

Vascular System

Anatomy Lab

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M.D , T.A

arteries
veins
lymph

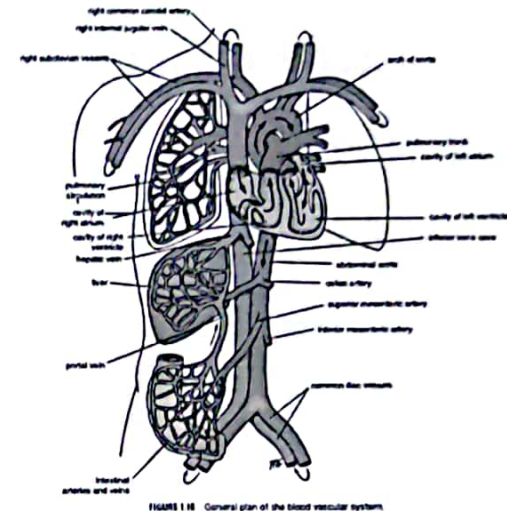
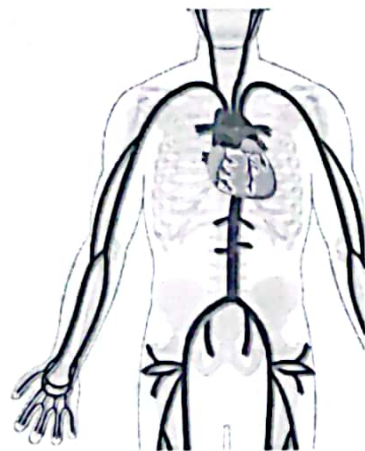


FIGURE 1.16 General plan of the blood vascular system.

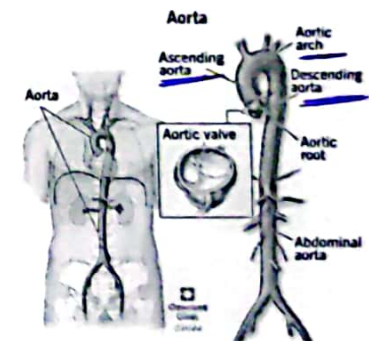
Large Arteries of the Thorax



Large Arteries of the Thorax

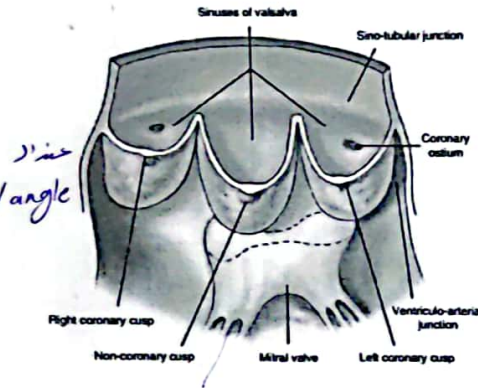
Aorta:

- The aorta is the main arterial trunk that delivers oxygenated blood from the left ventricle of the heart to the tissues of the body.
- It is divided into the following parts: ascending aorta, arch of the aorta, descending thoracic aorta, and abdominal aorta.



Ascending Aorta

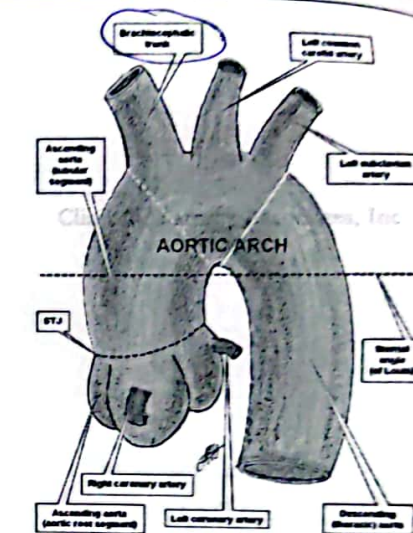
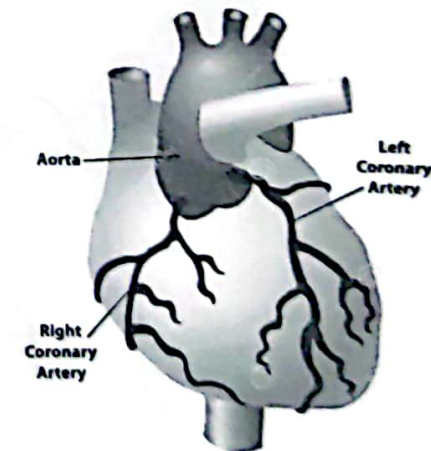
- The ascending aorta is 2 inches long in length and arises from the aortic orifice from the left ventricle and ascends to become the aortic arch.
- At its root, it possesses three bulges, the sinuses of the aorta, one behind each aortic valve cusp.



بالنسبة الى ascending aorta فهو يتوسع في 3 Sinus واحد Sinus خلفي اسفله
 2 posterior , 1 anterior
 dilated
 left right

Ascending Aorta

1. The right coronary artery arises from the right aortic sinus of the ascending aorta and runs forward between the pulmonary trunk and the right auricle.
- It descends almost vertically in the right atrioventricular groove, and at the inferior border of the heart.
2. The left coronary artery arises from the left aortic sinus.



