MED437
KING SAUD UNIVERSITY

ANATOMY
Team 437

Oral Cavity, Esophagus, and Stomach

Lecture (1)

- Important
- Doctors Notes
- Notes/Extra explanation

Please check our Editing File

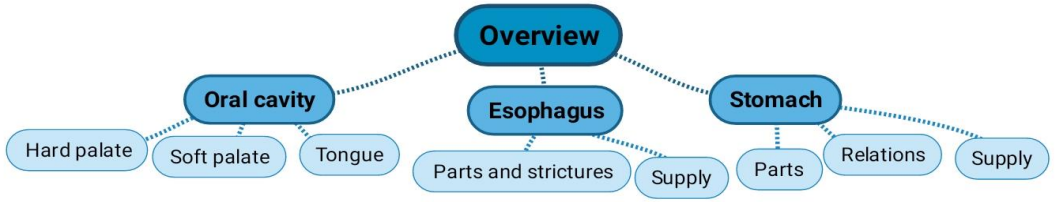
هذا العمل مبني بشكل أساسي على عمل دفعة ٤٣٦ مع المراجعة والتدقيق وإضافة الملاحظات ولا يغني عن المصدر الأساسي للمذاكرة

{وَمَنْ يَتَوَكَّلْ عَلَى اللَّهِ فَهُوَ حَسْبُهُ}

Objectives

At the end of the lecture, students should be able to:

- ✓ Describe the anatomy **the oral cavity**, (**boundaries**, **parts**, **nerve supply**).
- ✓ Describe the anatomy of **the palate**, (**parts**, **muscles**, **nerve** & **blood supply**).
- ✓ Describe the anatomy of **the tongue**, (**structure**, **muscles**, motor and sensory **nerve supply**, **blood supply** , **lymph drainage**).
- ✓ Describe the anatomical view of **the esophagus**; **extent**, **length**, **parts**, **strictures**, **relations**, **blood** & **nerve supply** and **lymphatic**.
- ✓ Describe the anatomical view of **the stomach**; **location**, **shape**, **parts**, **relations**, **blood** & **nerve supply** and **lymphatic**



Oral cavity

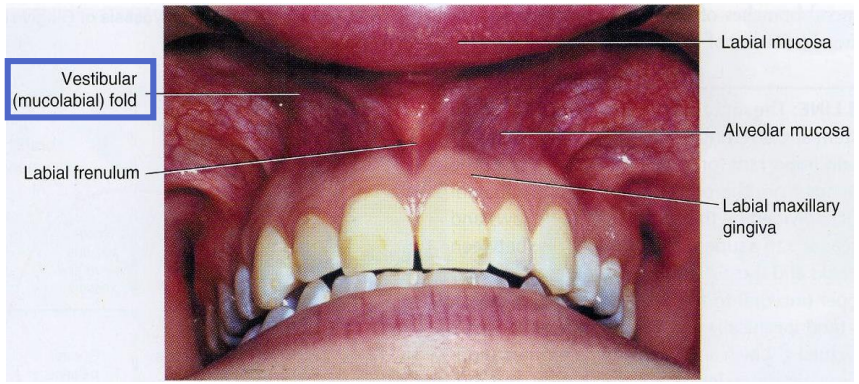
- The mouth extends from lips anteriorly to the oropharyngeal isthmus posteriorly (the junction between mouth & the pharynx).
- It is divided into : 1- Vestibule 2- Mouth cavity proper

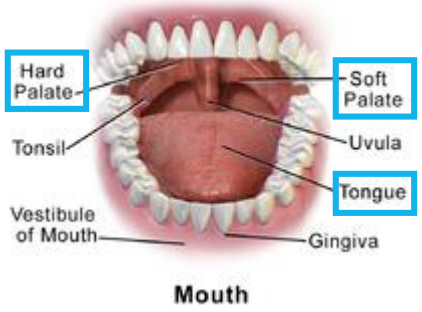
Vestibule

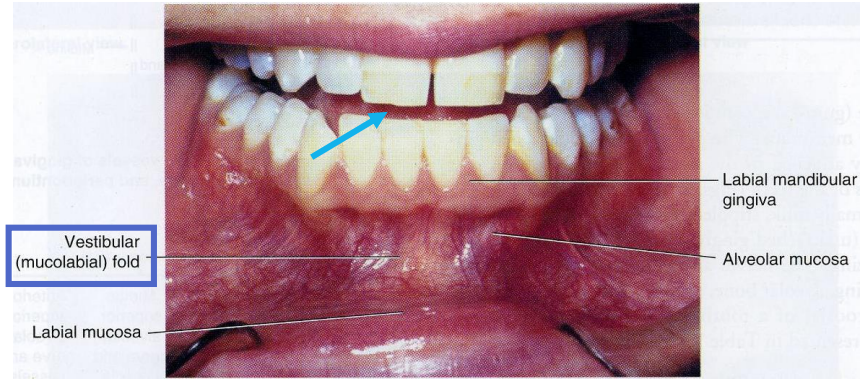
- Which lies between **teeth & gums** internally and **lips & cheeks** externally
- The vestibule receives the opening of the **parotid duct** opposite the **upper 2nd molar tooth**
- Teeth in adult 32, children 20

Mouth cavity proper

- Lies within the alveolar arches, gums, and teeth
- **Roof**: Formed by the hard & soft palate.
- **Floor**: Formed by the **anterior 2/3 of the tongue**
- It communicates with the vestibule behind the **3rd molar** tooth, when you close your lips.

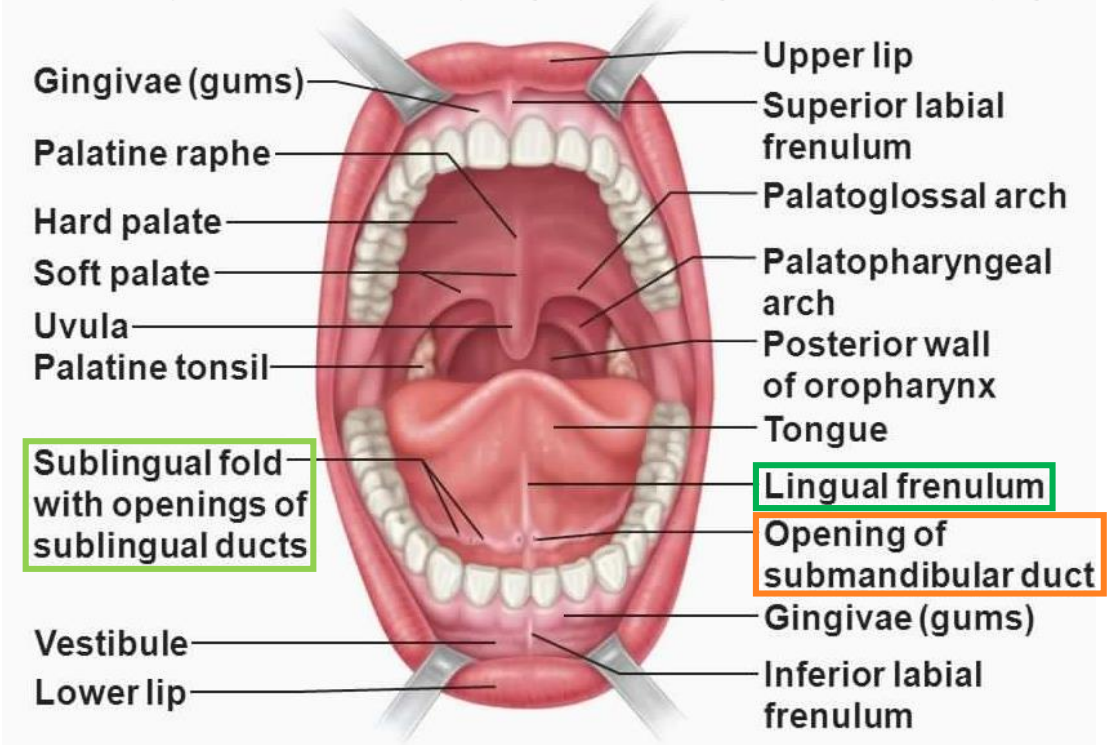






Oral cavity
Under surface of the tongue:

- **Lingual Frenulum** in the midline. It connects the under surface of the tongue to the floor of the mouth.
  If it reach the tip of the tongue, you need to cut it (لأنه بيعيق النطق)
- **Orifice (فتحه) of the Submandibular Duct** opens on each side of the frenulum.
- **Sublingual Fold** (formed by the underlying **sublingual salivary gland**).

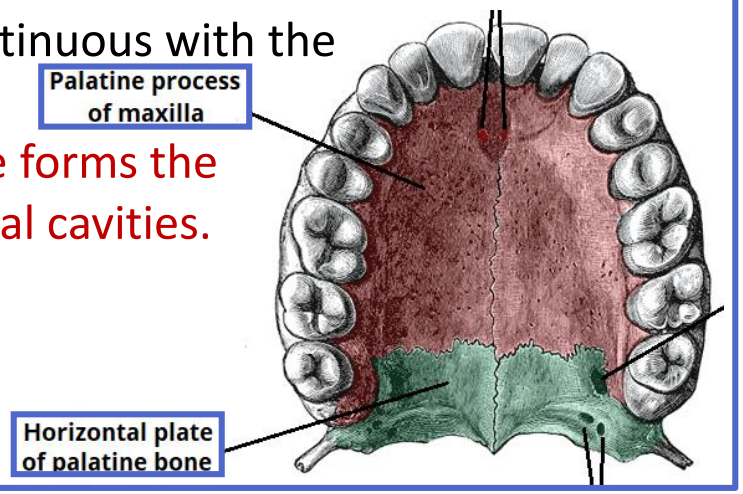


Oral cavity
Palate

- The Palate forms the roof of the mouth, it is divided into two parts:
- The **Hard (Bony)** palate in **front** & the **Soft** palate **behind**.

