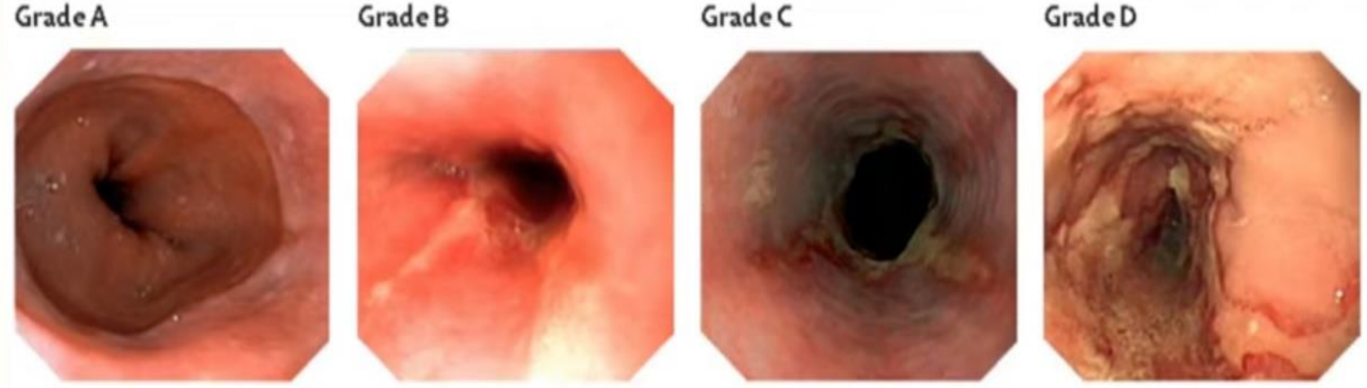
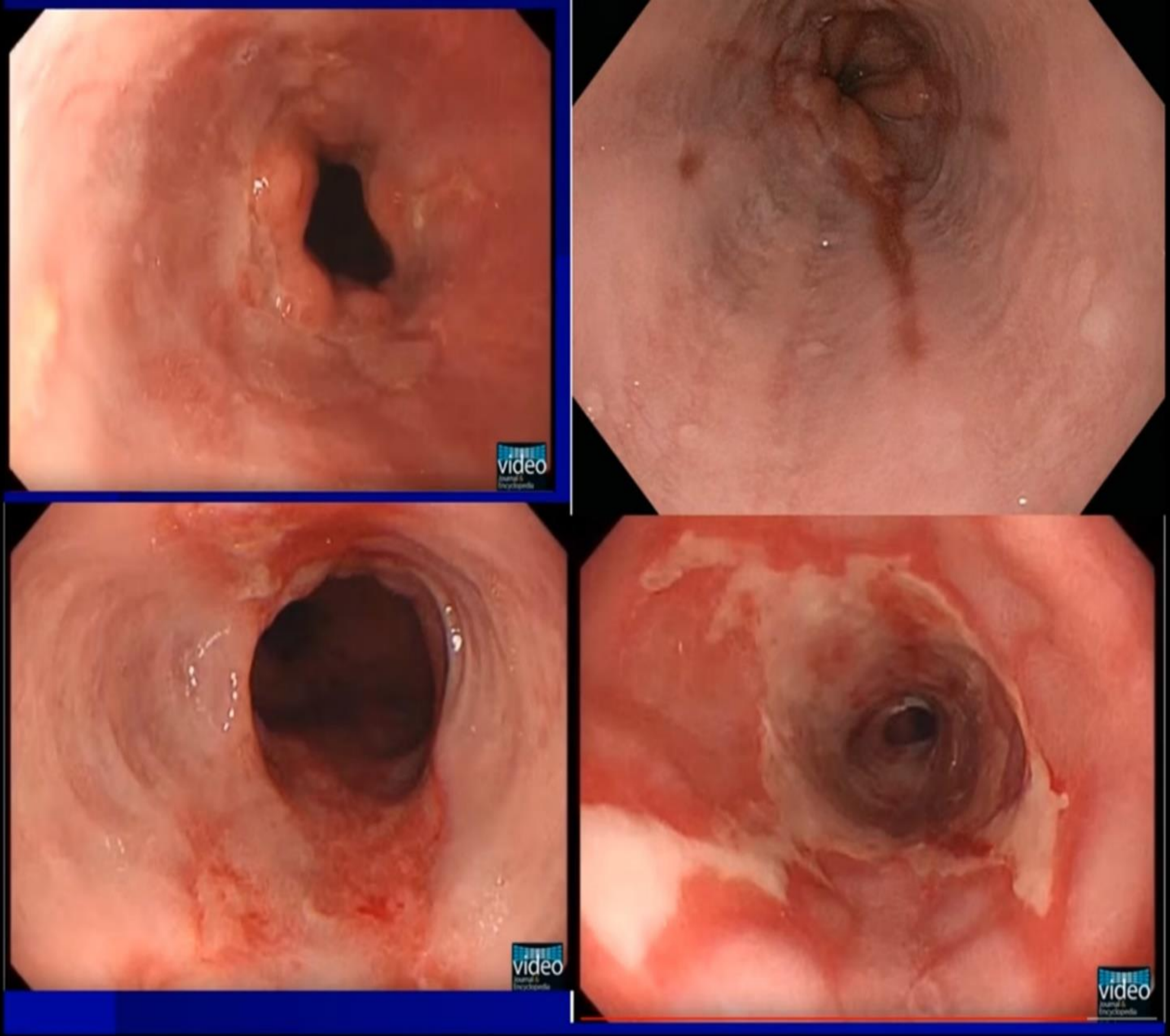


Figure 3: Los Angeles classification of reflux oesophagitis


video Journal & Encyclopedia
video Journal & Encyclopedia
video Journal & Encyclopedia

Hiatus Hernia

→ most of it not need ttt ...

- ***Definition:*** HH is a type of hernia in which abdominal organs (typically the stomach) slip through the diaphragm into the middle compartment of the chest .
- Risk factor is Obesity and Old age .
- HH is called The "*Great Mimics*" as symptoms vary

بتعمل اعراض بتشبه كلشي

- Heart burn, regurgitation , belching , GERD.
- Chest pain ,shortness of breath , palpitation.
- Dysphagia
- Bronchial asthma.
- Distension
- Taste of acid in back of mouth hoarseness of voice.