Ascending Aorta

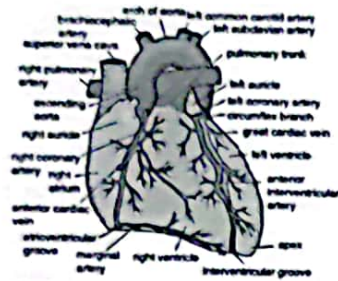


FIGURE 1.34 The anterior surface of the heart and the great blood vessels. Note the course of the coronary arteries and the cardiac veins.

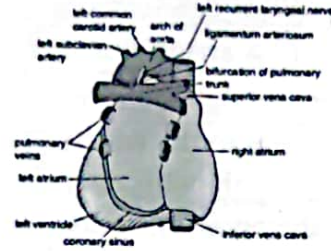
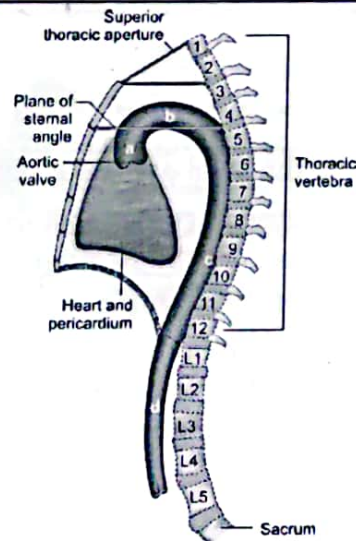
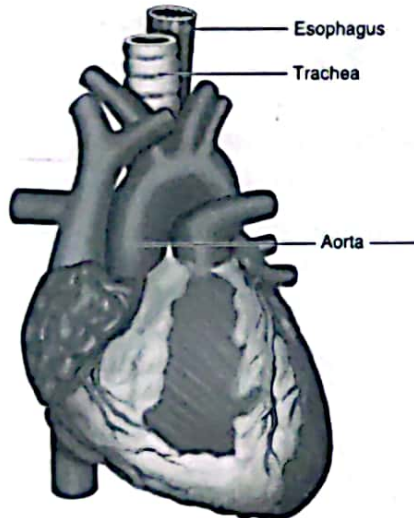


FIGURE 1.35 The posterior surface, or the base, of the heart.

Arch of Aorta

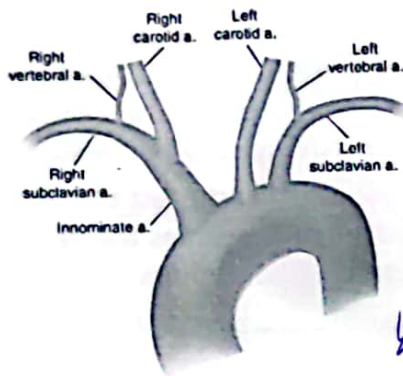
- The arch of the aorta is a continuation of the ascending aorta. Starts at the level of sternal angle behind the manubrium sterni and arches upward, backward, and to the left in front of the trachea (its main direction is backward).
- It then passes downward to the left of the trachea and, at the level of the sternal angle, becomes the descending aorta, which lies in posterior mediastinum.



Arch of Aorta - Branches

- The brachiocephalic artery (innominate artery). It passes upward and to the right of the trachea and divides into the right subclavian artery and right common carotid artery.
 - The left common carotid artery: It runs upward and to the left of the trachea.
 - The left subclavian artery: arises from the aortic arch behind the left common carotid artery.
- They all branch from the convex area of arch of aorta.

Arch of Aorta



external and internal
carotid triangle
3 borders

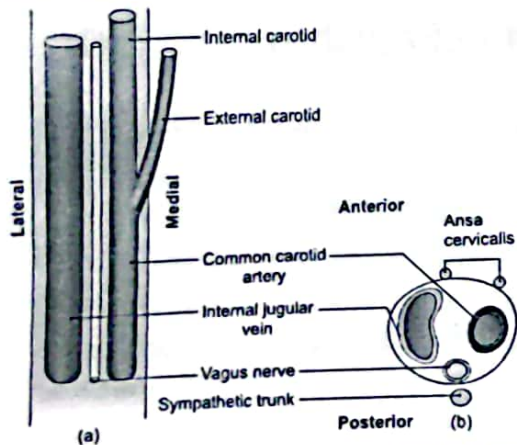
- posterior sternocleidomastoid muscle
- superior posterior belly of digastric muscle
- anterior inferior superior belly of omohyoid muscle

Common Carotid Arteries (CCA)

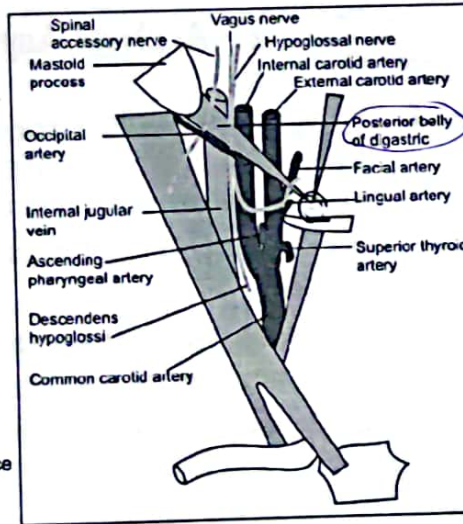
- The **right CCA** arises from the brachiocephalic artery at the level of the right sternoclavicular joint.
- The **left CCA** arises directly from the arch of the aorta.
- The left and right common carotid arteries ascend up the neck, lateral to the trachea and the esophagus within the carotid sheath (with the internal jugular vein and vagus nerve), under the anterior border of the sternocleidomastoid muscle. They do not give off any branches in the neck.