The Hard Palate

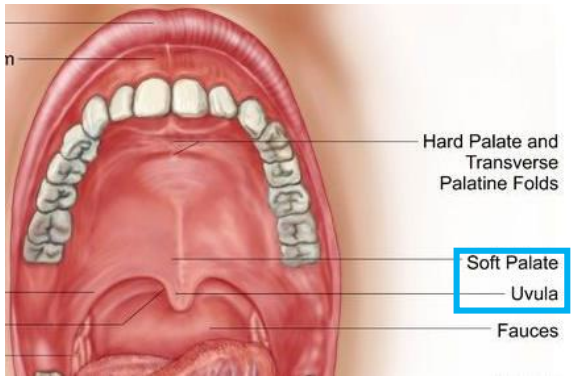
- The hard palate is formed by (4 bones):
- **2 Palatine processes of the maxillae anteriorly.** (connect by intermaxillary "median" suture)
- **2 Horizontal plates of palatine bones posteriorly.**
- It is Bounded laterally by the alveolar arches of the maxilla.
- Behind it is continuous with the soft palate.
- The hard palate forms the floor of the nasal cavities.



The Soft Palate

- It is a **mobile fold** formed of a **bag of mucous membrane** filled with **striated muscles**.
- It is attached to the posterior border of the hard palate.
- Its free posterior border is a conical projection called the **uvula**.

The tongue is composed of two parts 1) oral (palatine) part forms the anterior two thirds 2) pharyngeal part forms the posterior one third.

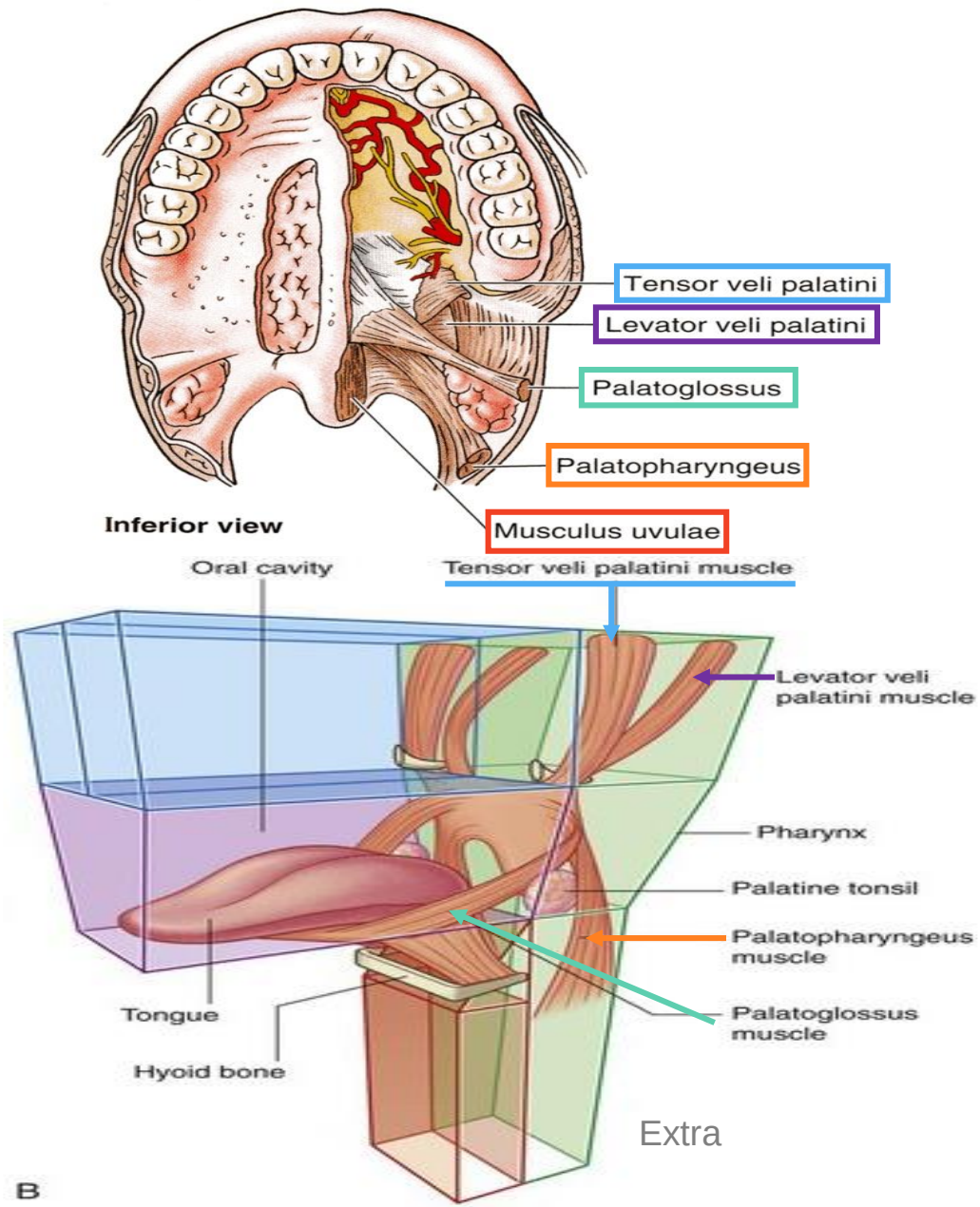


Oral cavity
Soft Palate (Muscles)

- Five pairs (one on each side) of muscles:

1. Tensor veli palatini*	• Tenses the soft palate
2. Levator veli palatini*	• Elevates the soft palate
3. Palatoglossus	• Pulls palatoglossal fold toward midline
4. Palatopharyngeus	• Moves palatopharyngeal fold toward midline
5. Musculus uvulae	• Elevates uvula

*A shorter name:
Tensor palatine
Levator palatine



Extra

Oral cavity
Soft Palate (Nerve supply)

Motor

- All muscles of the palate are supplied by **pharyngeal plexus*** of nerves EXCEPT **tensor veli palatini** (by mandibular nerve).
- Motor innervation of soft palate can be tested by saying 'Ah', normally soft palate rises upward and the uvula moves backward in the middle line.

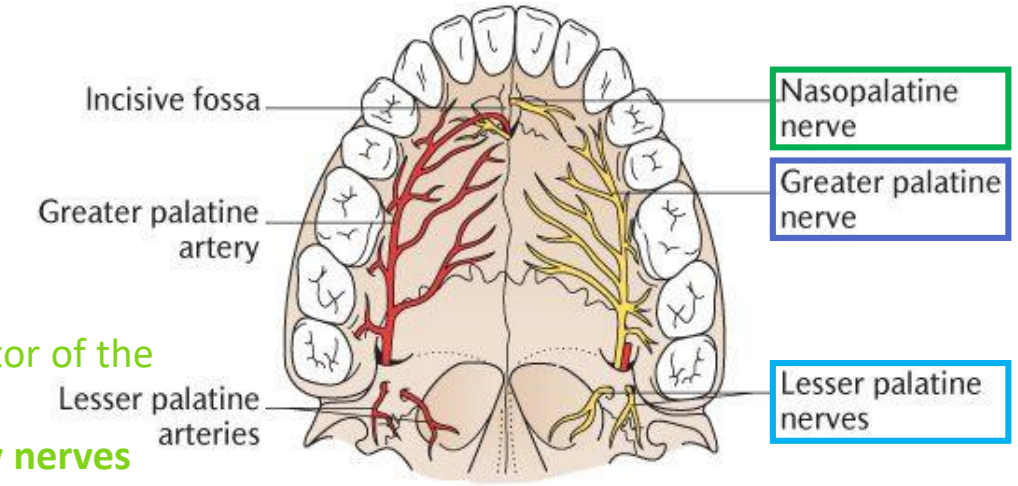
Sensory

1. Maxillary nerve through:
   - Greater **palatine** nerve
   - Lesser **palatine** nerve
   - Naso**palatine** nerve
2. Glossopharyngeal nerve.

(IMP Notes from Dr.Abuelmakarem)

***pharyngeal plexus**:

- Made up from :
  - **Nerve 9 (glossopharyngeal)**
  - **Nerve 10 (vagus)**
  - **Nerve 11 (accessory) ONLY cranial part**
  - **Superior cervical sympathetic ganglion**
- Those nerves unite in the outer surface of the middle constrictor of the pharynx & form pharyngeal plexus
- The **motor fibers** is from the **vagus** & **cranial part of accessory nerves**
- The **sensory fibers** is from the **glossopharyngeal (MAINLY)** & vagus nerves
- The **sympathetic fibers** is from **cervical sympathetic ganglion**



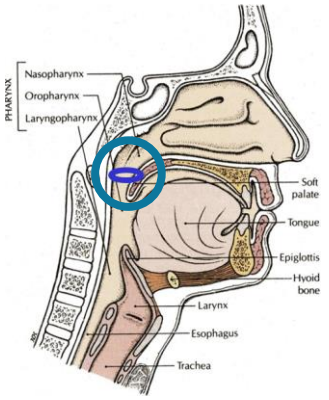
Oral cavity
Soft Palate (Movement)

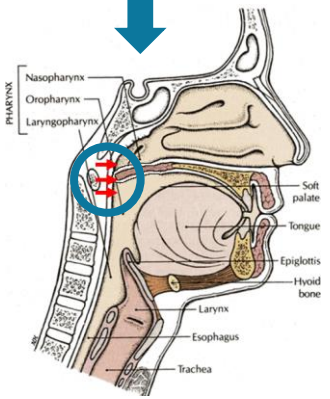
- Pharyngeal isthmus*: (It is the communication between the **nasal** & **oral** parts of the **pharynx**). *Between 2 palatopharyngeal arches & wall of the pharynx .
- Closure occurs during the production of explosive consonants in **speech** & **swallowing**
- It is **closed by raising** the **soft palate upward**:

1) Soft palate is raised by the contraction of the **levator veli palatini** & **Palatopharyngeus**.