Types of HH

- ***Type I:*** Sliding HH 95%.

in the middle compartment of the chest جزء من المعدة طالع ع ال

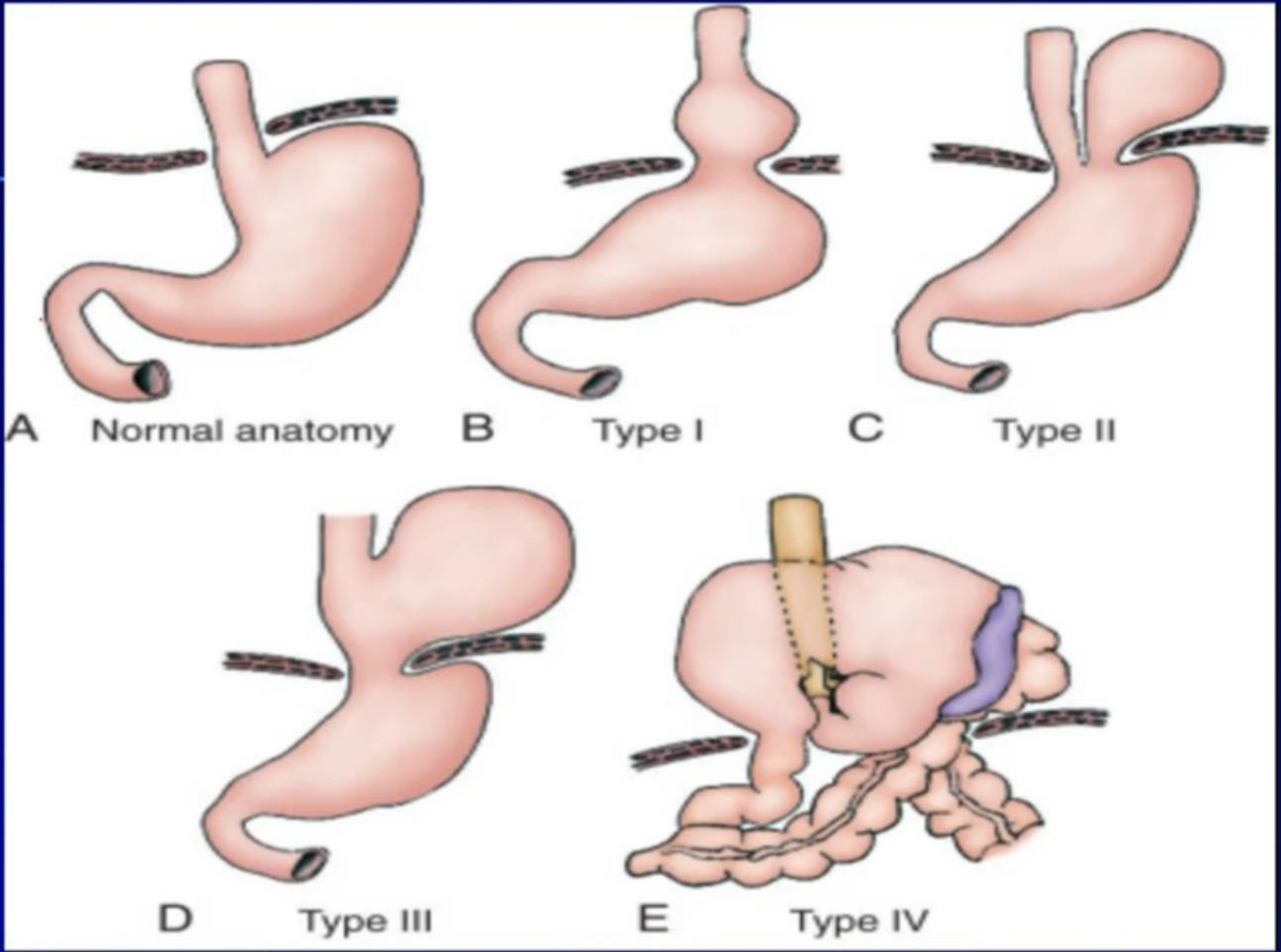
- ***Type II:*** Para esophageal " ***Rolling*** " HH 4.5%.

↳ need surgical ttt due to ↑ risk of volvuls of stomach → strangulation

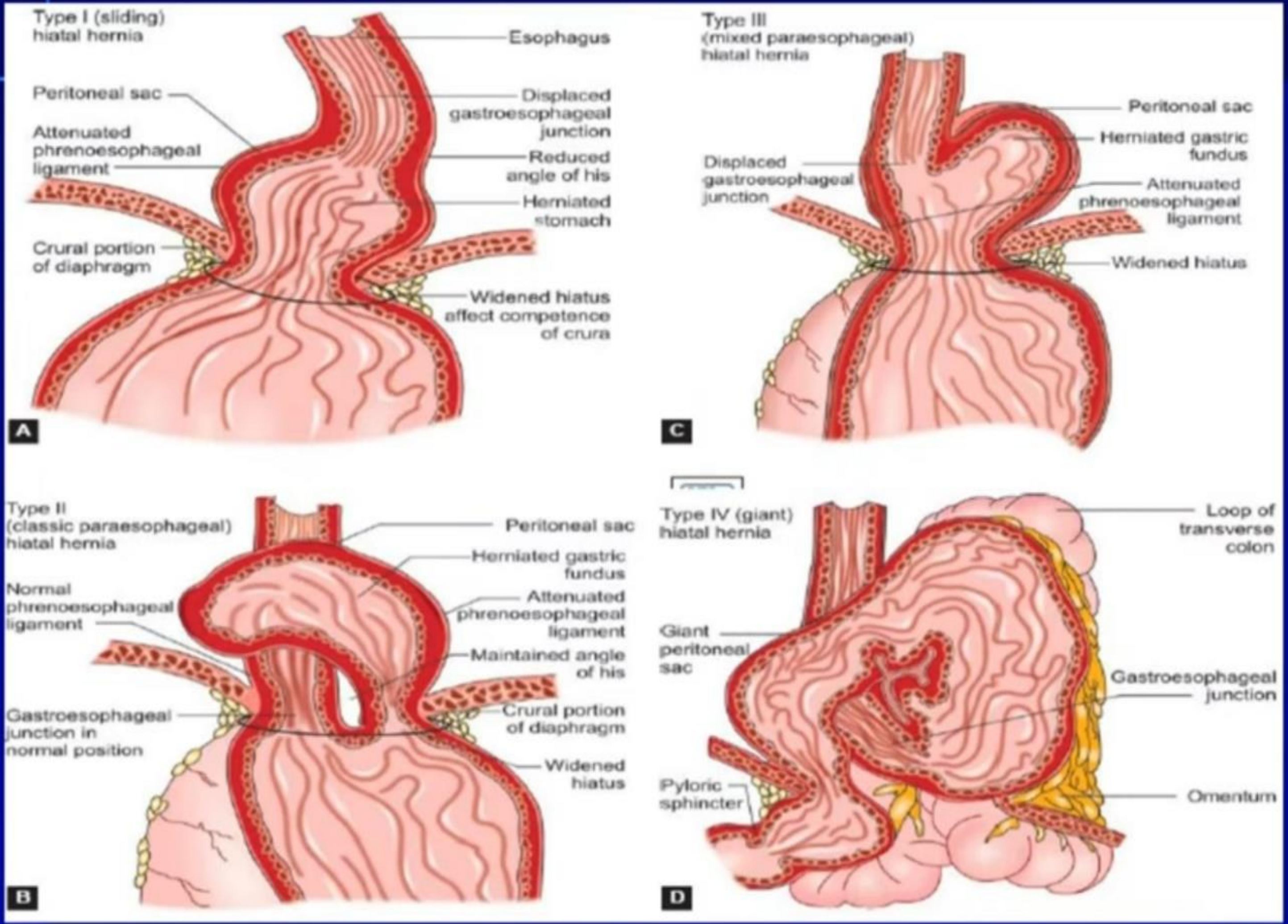
- ***Type III:*** Mixed type 0.4%. ✓

↳ type I + II

- ***Type IV:*** Other organs 0.1%.
- ***NB :*** Para esophageal HH can have alarming symptoms leading to gastric perforation and volvulus of stomach.