internal jugular carotid artery tube
* most medial structure is common carotid

* most lateral is internal jugular vein
* most posterior is vagus nerve

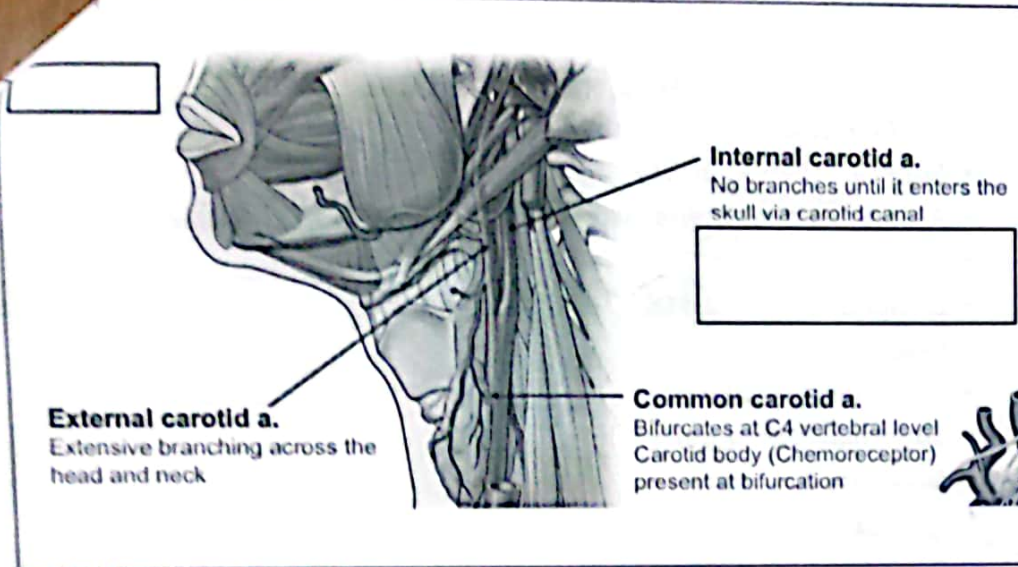


Figs 3.8a and b: Right carotid sheath with its contents: (a) Surface view, and (b) sectional view

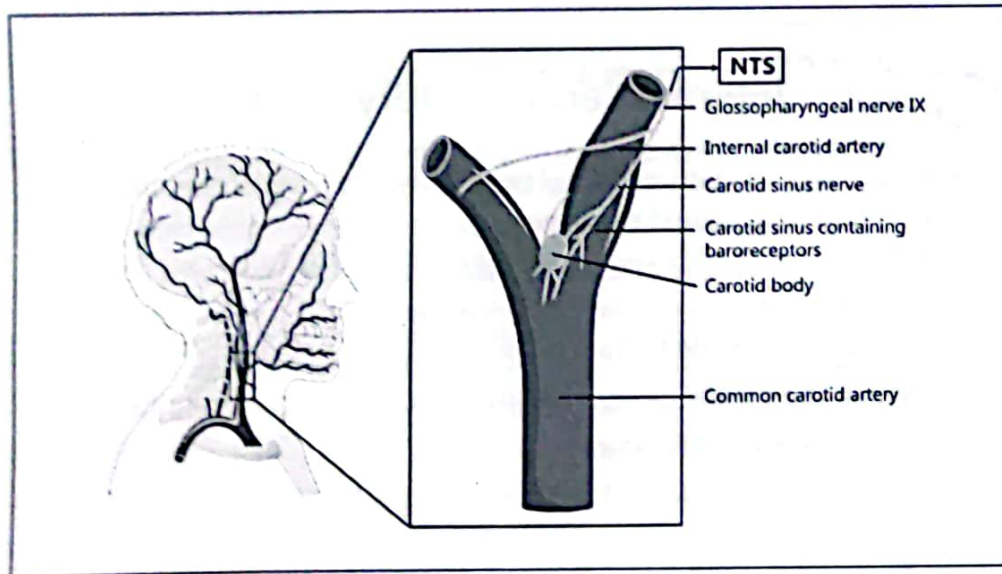


- At the level of the superior margin of the **thyroid cartilage (C4)** the carotid arteries split into the external and internal carotid arteries. This bifurcation occurs in an anatomical area known as the carotid triangle.
- The common carotid and internal carotid are slightly dilated here, this area is known as the carotid sinus, and is important in detecting and regulating blood pressure.

common carotid
internal carotid

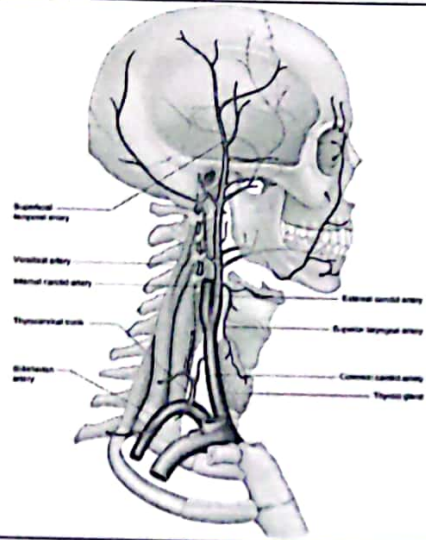


- الوعاء الذي ينقل الدم من القلب إلى باقي الجسم
يتركب من الشرايين
- The carotid sinus is a dilated portion of the common carotid artery and proximal internal carotid artery. It contains **baroreceptors**: specialised sensory cells. The baroreceptors detect stretch as a measure of blood pressure. The **glossopharyngeal nerve** feeds this information to the brain, and this is used to regulate blood pressure.
 - External to the carotid sinus, there is a cluster of nervous cells known as the **carotid body**. These cells act as **peripheral chemoreceptors**; detecting the **O₂** content of the blood and relaying this information to the brain to regulate breathing rate.
- حاسة اللمس
تستقبل الـ carotid body
ملاحظة: الـ carotid body تستقبل الـ O₂ في الدم
respiratory rate