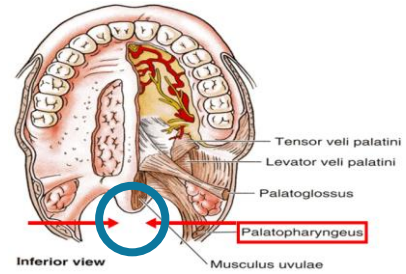
2) At the same time, the posterior wall of the pharynx is pulled forward (by superior constrictor).

3) The **palatopharyngeus muscles** on both sides also contract so that the palatopharyngeal arches are pulled medially, like side curtains.



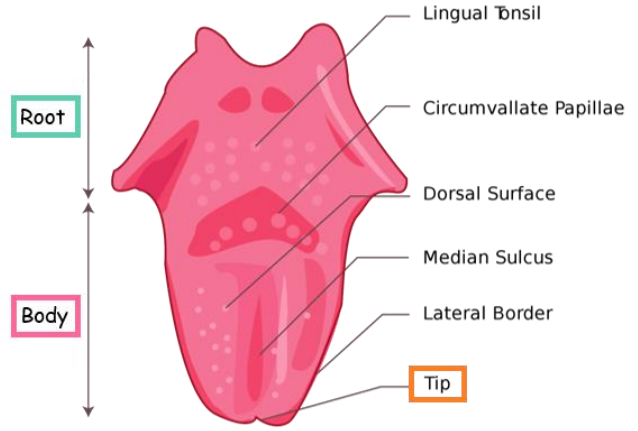


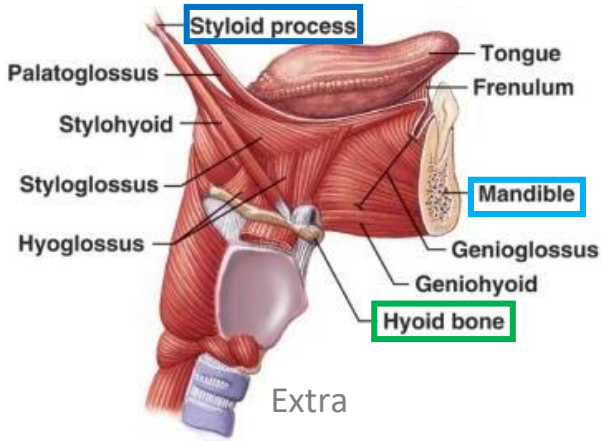
- By this means the nasal part of the pharynx is closed off from its **oral part**.



Oral cavity
Tongue

- The tongue is a **mass of striated muscle** covered with **mucous membrane**.
- Its divide into 3 parts: tip, body & root
  - Its **anterior 2/3** lies in the mouth (tip & body)
  - Its **posterior 1/3** lies in the pharynx (root)
- It is attached by muscles:
  - Above to → styloid process & soft palate
  - Below to → mandible and hyoid bone
- The tongue is essential for several Important **Functions**:
  - Normal articulation of the jaw
  - Manipulation of food
  - **Swallowing**
  - **Taste**
  - **Production of normal Speech**





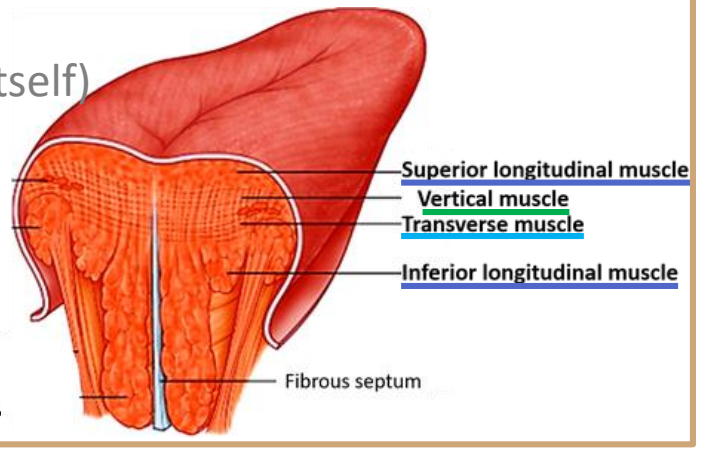
Extra

Oral cavity
Tongue

- Muscles of the tongue are divided into two types:

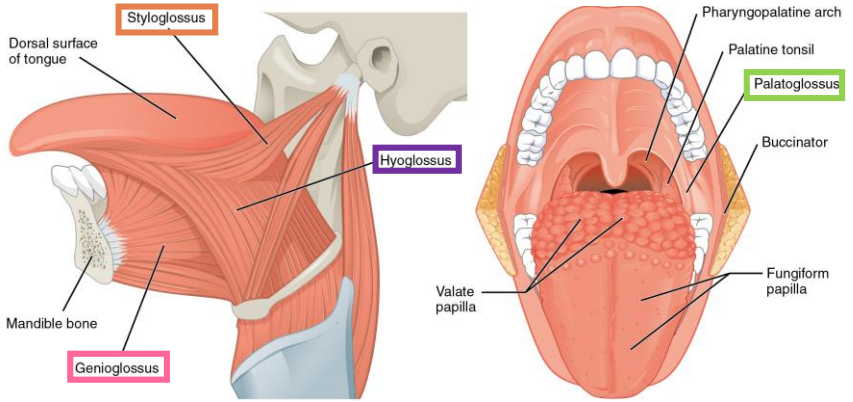
Intrinsic muscles

- Restricted to the tongue and are not attached to bone (within tongue itself)
- They consist of:
  - Longitudinal fibers (superior & inferior)
  - Transverse fibers
  - Vertical fibers
- **Action**: Alter the shape of the tongue while it lies in the mouth cavity.



Extrinsic muscles

- Attached to bones and the soft palate.
- There are 4 pairs:
  1- Palatoglossus (from the soft palate)
  2- Styloglossus (from the styloid process)
  3- Genioglossus (from the mandible)
  4- Hyoglossus (from the hyoid bone)
- Action: protrude, retract, depress & elevate the tongue.



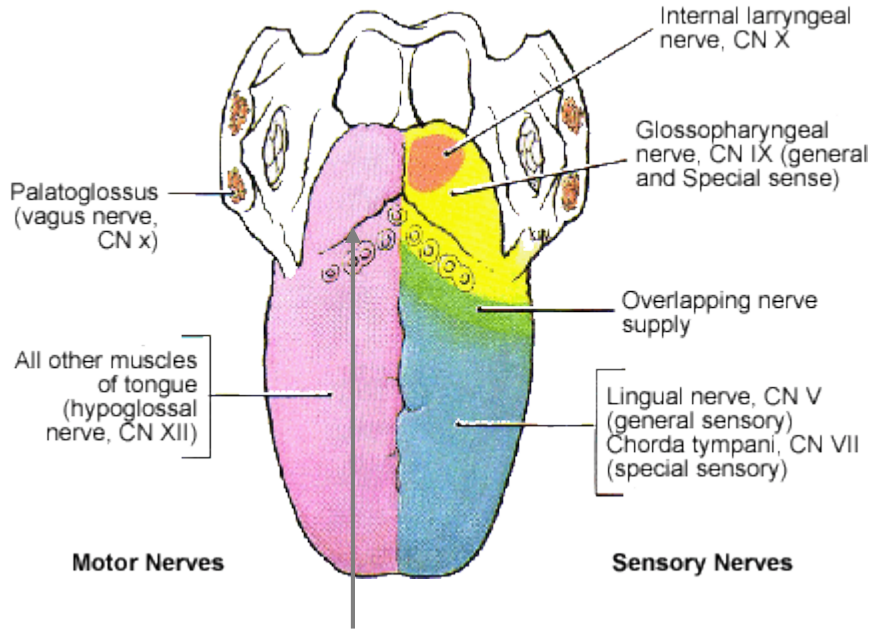
Oral cavity
Tongue (Innervations)

Motor

- All muscles of the tongue are supplied by the **Hypoglossal nerve**.
- EXCEPT **Palatoglossus** which is supplied by the **Pharyngeal plexus**.

Sensory

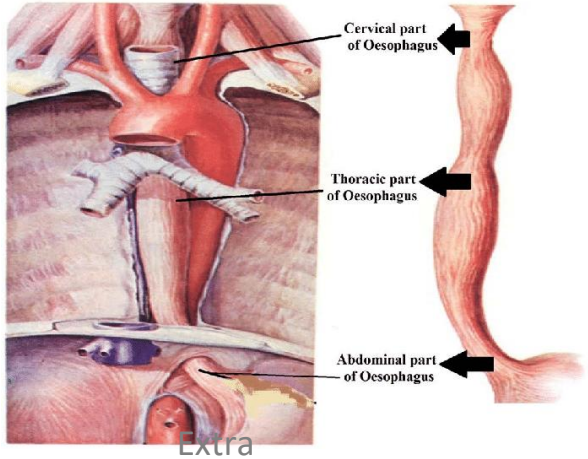
- Anterior 2/3:
  - **General sensations**: **Lingual nerve** (branch of trigeminal nerve).
  - **Taste**: through Chorda Tympani of the **Facial nerve**, EXCEPT the vallate papillae. (because it has different origin "embryonical")
- Posterior 1/3: (including the vallate papillae):
  General & taste sensations: Glossopharyngeal nerve
- Root of the tongue & Epiglottis:
  General & taste sensations are carried by the **Vagus nerve**

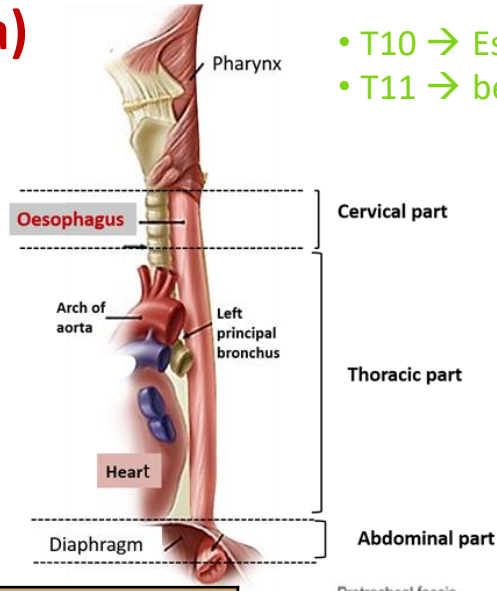


(Sulcus termenalis) it separate the posterior 1/3 from anterior 2/3

Esophagus

- It is a tubular structure about **25 cm** long.
- It begins as the continuation of the pharynx at the level of the **C6 (6th cervical vertebra)**
- It pierces the diaphragm at the level of the **T10 (10th thoracic vertebra)** to join the stomach
- It terminates at the level of **T11 (11th thoracic vertebra)**
- It is formed of 3 parts:
  - Cervical
  - Thoracic
  - Abdominal