A Normal anatomy
B Type I
C Type II
D Type III
E Type IV

Types of HH


Type I (sliding) hiatal hernia
Esophagus
Peritoneal sac
Displaced gastroesophageal junction
Attenuated phrenoesophageal ligament
Reduced angle of his
Herniated stomach
Crural portion of diaphragm
Widened hiatus affect competence of crura
A
Type III (mixed paraesophageal) hiatal hernia
Peritoneal sac
Herniated gastric fundus
Displaced gastroesophageal junction
Attenuated phrenoesophageal ligament
Widened hiatus
C
Type II (classic paraesophageal) hiatal hernia
Peritoneal sac
Herniated gastric fundus
Normal phrenoesophageal ligament
Attenuated phrenoesophageal ligament
Maintained angle of his
Gastroesophageal junction in normal position
Crural portion of diaphragm
Widened hiatus
B
Type IV (giant) hiatal hernia
Loop of transverse colon
Giant peritoneal sac
Gastroesophageal junction
Pyloric sphincter
Omentum
D

Treatment

- Most are *Asymptomatic so No Treatment .*
- Change life style reduce weight. ✓
- Avoid heavy lifting, and tight clothes . ✓
- Avoid Smoking alcohol , spicy food . ✓
- Avoid citrus juice , peppermint ,chocolate, fat .
- Raise head over two pillows . ✓
- Small frequent meals less night food . ما ياكل بالليل + ياكل small meals ...
- Treat GERD , PPIS, H2 blockers .

↳ medical.

↳ side effects:- osteoperosis - Arrhythemia - CKD - ↓Mg^{+2} ...

Medical versus Surgical III

use it when the medical ttt failed...

preferred in young age...

- *Surgical therapy for GERD is an equally effective alternative to medical therapy .*
- *Surgical therapy effectively addresses the mechanical issues associated with the disease and results in long-term patient satisfaction .*
- *For surgery to compete with medical treatment, it has to be associated with minimal morbidity and cost .*

Indication for surgery

- Have failed medical management . ✓
- ضيا - اعريض Opt for surgery despite successful medical management. ✓
- Have complications of GERD (e.g., Barrett's
- oesophagus, peptic stricture) . ✓

+ goblet cells

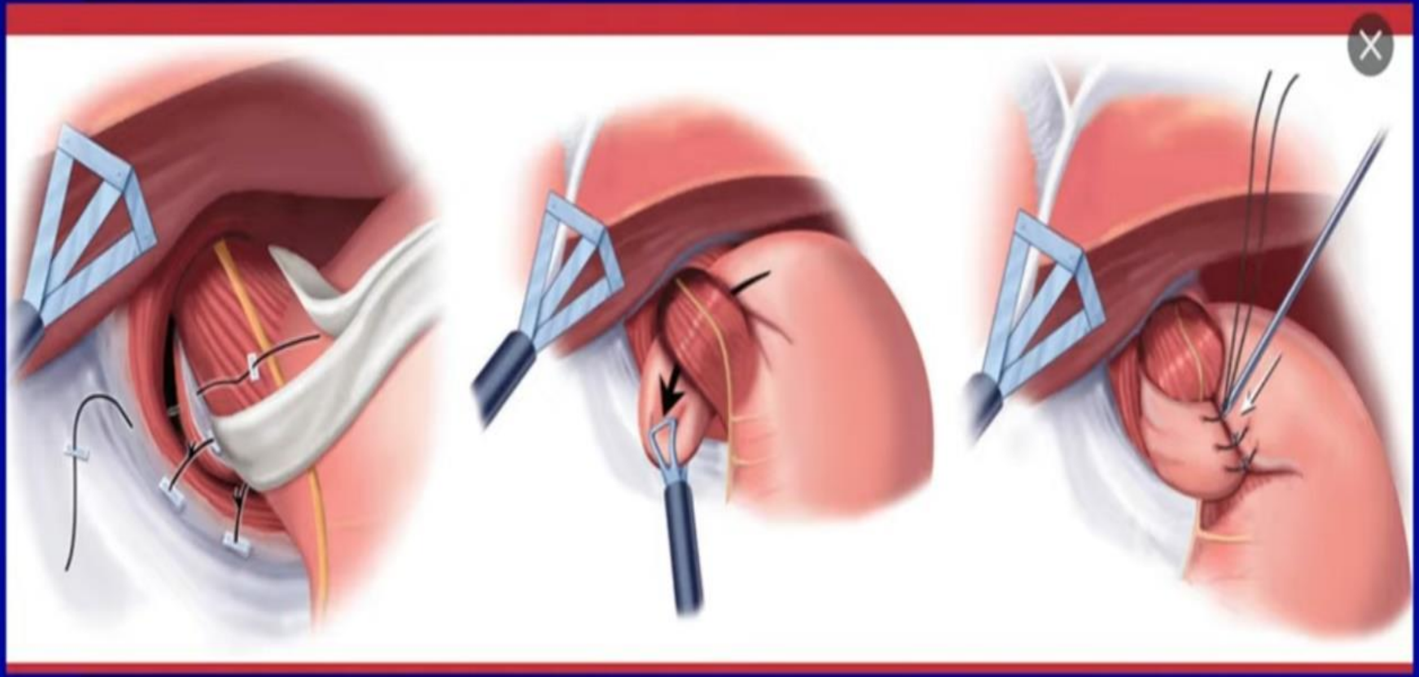
→ columnar metaplasia of the stratifid squamous epithelium of the lower 1/3 esophagus