External Carotid Artery (ECA)

- The **external carotid artery** supplies structures in the **neck**, **face**, and **scalp**; it also supplies the **tongue** and the **maxilla**.
- After arising from the common carotid artery at the level of the upper border of the thyroid cartilage, it travels up the neck, passing posteriorly to the mandibular neck and anteriorly to the lobule of the ear.
- The artery ends within the **parotid gland** **posterior** to the neck of the mandible by dividing into the superficial temporal artery and the maxillary artery.

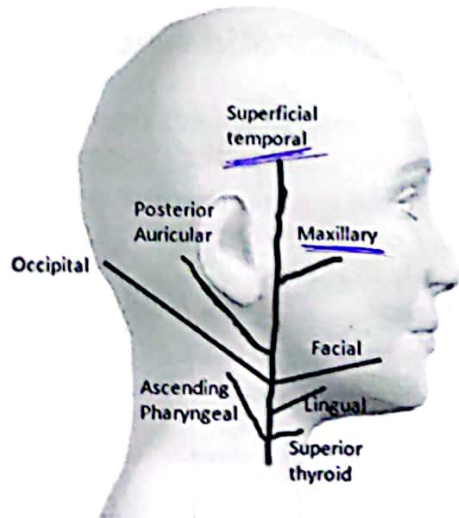


Branches of ECA

- the first branch*
- Superior thyroid artery
 - Ascending pharyngeal artery
 - Facial a.
 - Occipital a.
 - Lingual a.
 - Posterior auricular a.
 - Superficial temporal a.
 - Maxillary a.

FOL

عنه من عروق ECA



branch

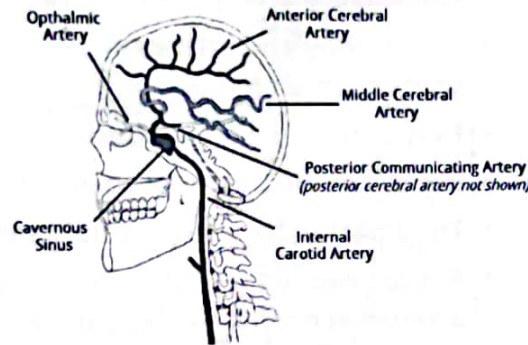
وهو ما يقع لغوفها في العنق

Internal Carotid Artery (ICA)

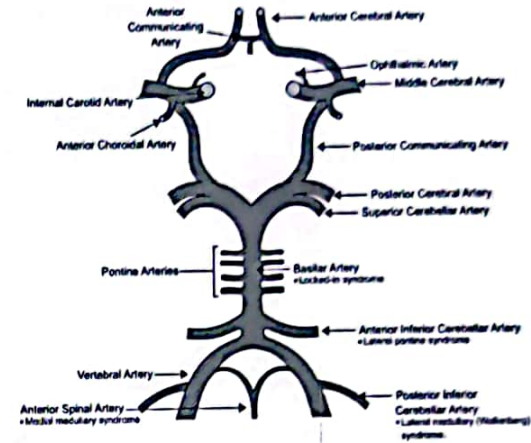
- It begins at the bifurcation of the CCA at the level of the upper border of the thyroid cartilage.
- The internal carotid arteries **do not** supply any structures in the neck, entering the cranial cavity via the carotid canal in the petrous part of the temporal bone. *ICA*
- Within the cranial cavity, the internal carotid artery supplies: the brain , eyes and forehead.

Branches of the ICA

- Ophthalmic a.
- Posterior communicating a.
- Anterior cerebral a.
- Middle cerebral a.