- T10 → Esophageal orifice
- T11 → before open in stomach (1.3 cm)

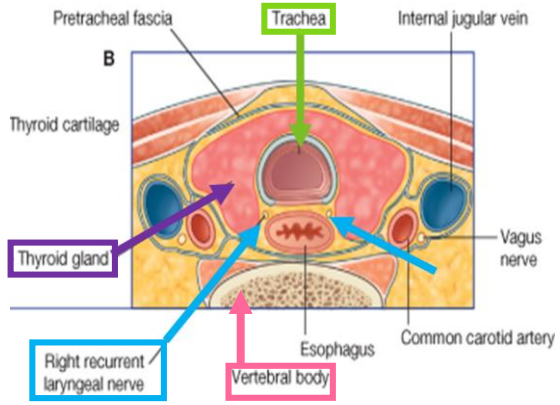
Esophagus

I. Cervical Part

Extra

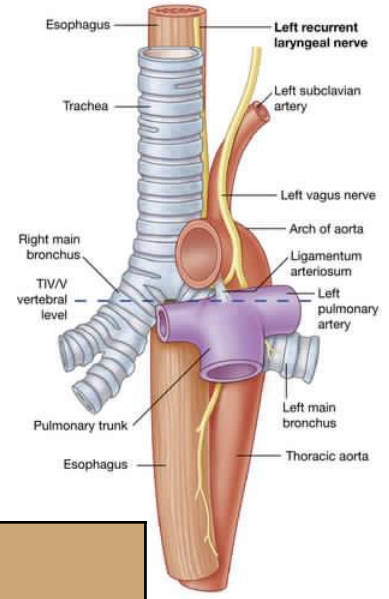
IMPORTANT

Relations	
Anterior	• Trachea • Recurrent laryngeal nerves
Posterior	• Vertebral column
Laterally	• Lobes of the thyroid gland



*Remember that **both recurrent laryngeal** nerves are found in the **cervical** portion of the **esophagus**, while **ONLY** the **left recurrent laryngeal** is found in the **thoracic** part of the **esophagus**

Esophagus
II. Thoracic Part

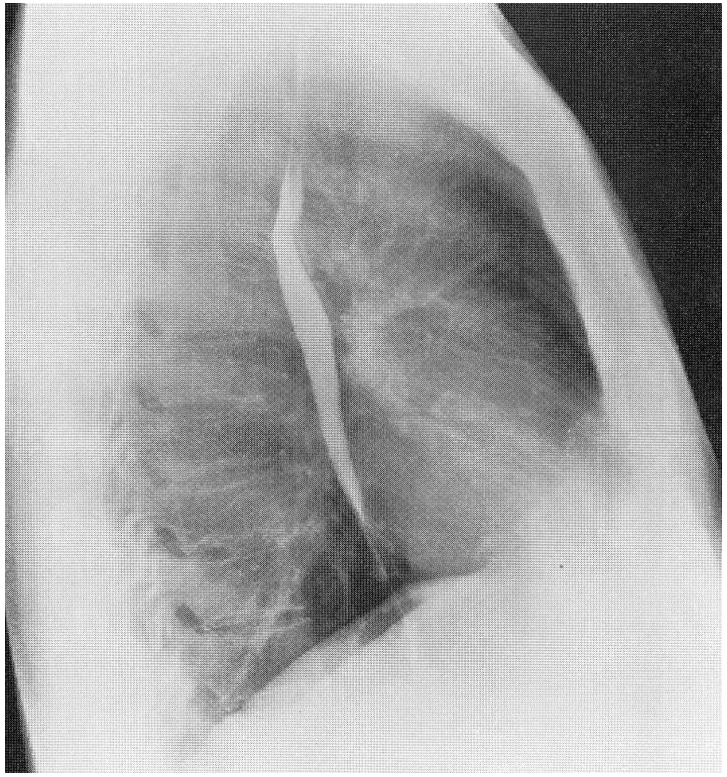


- In the thorax, it passes downward and to the **left** through superior and then to posterior mediastinum
- At the level of the **sternal angle** (T4 | disc between T4 & T5), the **aortic arch** and **left main bronchus** push the esophagus again to **the midline**.
- **Relations:**

Relations	
Anterior	**Posterior**
• Trachea • **Left** recurrent laryngeal nerve • **Left** principal (main) bronchus • Pericardium • **Left** atrium (hypertrophy → case dysphagia)	• Bodies of the thoracic vertebrae • Thoracic duct • Azygos vein • **Right** posterior intercostal arteries • Descending thoracic aorta (at the lower end)
Lateral (Right Side)	**Lateral (Left Side)**
• **Right** mediastinal pleura • Terminal part of the azygos vein	• **Left** mediastinal pleura • **Left** subclavian artery • Aortic arch • Thoracic duct

Esophagus
Left Atrium

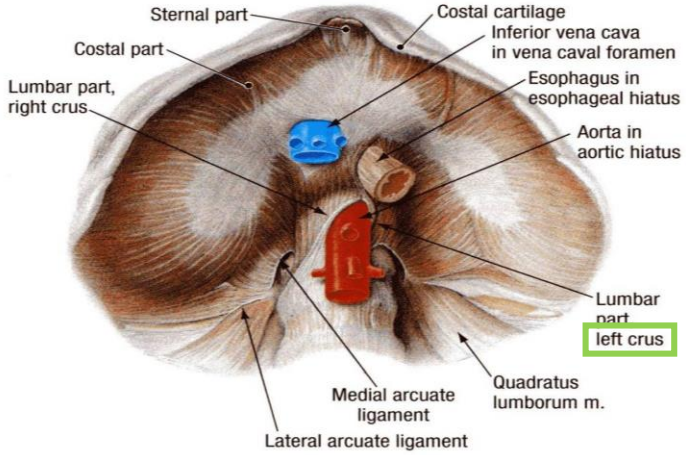
- There is a close relationship between the left atrium of the heart and the esophagus.
- **What is the clinical application?**
- A barium swallow will help the physician to **assess the size of the left atrium**, as in case of a heart failure, or long standing mitral stenosis **(Dilation)**



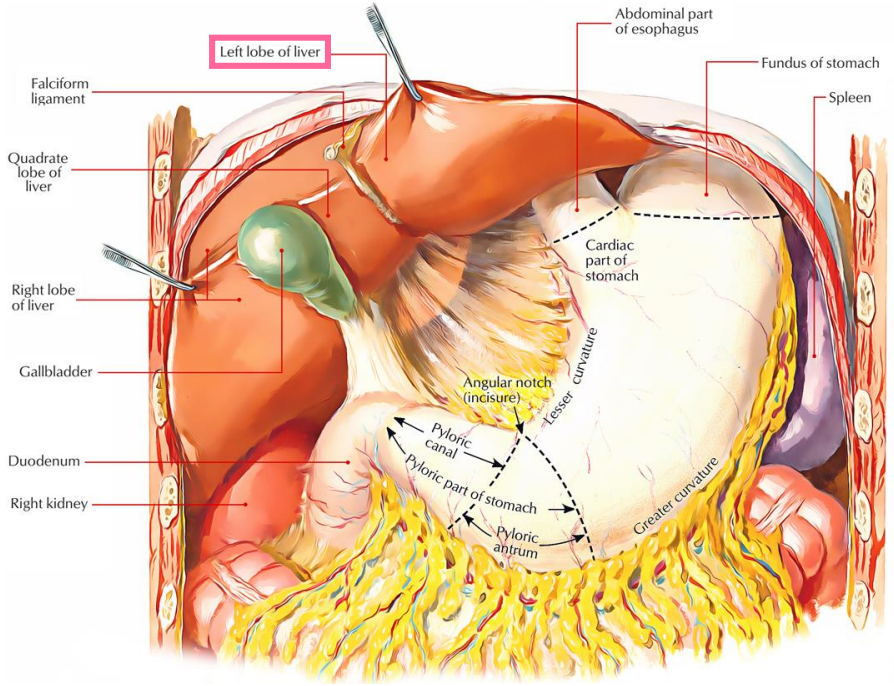
Esophagus
III. Abdominal Part

- In the abdomen, the esophagus descends for **1.3** cm and joins the stomach. Between T10 & T11