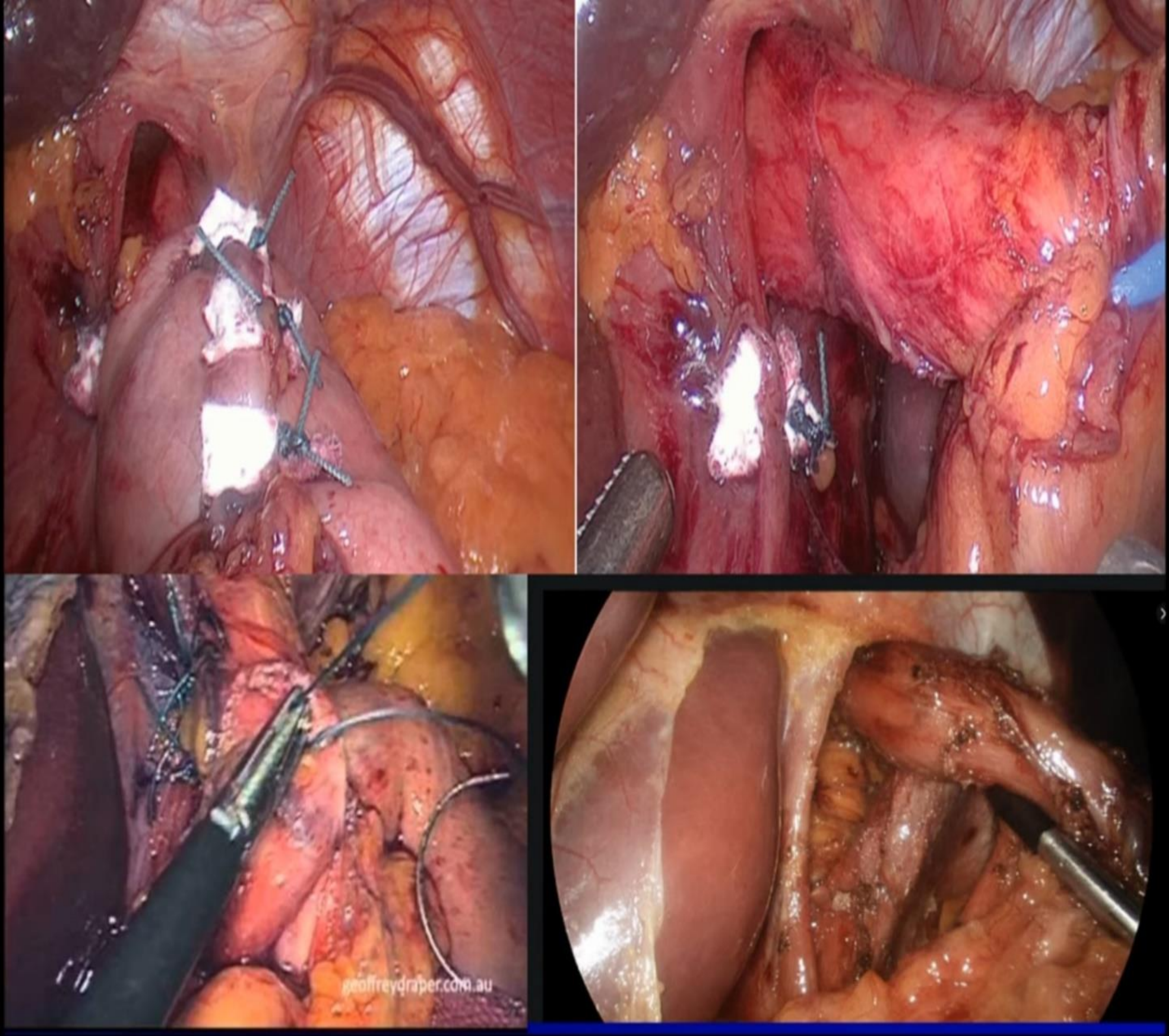
→ pre malignant so it indicate for surgery...

- Have extra- esophageal manifestations (asthma, hoarseness, cough, chest pain, aspiration) . ✓

Surgical options

- Thoracic verses abdominal approach.
- Open verses laparoscopic approach.
- Complete or incomplete wrap.
- Mesh no Mesh.





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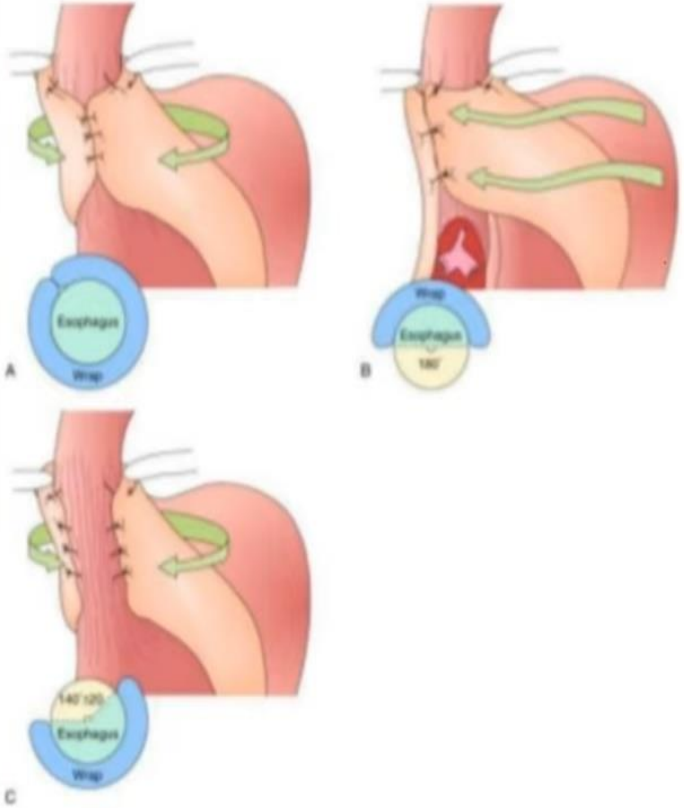
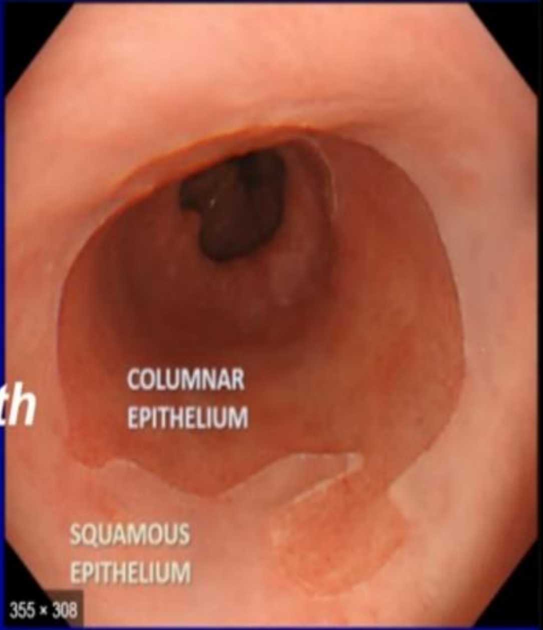
Complete vs. partial fundoplication



- Ant. partial fundoplication
  → Thal/Dor procedure

- Post. partial fundoplication
  → Toupet procedure

Barrett's esophagus



Barrett's esophagus: *An abnormal (metaplastic) change in the mucosal cells lining the lower portion of the oesophagus , from normal stratified squamous epithelium to simple columnar epithelium with interspersed **Goblet cells** that are normally present only in the small intestine.*