Circle of Willis

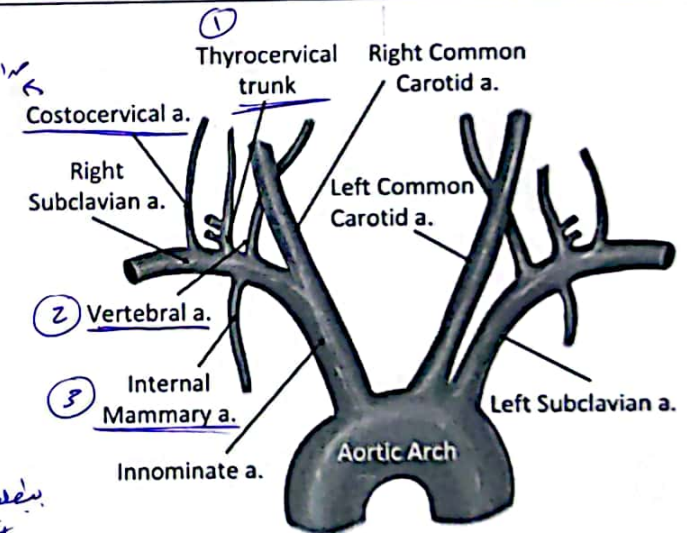


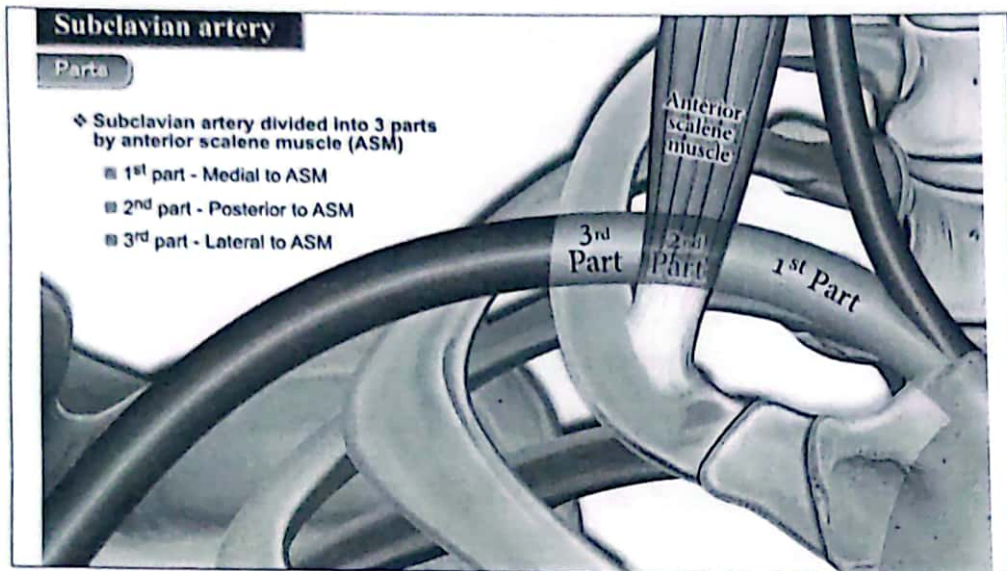
© Lineage

Moises Dominguez

Subclavian Artery

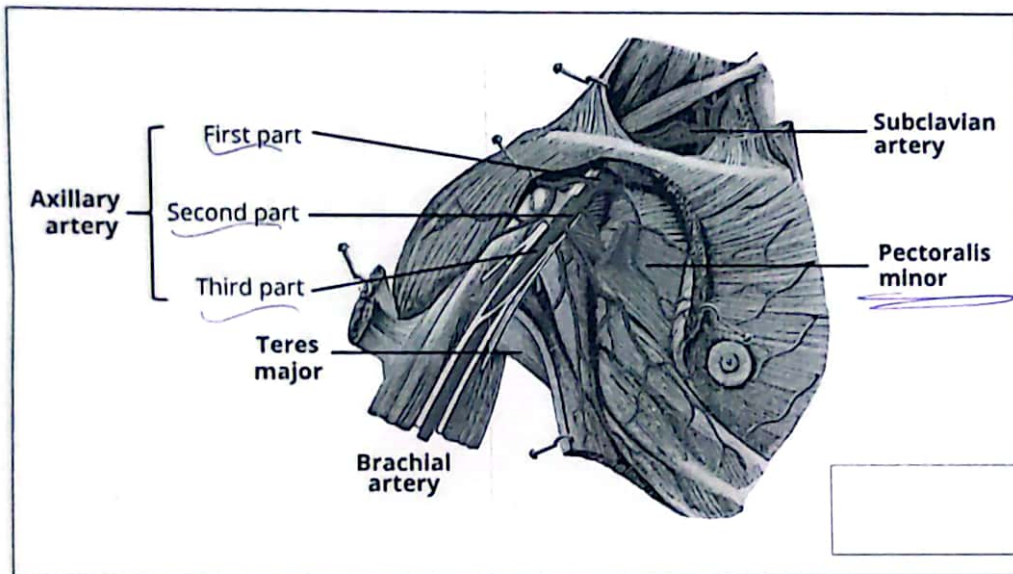
- On the right, the subclavian artery arises from the brachiocephalic trunk. On the left, it branches directly from the arch of aorta.
- The subclavian artery travels laterally towards the axilla. It can be divided into three parts based on its position relative to the anterior scalene muscle:
- First part – origin of the subclavian artery to the medial border of the anterior scalene.
- Second part – posterior to the anterior scalene.
- Third part – lateral border of anterior scalene. → *دفع من واد*
- At the lateral border of the first rib, the subclavian artery enters the axilla – and is renamed as axillary artery. → *دفع من واد*