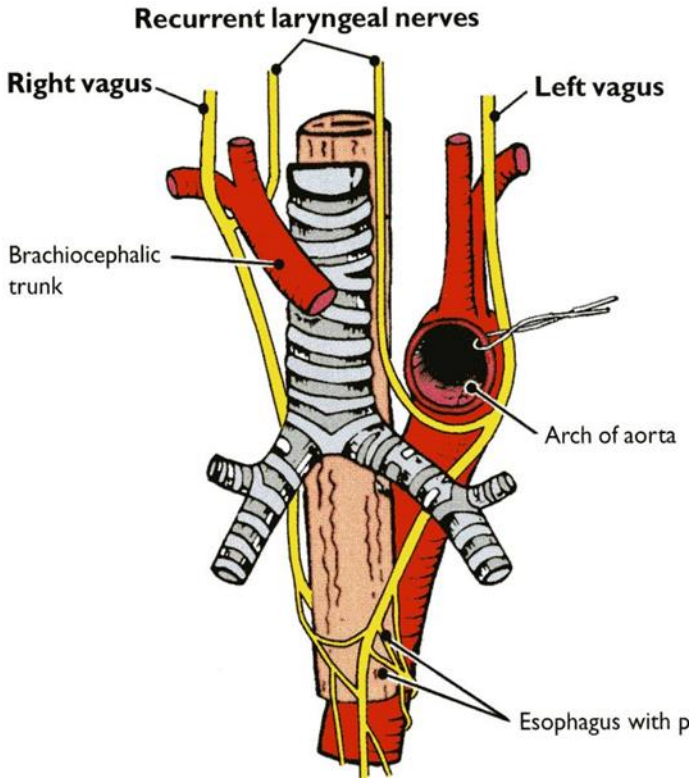
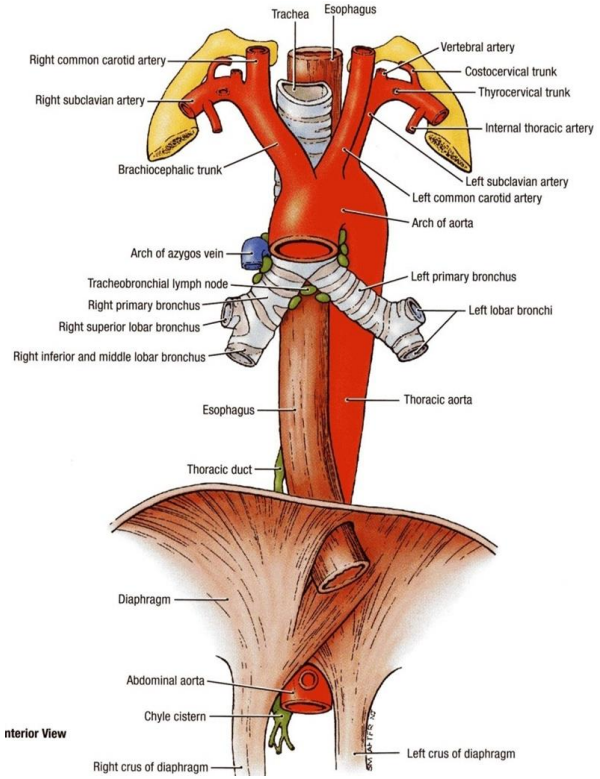
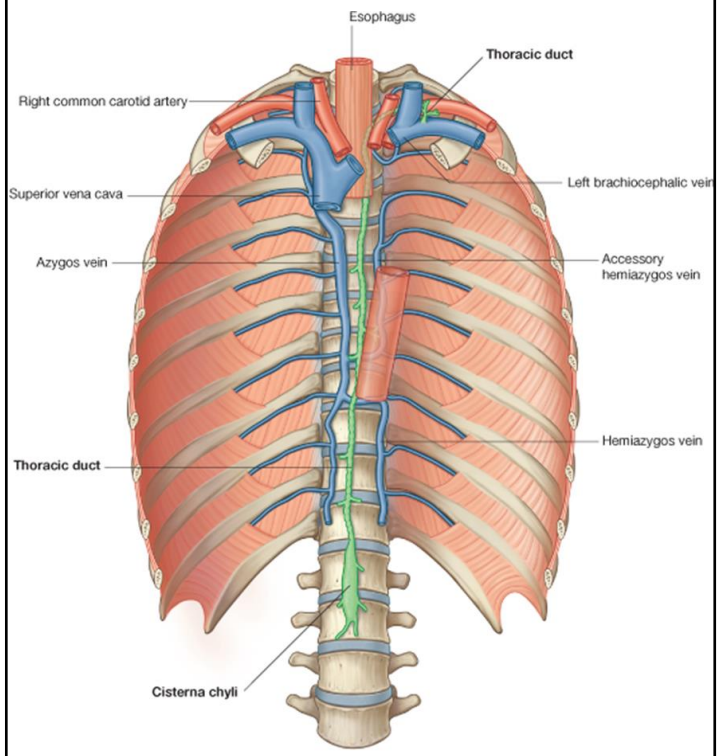
Relations	
Anterior	• **left** lobe of the liver.
Posterior	• **left** crus of the diaphragm



- Fibers from the **right crus** of the diaphragm form a sling around the esophagus (to keep it in position)
- Right crus larger than left crus
- At the opening of the diaphragm, the esophagus is accompanied by:
  - The two vagi
  - Branches of the left gastric vessels
  - Lymphatic vessels.



Esophagus
Relations

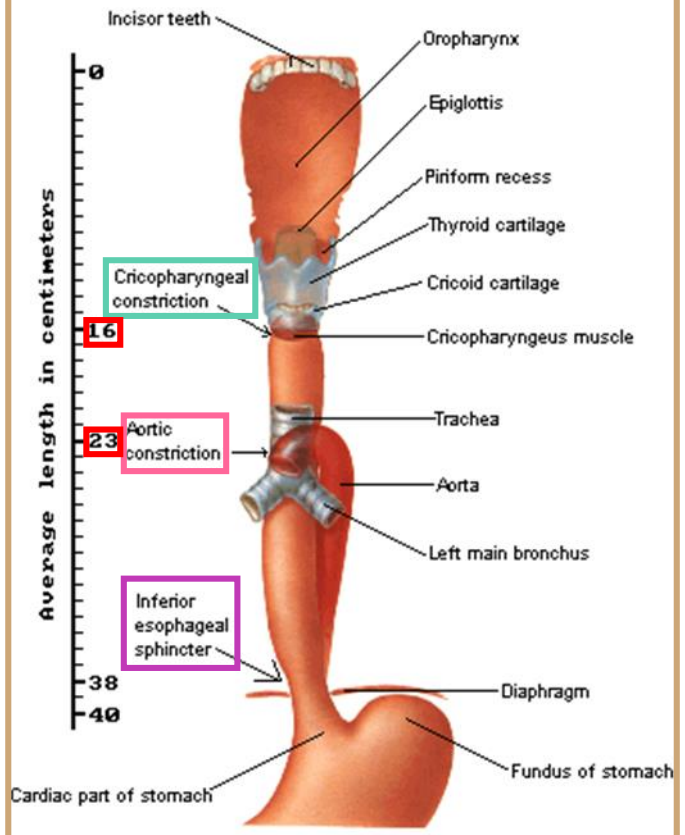
Anterior	lateral	Posterior
		

Esophagus

Constriction

- The esophagus has **3** anatomic constrictions.
  1- The first (pharyngo-esophageal or cricopharyngeal constriction) is at the junction with the pharynx.
  2- The second (aortobronchial or aortic constriction) is at the crossing with the aortic arch and the left main bronchus.
  3- The third (diaphragmatic or inferior esophageal sphincter) is at the junction with the stomach.
- They have a considerable clinical importance.

- 6 inch → pharyngo-esophagea constriction
- 9 inch → Aortic or thoracic constriction
- 12 inch → Diaphragmatic constriction



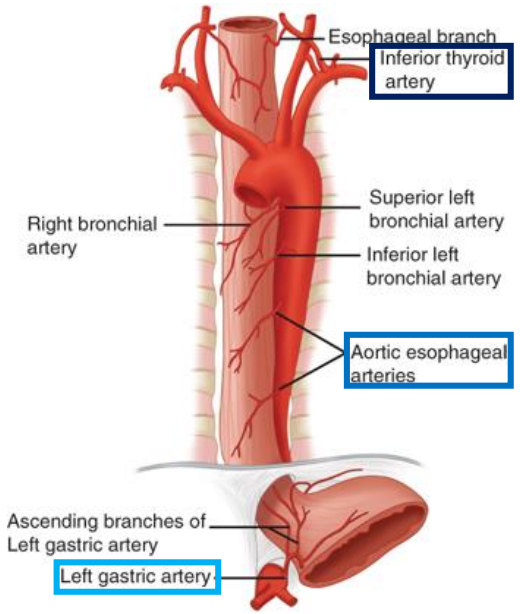
Strictures

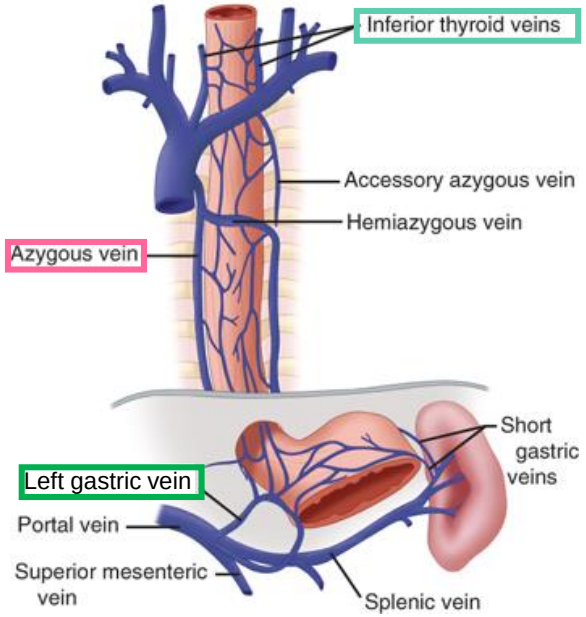
- They may cause difficulties in passing an esophagoscope.
- In case of swallowing of caustic liquids (mostly in children), this is where the burning is the worst and strictures develop.
- The esophageal strictures are a common place of the development of esophageal carcinoma.
- In this picture what is the importance of the scale? to know where and when you have resistance on passing esophagoscope.