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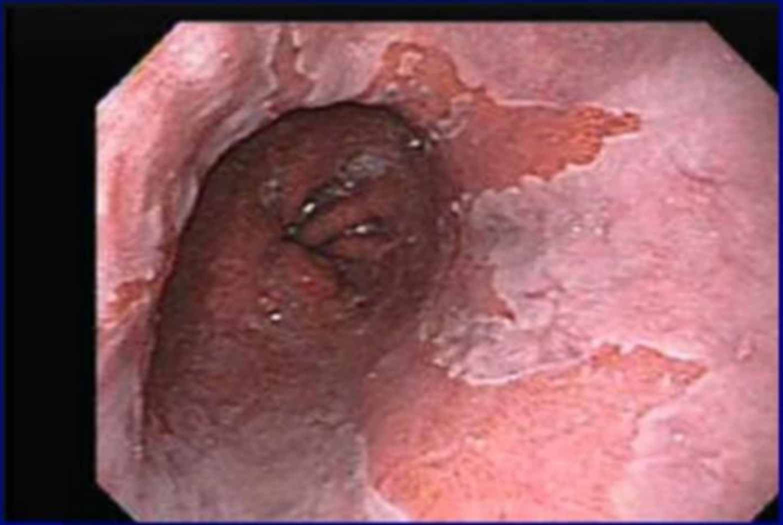
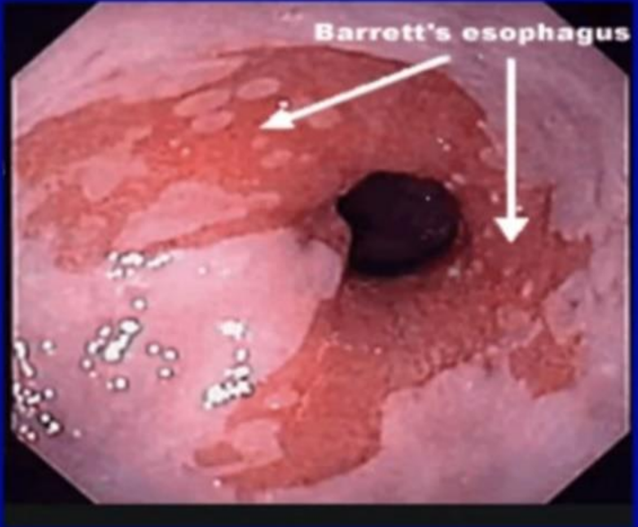
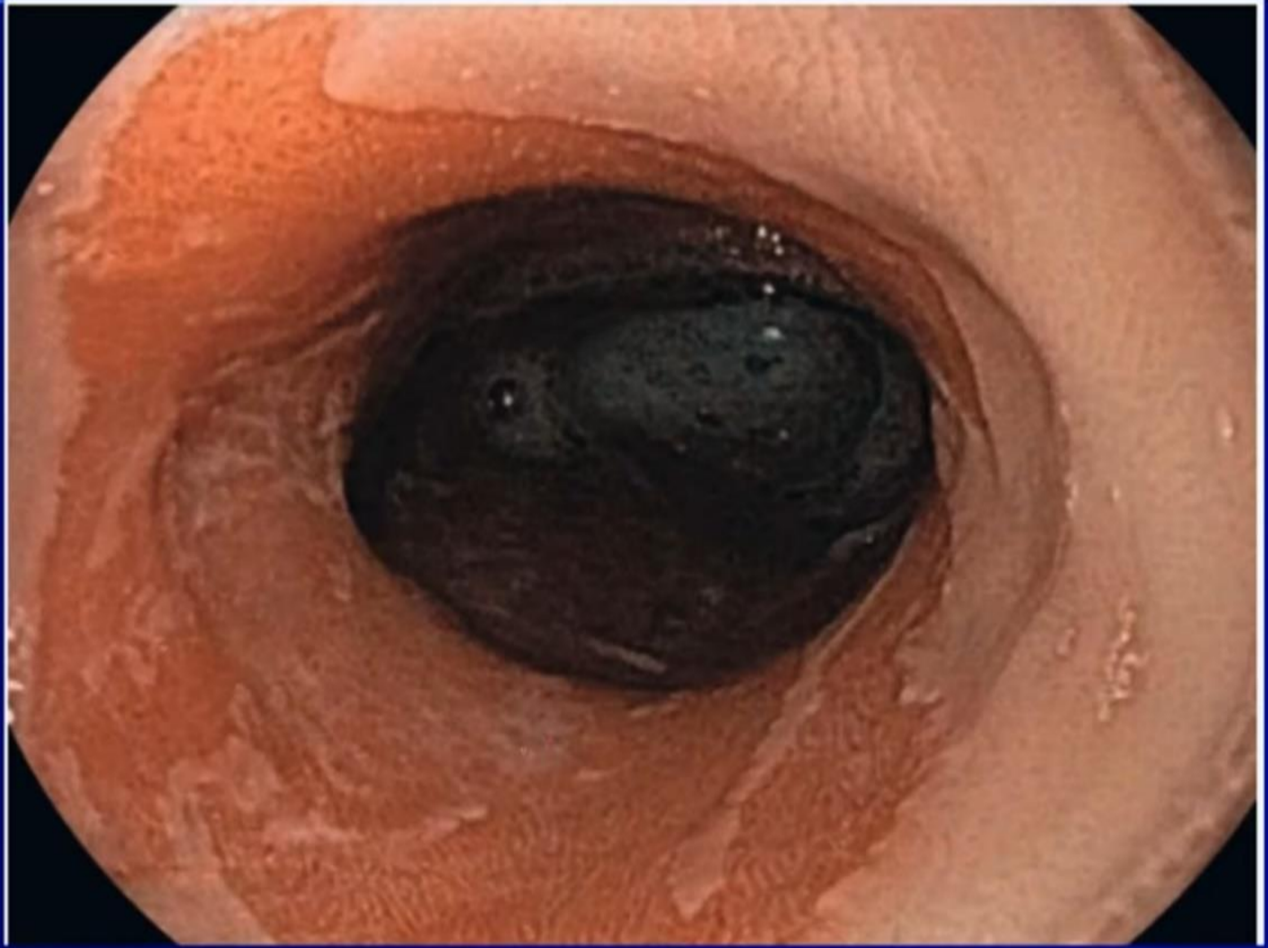




Barrett’s esophagus



Esophageal cancer

- Common cancer in elderly (8th world wide).
- SCC , versus adenocarcinoma.

sq. [more common]

- Incidence of adeno-ca is rising . due to obesity - GERD - Alcohol...
- Male : Female 4:1.
- Tobacco all forms , and alcohol are risk factors .
- Achalasia increase risk of SCC of esophagus.
- GERD ,obesity, Barrett's increase risk of Adeno-ca.
- GEJ adenocarcinomas are staged and classified as oesophageal cancers.

↳ we should see if there is meta or not... [once if there is meta → there is no surgical option]...

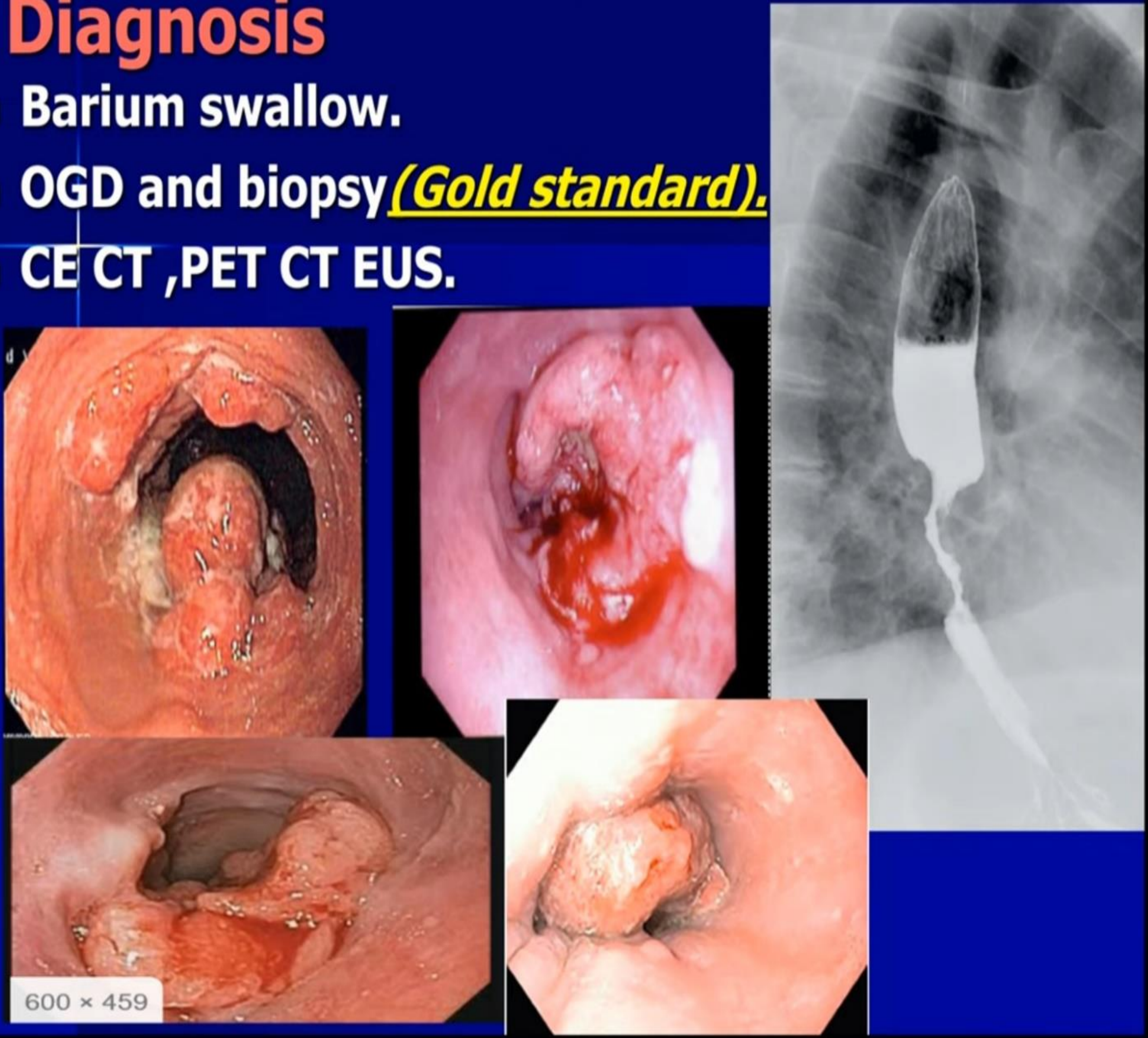
* any OG cancer treat as esophageal cancer...