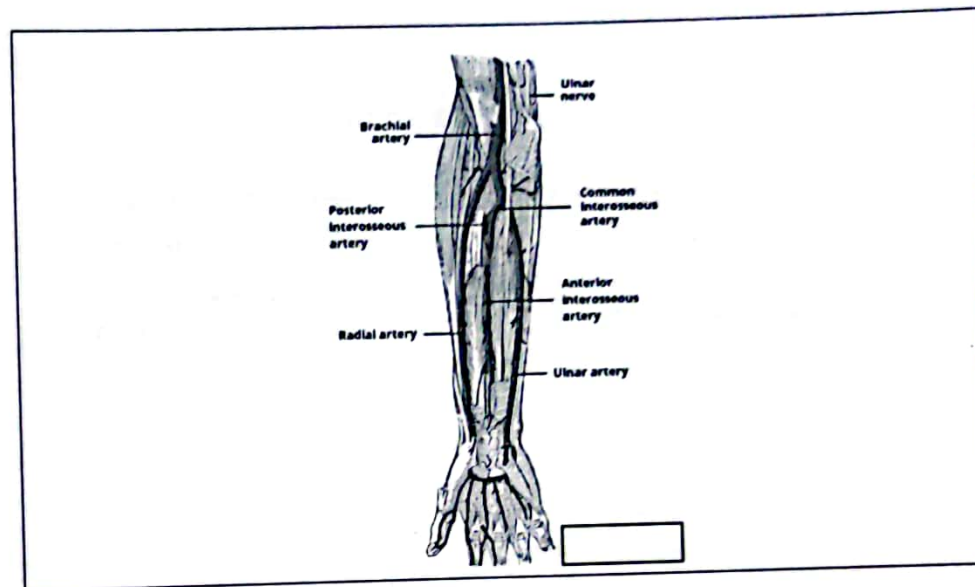
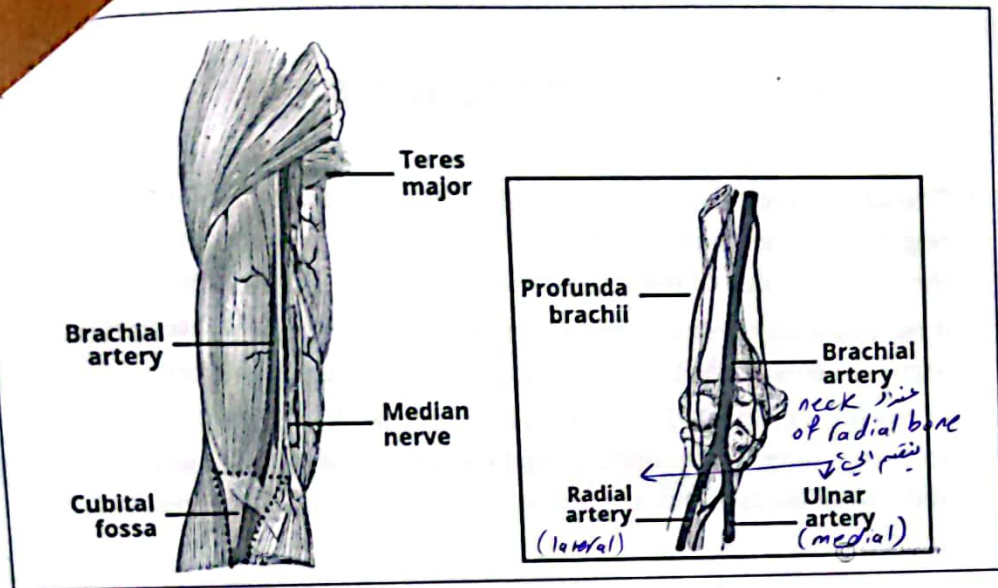
teres major ذراع عريض ← **Axillary Artery**
brachial artery ذراع

- The **axillary artery** lies deep to the pectoralis minor m.
- Importantly, the artery can be divided into three parts based on its position relative to the pectoralis minor muscle:
- First part** – proximal to pectoralis minor
- Second part** – posterior to pectoralis minor
- Third part** – distal to pectoralis minor
- At the lower border of the teres major muscle, the axillary artery is renamed the **brachial artery**.



medial to biceps ~ **Brachial Artery**

- The **brachial artery** is a continuation of the axillary artery past the lower border of the teres major. It is the main supply of blood for the arm.
- The brachial artery proper descends down the arm. As it moves through the cubital fossa, underneath the bicipital aponeurosis, the brachial artery **terminates** by bifurcating into the radial and ulnar arteries (at the level of the neck of the radius).



Clinical Relevance: Coarctation of the Aorta

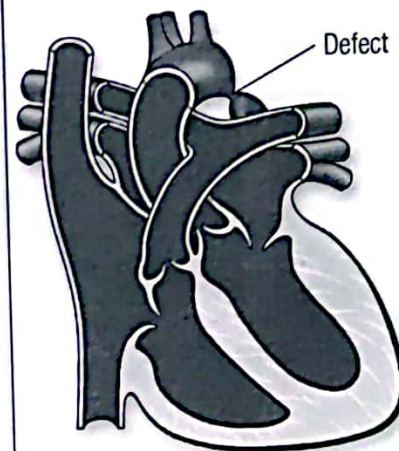
narrowing

تضييق

- Coarctation of the aorta refers to congenital snarrowing of the vessel, usually at the insertion of the ligamentum arteriosum. The narrow vessel has an increased resistance to blood flow, which leading to left ventricular hypertrophy.
- Blood supply to the head, neck and upper limbs is not compromised as the vessels that supply them emerge proximal to the coarctation. However, blood supply to the rest of the body is reduced. This results in a weak, delayed femoral pulse which presents clinically as radio-femoral delay.