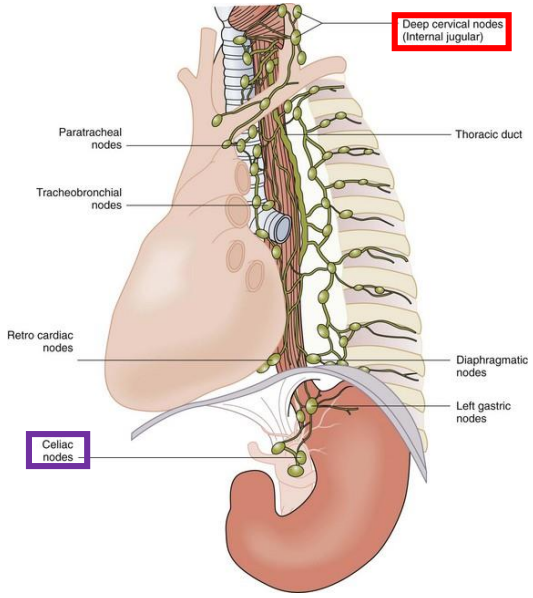
Esophagus
Supply

- Inferior thyroid & Azygos veins → systemic vein
- Left gastric vein → Portal vein

Part	Arterial supply	Venous Drainage	Lymphatic Drainage
Upper third (Cervical)	**Inferior thyroid** artery	**Inferior thyroid** veins	**Deep cervical** nodes
Middle third (Thoracic)	**Thoracic** (descending) **aorta**	**Azygos** veins	**Superior** and **inferior mediastinal** nodes
Lower third (Abdominal)	**Left gastric** artery	**Left gastric** vein(tributary of the portal vein)	**Celiac** lymph nodes (in the abdomen)

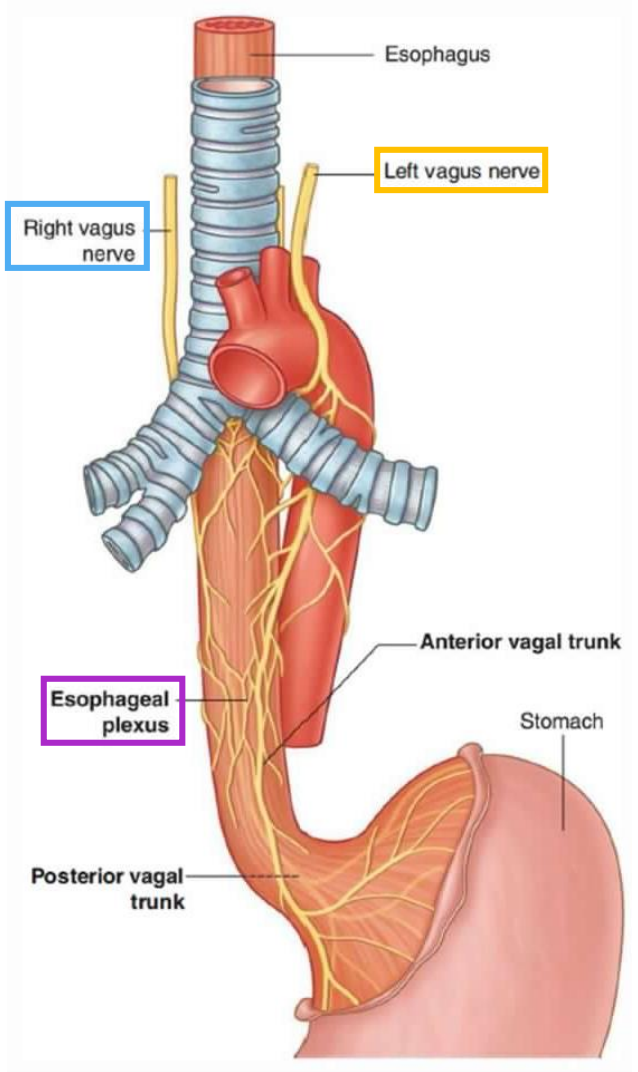






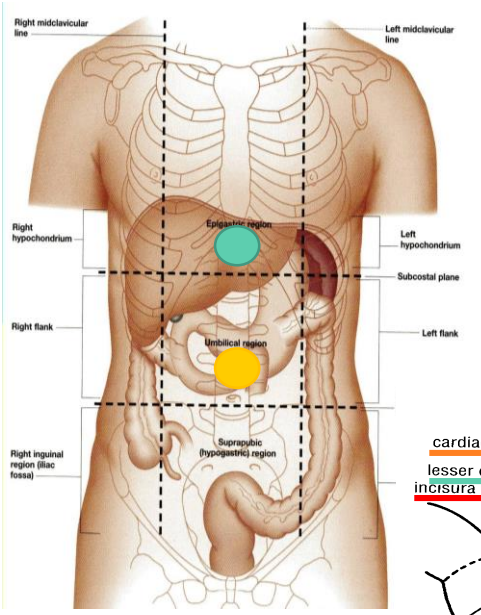
Esophagus
Supply

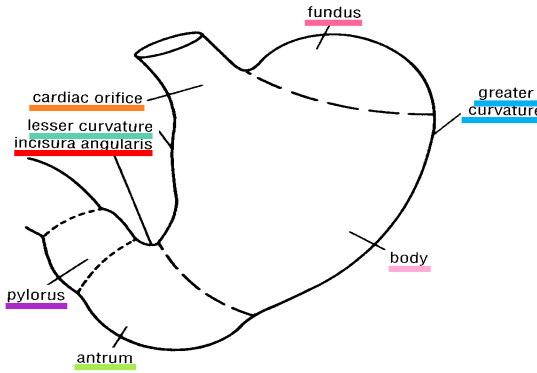
Nerve supply	
Sympathetic	**Sympathetic**
It is supplied by sympathetic fibers from the **sympathetic trunks.**	1. The **parasympathetic** supply comes form the **vagus nerves**. 2. Inferior to the roots of the lungs, the vagus nerves join the **sympathetic** nerves to form the **esophageal plexus**. 3. The **left vagus** lies anterior to the esophagus. 4. The **right vagus** lies posterior to it.



Stomach
Location

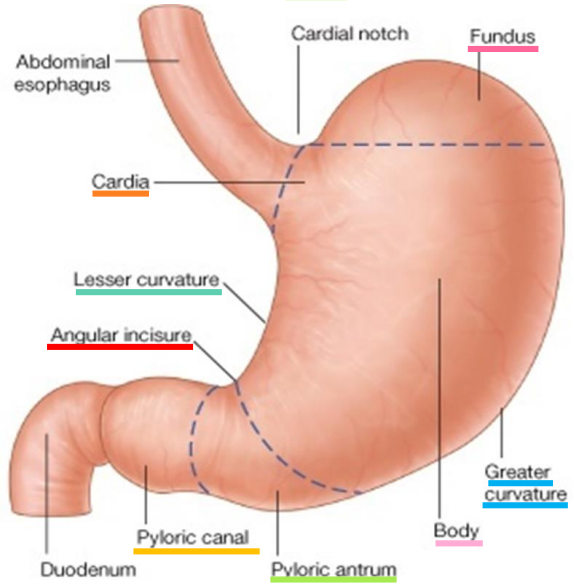
- The stomach is most **dilated part** of the **alimentary canal**.
- It is located in the **upper part** of the **abdomen.**
- It extends from beneath the **left costal** region into the **epigastric** and **umbilical** regions.
- Much of the stomach is protected by the lower ribs.
- It is roughly J-shaped





Stomach
Parts

2 orifices	2 borders	2 surfaces	3 parts	Pylorus
Cardiac	Lesser curvature	Anterior	Fundus	Pyloric antrum
			Body	Pyloric canal
Pyloric	Greater curvature	Posterior	Pylorus	Pyloric sphincter



Stomach
Parts

Only on the girl's slides

Cardiac Orifice:

- It is the site of the **gastro-esophageal sphincter** (opening of esophagus in stomach)
- It is a **physiological sphincter** rather than an anatomical sphincter.
- Consists of **circular layer** of **smooth muscle** (under **vagal** and **hormonal control**).
- Lies opposite **left seventh costal** cartilage 2.5 cm from the sternum **T10**.
- Function: Prevents esophageal regurgitation (reflux) حرقان

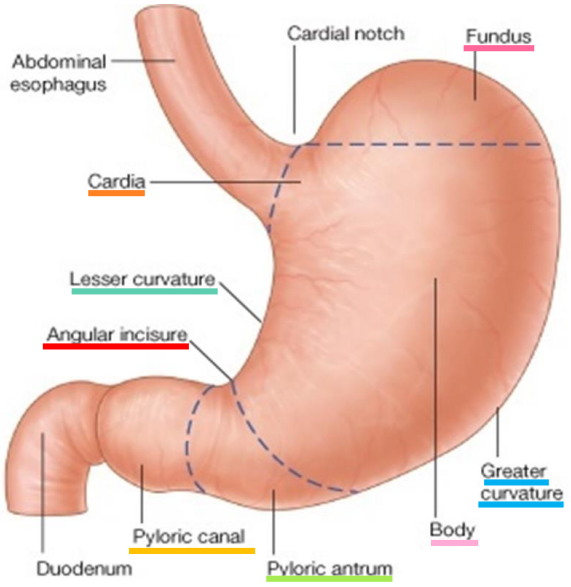
Fundus

- **Dome-shaped.**
- Located to the left of the cardiac orifice.
- Usually **full of gazes** (black color in X-ray)
- It reaches to the **left fifth** intercostal space & ½ inches from the middle line* a little below the apex of the heart.

*Only on the boy's slides

Body

- Extends from the level of the **fundus**, to the level of **Incisura angularis**. (This is a constant notch on the lesser curvature)



Stomach Parts

*lesser omentum (gasrtohepatic ligament & hepatoduodenal ligament). portal vein, hepatic artery & bile duct located in free margin of lesser omentum

Pylorus

- The pylorus is a **tubular part** of the stomach.
- It lies in the transpyloric plane (L1), 1 cm to the right of the middle line.
- It has a **thick muscular** end called **pyloric sphincter.**
- The **cavity** of the pylorus is the **pyloric canal.**

Pyloric antrum

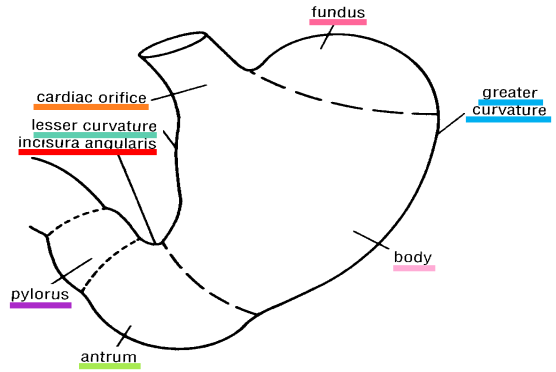
- The pyloric antrum extends from **Incisura angularis** to the **pylorus**.