Symptoms and signs

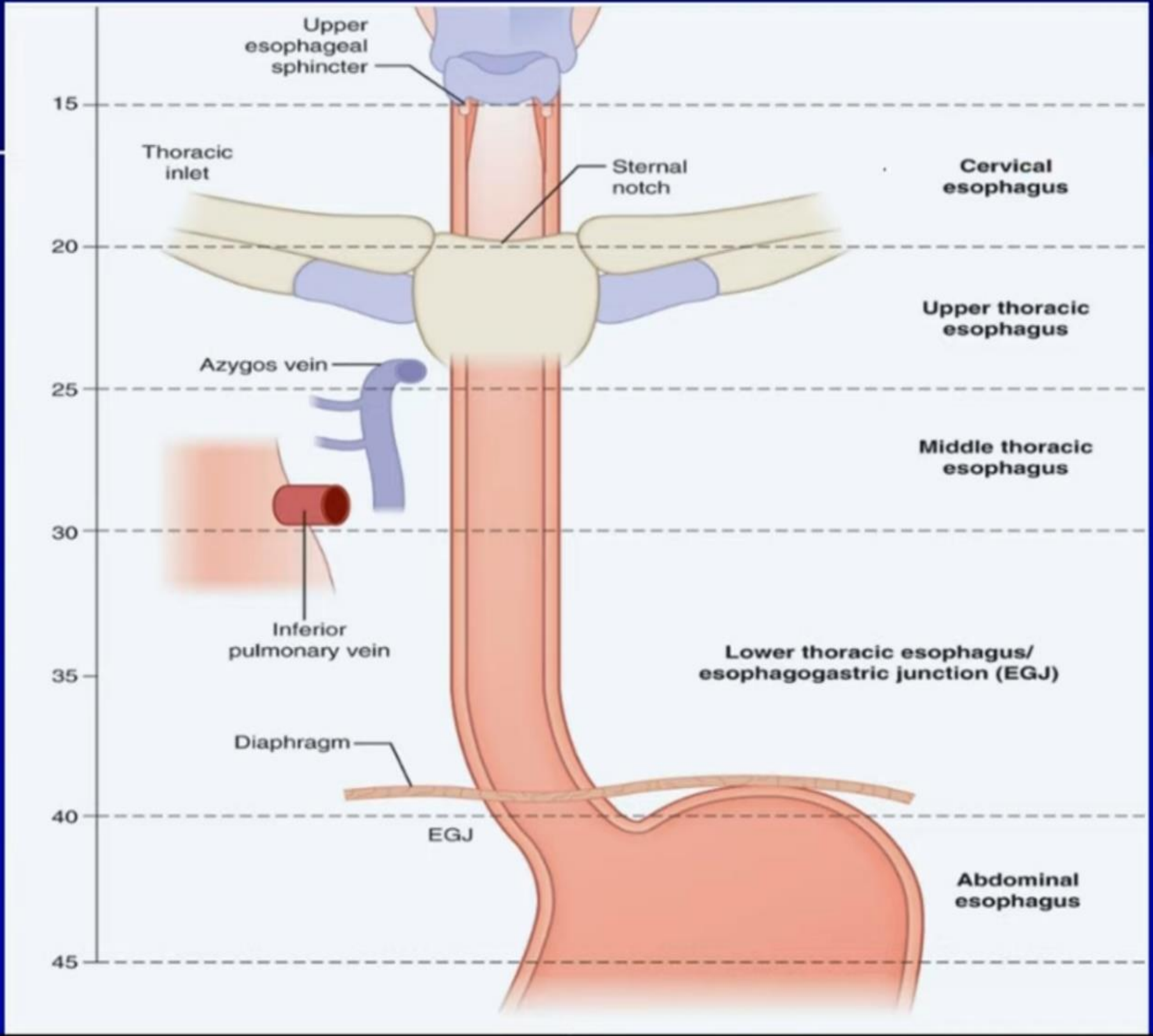
- Late presentation late symptoms.
- Dysphagia is the commonest symptom 75%.
- Long history of GERD ,HH.
- Loss of weight.
- Hoarseness of voice ,Hiccups.

Diagnosis

- Barium swallow.
- OGD and biopsy ***(Gold standard).***
- CE CT ,PET CT EUS.