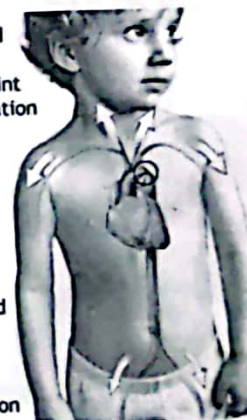
inserted
left pulmonary artery
aortic arch
نقل الدم إلى
تضييق

Coarctation of the Aorta



High blood pressure before point of coarctation

Low blood pressure beyond point of coarctation



ADAM

Descending Aorta

- The descending aorta is the largest part of the aorta. It arises as a continuation of the aortic arch after the branching of the left subclavian artery.
- The descending aorta is divided into the thoracic aorta and the abdominal aorta, which are anatomically separated by the diaphragm.

Descending Aorta

- The descending thoracic aorta lies in the posterior mediastinum and begins as a continuation of the arch of the aorta on the left side of the lower border of the body of the T4 (opposite the sternal angle).
- It runs downward in the posterior mediastinum to the left of the vertebral column but approaches the midline as it descends.
- At the level of the T12, it passes behind the diaphragm (through the aortic opening) in the midline and becomes continuous with the abdominal aorta.

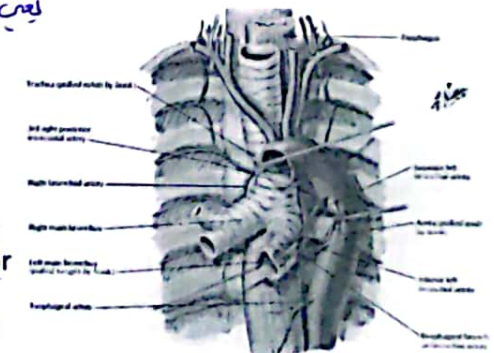
Descending Aorta



Descending thoracic Aorta - Branches

1. Bronchial arteries:

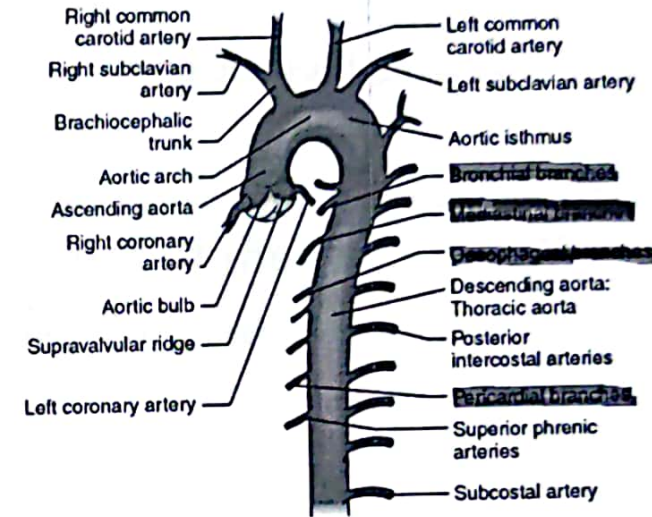
- paired visceral branches arising laterally to supply bronchial and peribronchial tissue and visceral pleura.
- However, most commonly, only the paired left bronchial artery (Superior and inferior left bronchial arteries) arises directly from the aorta whilst the right branches off usually from the 3rd posterior intercostal artery.



Descending thoracic Aorta - Branches

2. **Mediastinal arteries:** Small unpaired arteries that supply the lymph glands and loose areolar tissue in the posterior mediastinum. *مجموعاً 5*
3. **Esophageal branches:** consist of four or five unpaired vessels that supply blood to the esophagus and arise from anterior surface of descending aorta.
4. **Pericardial arteries:** Small unpaired arteries that arise anteriorly to supply the dorsal portion of the pericardium.

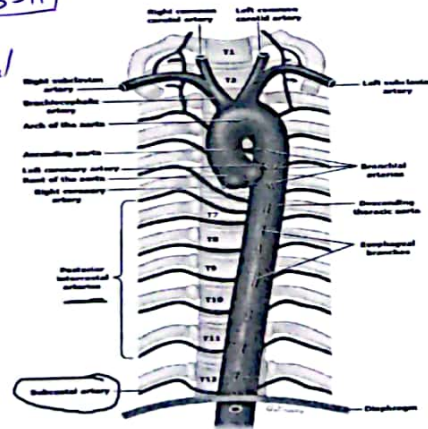
MEP → unpaired
→ visceral



Descending thoracic Aorta - Branches

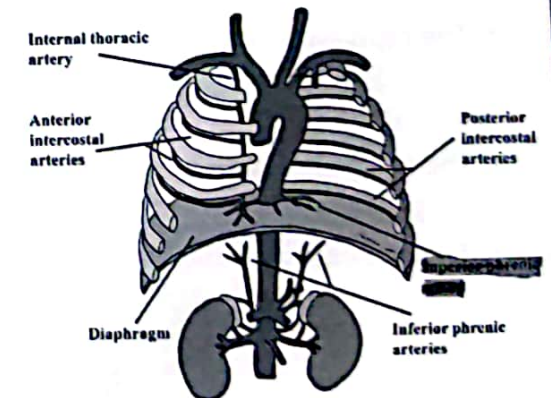
5. **Posterior intercostal arteries** are given off to the lower nine intercostal spaces on each side. They consist of 9 pairs of arteries that run between the ribs and supply the intercostal spaces. *3-11*

6. **Subcostal Arteries:** given off on each side and run along the lower border of the 12th rib to enter the abdominal wall. *paired parietal*



Descending thoracic Aorta - Branches

7. **Superior phrenic arteries:** Paired parietal branches that supply the superior portion of the diaphragm. *تغذية muscle*