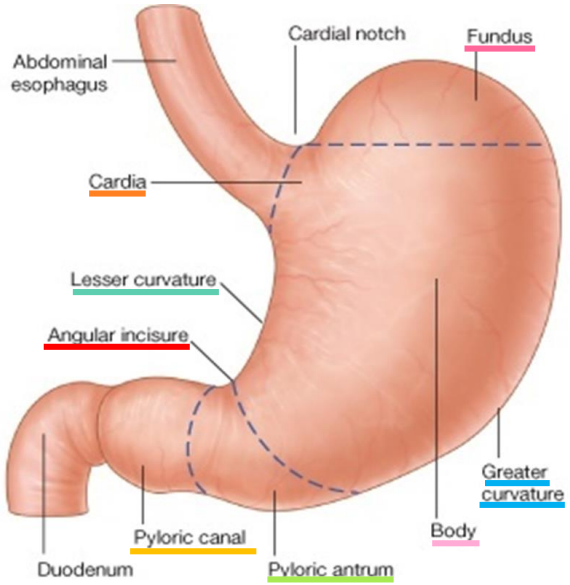
Lesser curvature

- Forms the **right border** of the stomach.
- Extends from the **cardiac orifice** to the **pylorus**.
- Attached to the liver by the lesser omentum* (gasrtohepatic ligament)

Greater curvature

- Forms the **left border** of the stomach.
- Extends from the **cardiac orifice** to the **pylorus**.
- Its **upper part** is attached to the **spleen** by **gastrosplenic ligament.**
- Its **lower part** is attached to the **transverse colon** by the **greater omentum**.

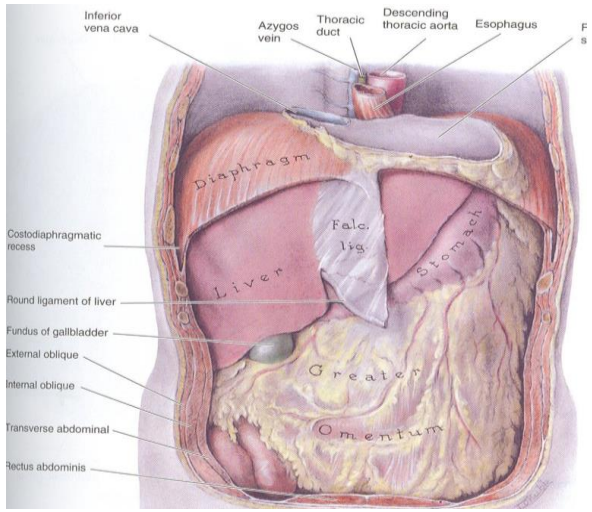


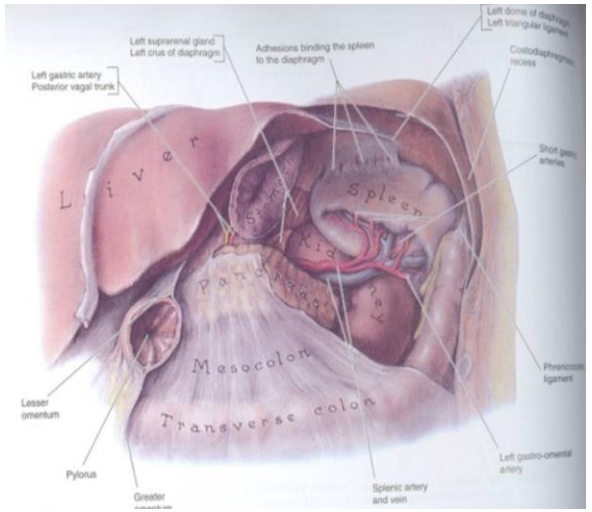


Stomach Relations

Anterior	Posterior (stomach bed)
1. Anterior abdominal wall. 2. Left costal margin. 3. Left pleura & lung. 4. Diaphragm. 5. Left lobe of the liver.	1. Left crus of diaphragm 2. Left suprarenal gland 3. Part of left kidney 4. Spleen 5. Splenic artery 6. Pancreas 7. Transverse mesocolon 8. Transverse colon 9. Lesser sac • All these structures form **the stomach bed.** • All are separated from the stomach by **peritoneum of lesser sac** except the **spleen** by greater sac.

*REMEMBER LESSER sac different from LEESER curvature & LESSER omentum

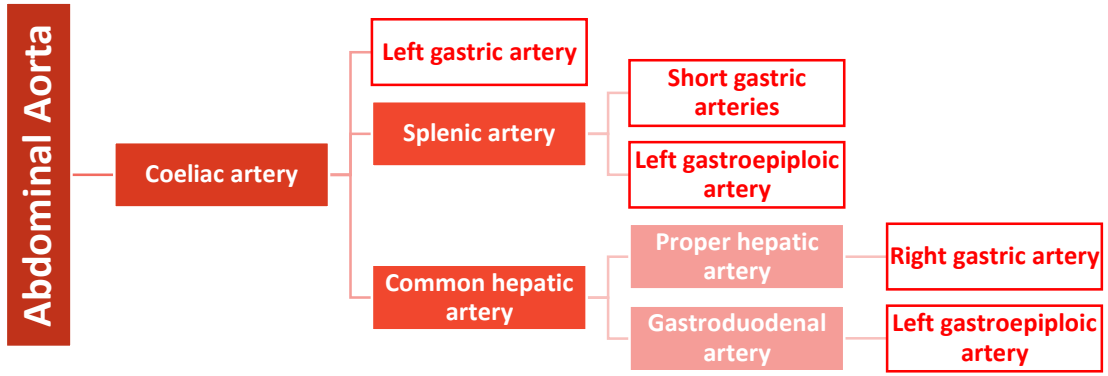


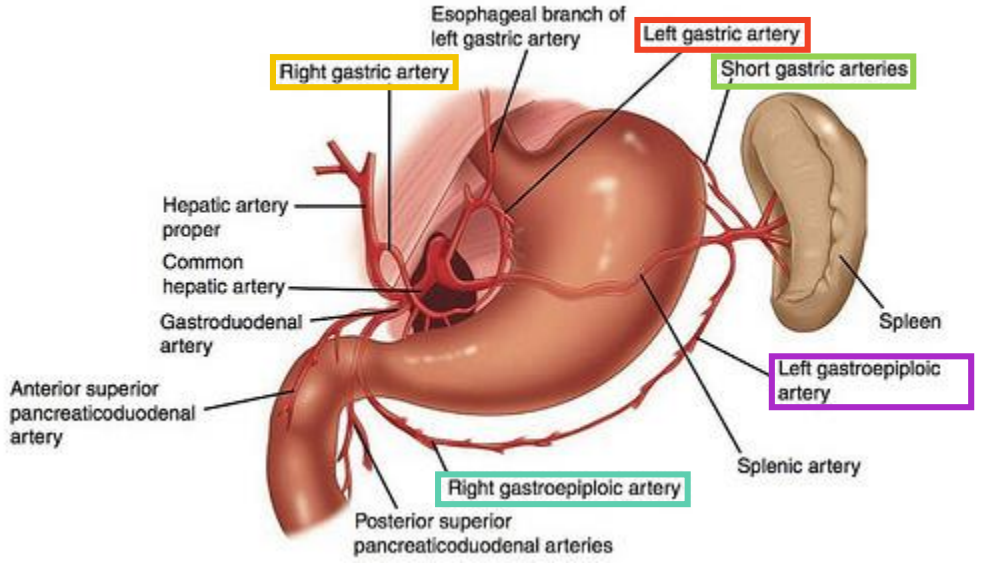


Stomach
Supply

Arterial supply		
1- Left gastric artery	branch of celiac artery 1st branch of Abdominal Aorta	Runs along the lesser curvature.
2- Right gastric artery	a branch of hepatic artery of celiac	Runs to the left along the lesser curvature
3- Short gastric arteries	a branch of splenic artery	Pass in the **gastrosplenic ligament**.
4- Left gastroepiploic artery	a branch of splenic artery	Pass in the **gastrosplenic ligament**.
5- Right gastroepiploic artery	a branch of gastroduodenal artery of hepatic	Passes to the left along the greater curvature.