Location of esophageal ca

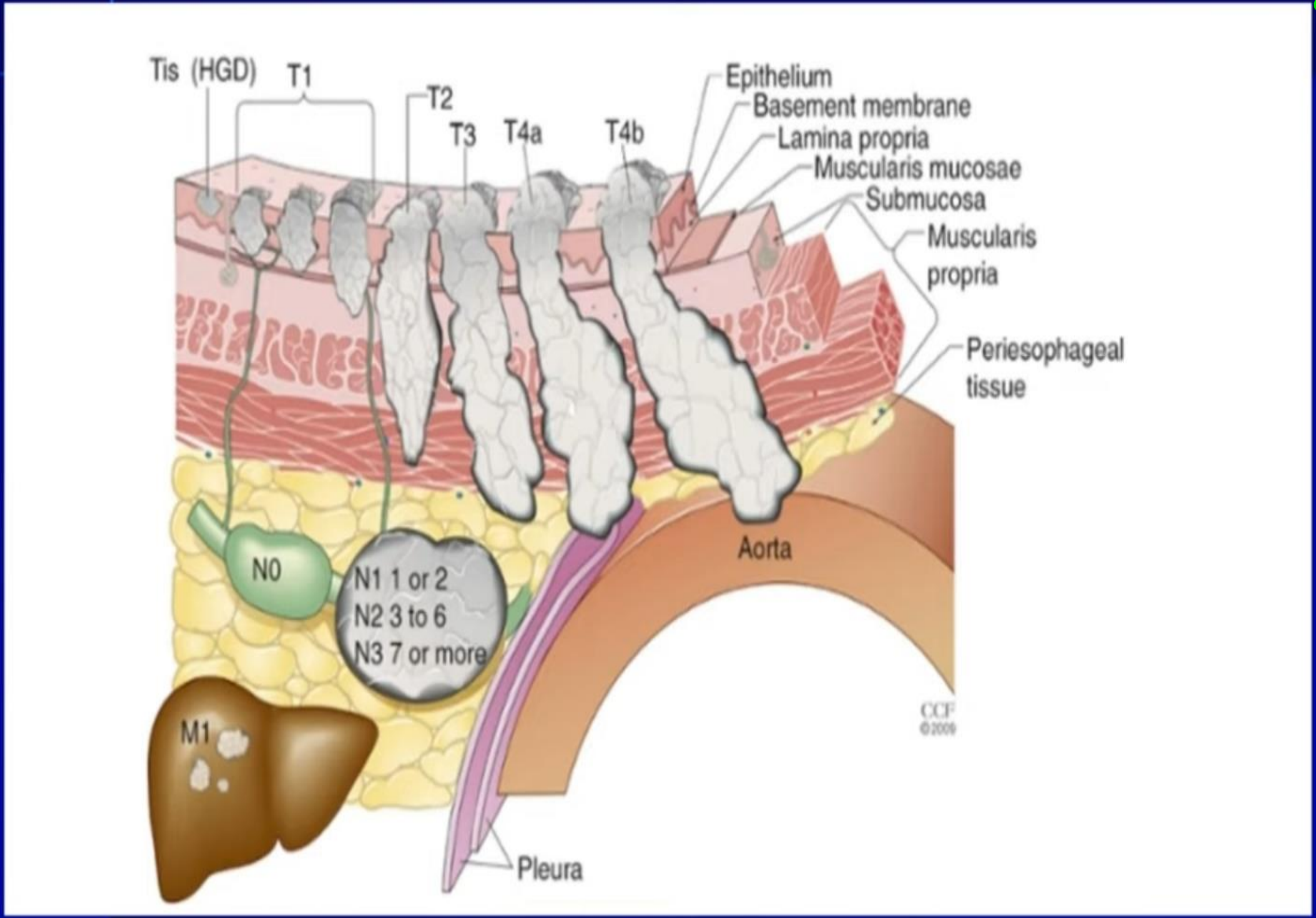


Staging for Adeno -Ca

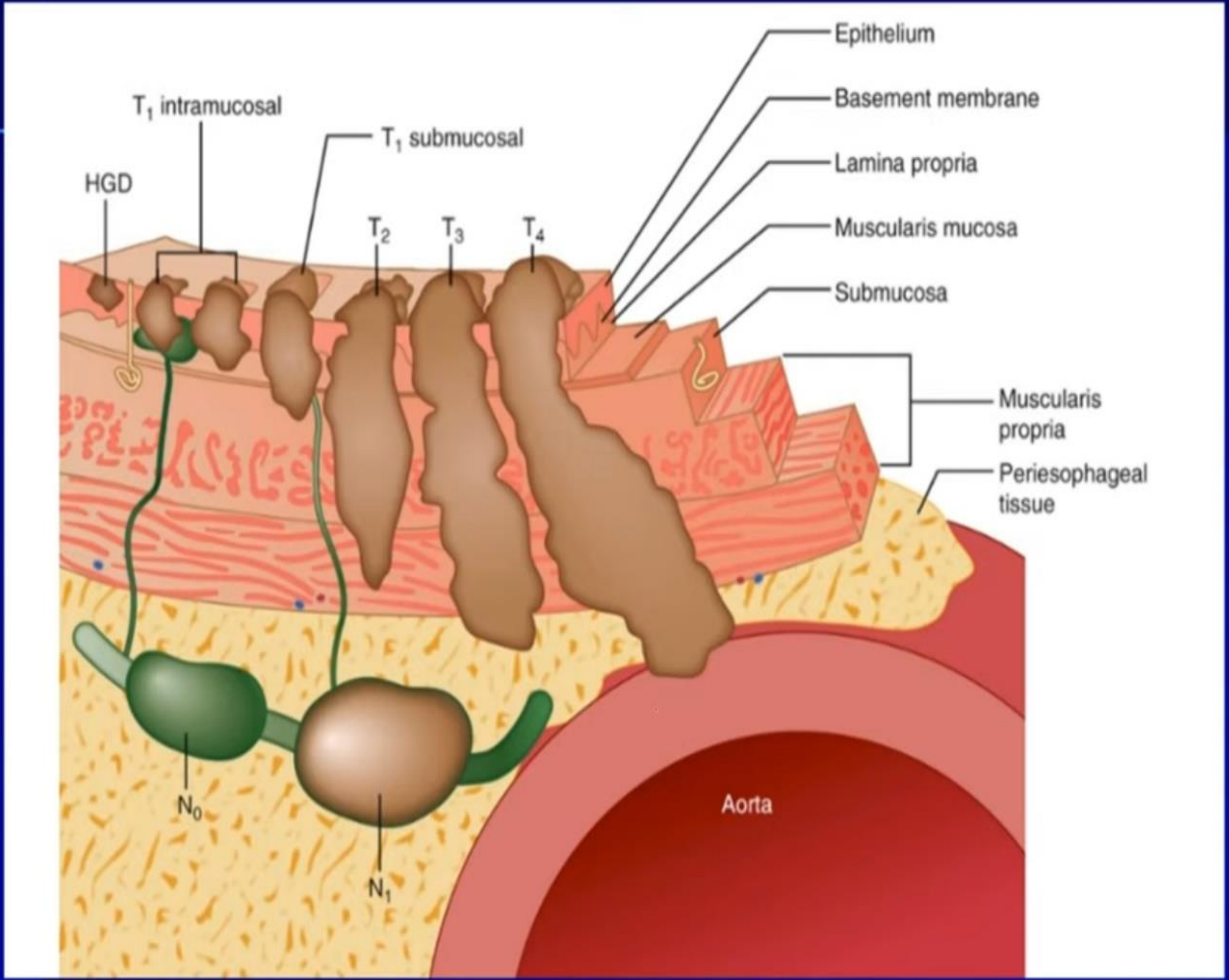
* T4 indicate distal metz

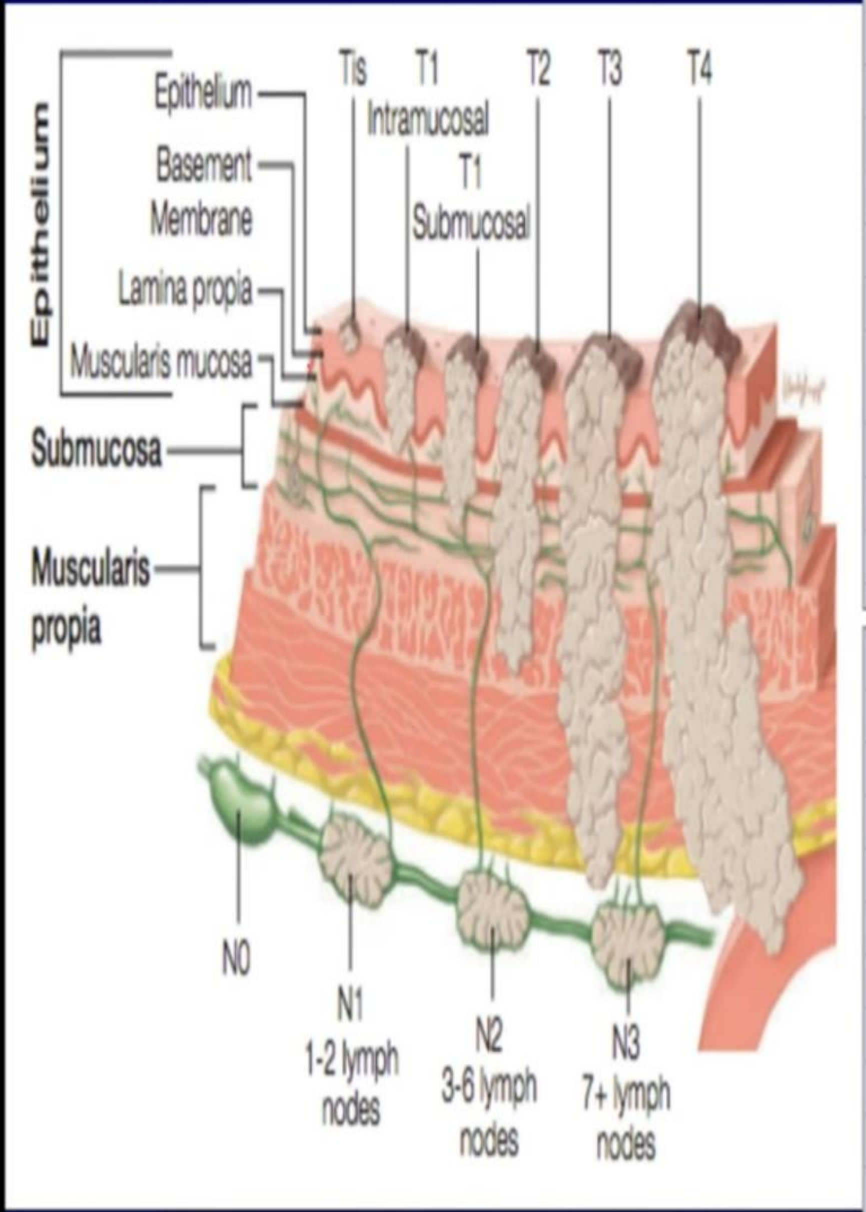
→ T4a: pleural - pericardium ملزمة باستيا د بنقدر نشيلها مثل

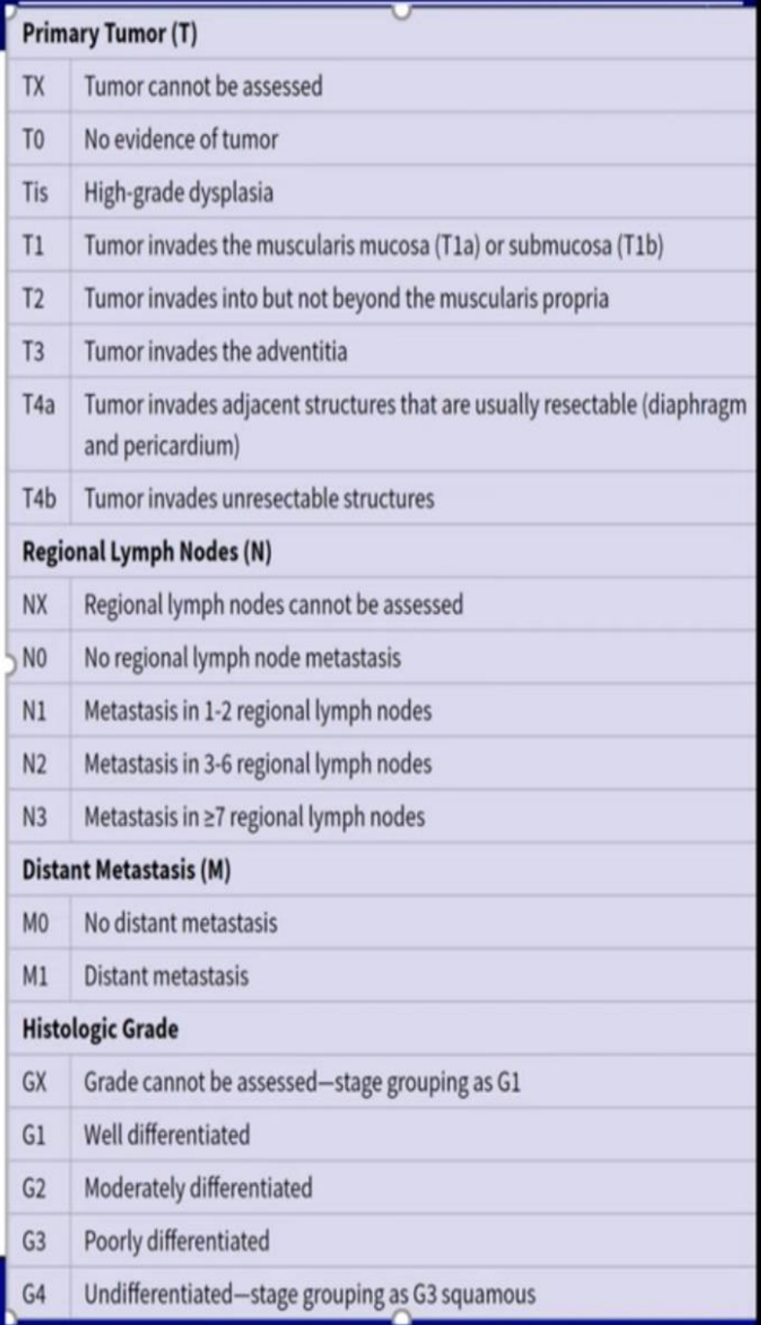
→ T4b: abdominal aorta ملزمة باستيا د ما بنقدر نشيلها مثل
or Bronchus...



Depth of Tumor







Primary Tumor (T)	
TX	Tumor cannot be assessed
T0	No evidence of tumor
Tis	High-grade dysplasia
T1	Tumor invades the muscularis mucosa (T1a) or submucosa (T1b)
T2	Tumor invades into but not beyond the muscularis propria
T3	Tumor invades the adventitia
T4a	Tumor invades adjacent structures that are usually resectable (diaphragm and pericardium)
T4b	Tumor invades unresectable structures
Regional Lymph Nodes (N)	
NX	Regional lymph nodes cannot be assessed
N0	No regional lymph node metastasis
N1	Metastasis in 1-2 regional lymph nodes
N2	Metastasis in 3-6 regional lymph nodes
N3	Metastasis in ≥7 regional lymph nodes
Distant Metastasis (M)	
M0	No distant metastasis
M1	Distant metastasis
Histologic Grade	
GX	Grade cannot be assessed—stage grouping as G1
G1	Well differentiated
G2	Moderately differentiated
G3	Poorly differentiated
G4	Undifferentiated—stage grouping as G3 squamous