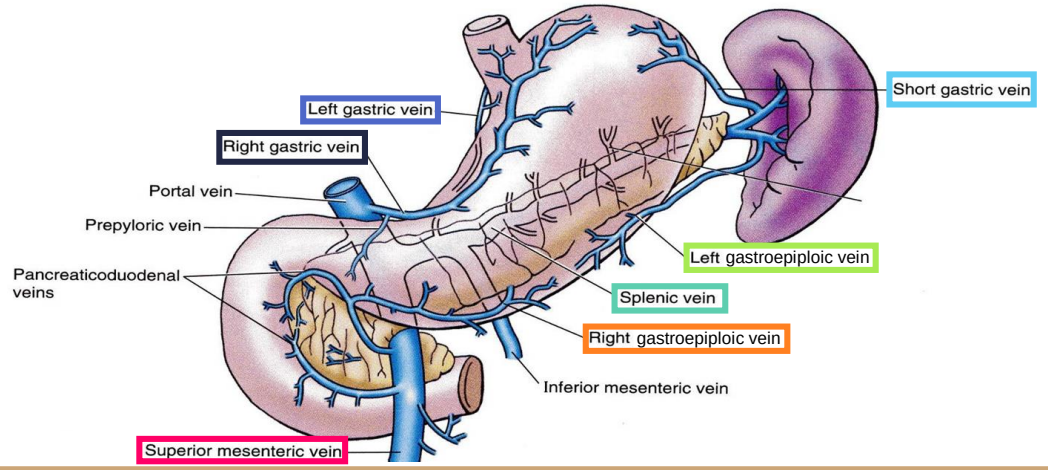
*FOR BETTER UNDERSTANDING

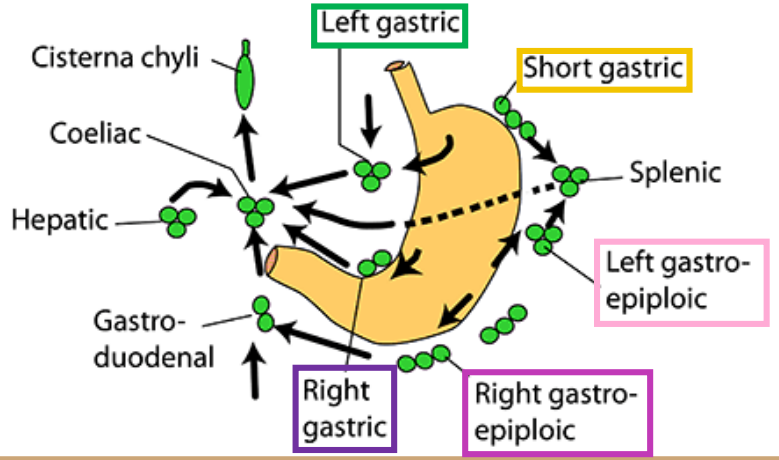




Stomach
Supply

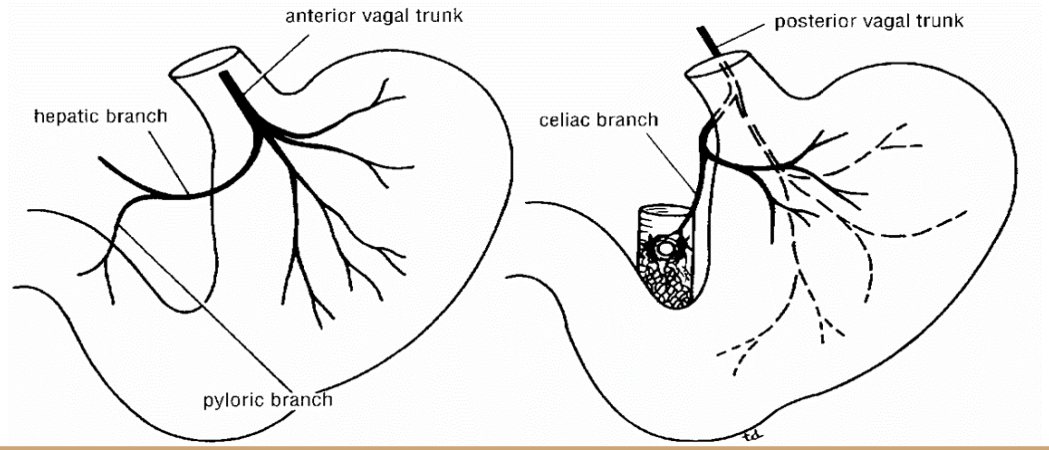
Venous Drainage	• All of the veins drain into the **portal circulation (last drainage)** • The **right gastric vein** and **left gastric vein** drain directly in the **portal vein**. • The **short gastric** veins and the **left gastroepiploic** vein join the **splenic vein**. • The **right gastroepiploic vein** drain in the **superior mesenteric vein**
Lymphatic Drainage	• The lymph vessels follow the arteries. • They first drain to the: 1- **Left gastric nodes** and **right gastric nodes** 2- **Left gastroepiploic nodes** and **right gastroepiploic nodes** 3- **Short gastric nodes** • Ultimately, all the lymph from the stomach is collected at the **celiac nodes (last drainage)**

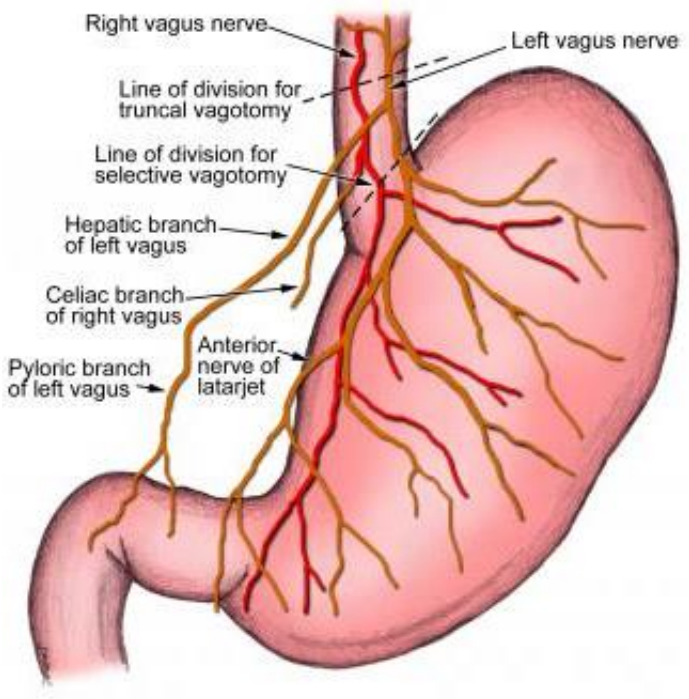




Stomach
Supply

Nerve supply: **Sympathetic** fibers are derived from the **celiac plexus** **Parasympathetic** fibers from both vagi.	
Anterior vagal trunk:	**Posterior vagal trunk:**
• Formed from the **left vagus** • Supply the anterior surface of the stomach **(EXCEPT pylorus)** • Gives off a **hepatic branch** and from it a branch to the **pylorus**.	• Formed from the **right vagus** • Supply the posterior surface of the stomach • Gives off a **large branch** to the **celiac** and the **superior mesenteric plexuses**.





Oral Cavity	
Hard palate	Formed by (4 bones): 2 Palatine processes of the maxillae, and 2 Horizontal plates of palatine bones posteriorly.
Soft palate	Muscles: Tensor veli palatini, Levator veli palatini, Palatoglossus, Palatopharyngeus &Musculus uvulae. Nerve supply: Motor: All by **pharyngeal plexus** EXCEPT **tensor veli palatini** by mandibular nerve. Sensory: Maxillary nerve (Greater palatine, Lesser palatine, and Nasopalatine nerves) and Glossopharyngeal nerve.
Tongue	Attached to: Above (styloid process & soft palate) below (mandible & hyoid bone) Muscles: Intrinsic & extrinsic (palatoglossus, styloglossus, genioglossus, and hyoglossus) Nerve supply: Motor: all by **hypoglossal nerve** EXCEPT **palatoglossus** by pharyngeal plexus.

Esophagus	
Cervical	Anterior: Trachea & Recurrent laryngeal nerves Lateral: Lobes of the thyroid gland. Posterior: Vertebral column
Thoracic	Barium swallow allows assessment of size of **left atrium**
Abdominal	Anterior: left lobe of liver Posterior: left crus of diaphragm Opening of diaphragm: The two vagi, branches of the left gastric vessels, and lymph.
Constrictions	1.Junction with pharynx 2.Crossing of aortic arch and left main bronchus 3.Junction with stomach
Supply	Upper third: **inferior thyroid**. Middle third: **aorta** + **azygos** Lower third: **left gastric** Parasympathetic: vagus

Stomach	
Cardiac orifice	Left seventh costal cartilage (T10)
Fundus	Left fifth intercostal space
Pylorus	Transpyloric plane (L1)
Curvature	Lesser curvature: Attached to the liver by the lesser omentum, (**gasrtohepatic** ligament) Greater curvature: Upper part → attached to spleen by **gastrosplenic** ligament. Lower part → attached to transverse colon by the greater omentum.
Supply	Arterial: Right & left **gastric**, **short gastric** , right & left **gastroepiploic** arteries. Venous: Right & left **gastric** → portal. **Short gastric** & left **gastroepiploic** → **splenic** → portal. Right **gastroepiploic** → **superior mesenteric** → portal Lymph: **celiac** lymph nodes Sympathetic: **celiac** plexus Parasympathetic: **vagus** nerve

MCQs

(1) Which of the following is a posterior relation of the stomach?

A) Anterior abdominal wall
B) Left costal margin
C) Left pleura & lung
D) Splenic artery

(2) Which of the following is a direct branch of the celiac artery?

A) Left gastric artery
B) Right gastric artery
C) Short gastric artery
D) Right gastroepiploic artery

(3) The vestibule receive the opening of the parotid gland at the upper side of seconded molar tooth at the same side :

A) True
B) False

(4) The vestibule lie between?

A) The teeth and gum externaliy and the tounge posteriorly
B) The space in behind the tounge
C) The 2nd molar tooth and the cheeks
D) The teeth & gums internally and lips and cheeks externally

(5) The Left gastroepiploic is a branch of which artery

A) Splenic
B) Abdominal Aorta
C) Gastroduodenal
D) Hepatic

(6) Where does the right gastroepiploic vein drain?

A) Portal
B) Superior mesenteric
C) Left gastroepiploic
D) Left gastric

(7) What is the level of the cardiac orifice?

A) T7
B) T10
C) T8
D) T12

(8) Barium swallow asses which of the following?

A) Right atrium
B) Left atrium
C) Right ventricle
D) Left ventricle

(9) Which of the following is a lateral relation of the cervical part of esophagus?

A) Trachea
B) Aortic arch
C) Lobes of thyroid gland
D) Pericardium

(10) Most muscles of the soft palate are supplied by?

A) Glossopharyngeal nerve
B) Vagus nerve
C) Pharyngeal plexus
D) Maxillary nerve

Answers

(1) D
(2) A
(3) A
(4) D
(5) A
(6) B
(7) B
(8) B
(9) C
(10) C

Good luck
Special thank for team436 ❤

Team Leaders:

Faisal Fahad Alsaif
Rawan Mohammad Alharbi

Team Members:

Abdulaziz Aldukhayel
Abdulrahman Alduhayyim
Rinad Alghoraiby
Rawan Mishal

- References:
  1. Girls' & Boys' Slides
  2. Greys Anatomy for Students
  3. TeachMeAnatomy.com

Twitter.com/Anatomy437

Anatomyteam.437@gmail.com