Descending thoracic aorta

Visceral branches:

Bronchial, pericardial, esophageal, mediastinal arteries

Parietal branches:

Posterior intercostal, subcostal arteries and superior phrenic arteries

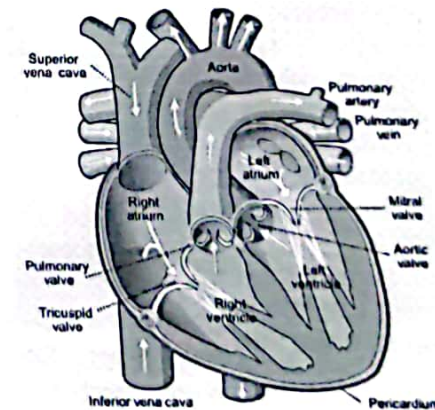
Large Arteries of the Thorax – Pulmonary Trunk

- The pulmonary trunk conveys deoxygenated blood from the right ventricle of the heart to the lungs.
- Pulmonary trunk leaves the upper part of the right ventricle, then runs upward, backward, and to the left.
- It is about 2 in. (5 cm) long and terminates in the concavity of the aortic arch by dividing into right and left pulmonary arteries for left and right lungs respectively.

Pulmonary Trunk

- The right pulmonary artery runs to the right behind the ascending aorta and superior vena cava to enter the root of the right lung.
- The left pulmonary artery runs to the left in front of the descending aorta to enter the root of the left lung.
- The ligamentum arteriosum.

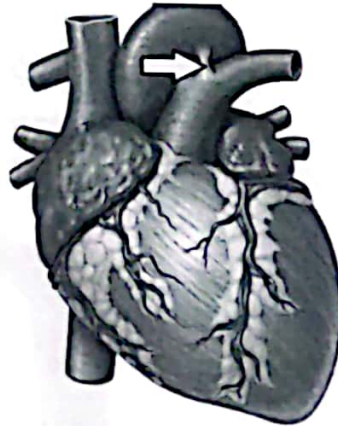
Pulmonary Trunk



Ligamentum Arteriosum

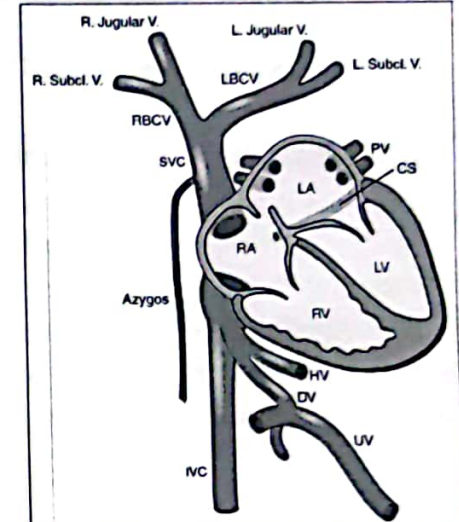
- fibrous band that connects the left pulmonary artery to the aortic arch.

- The ligamentum arteriosum is the remnant of the ductus arteriosus, which in the fetus conducts blood from the pulmonary trunk to the aorta, thus bypassing the lungs.



مخاطب وچه بچه تعلقات و ساختار duct دست
شکل indomethacin

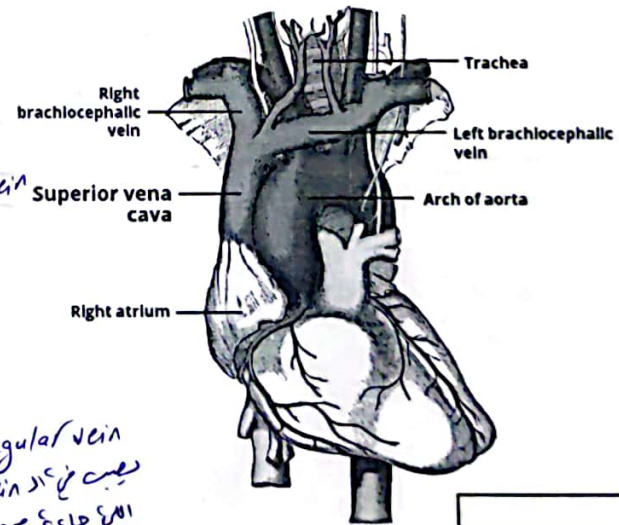
Large Veins of the Thorax



Superior Vena Cava

- The superior vena cava with a 7 cm length receives all the venous blood from the head and neck and both upper limbs.
- It arises from the union of the left and right brachiocephalic veins, posterior to the 1st right costal cartilage. It descends vertically through the superior mediastinum to the right of the aorta and trachea.
- It terminates by emptying into the superior aspect of the right atrium at the level of the 3rd costal cartilage.

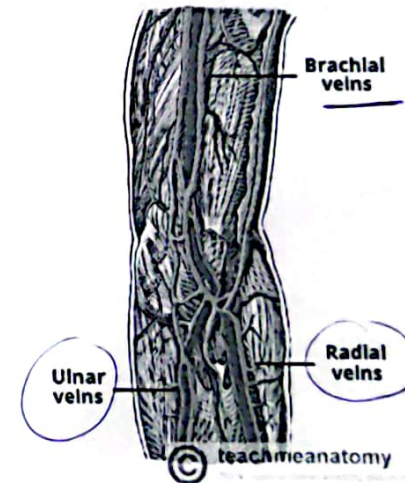
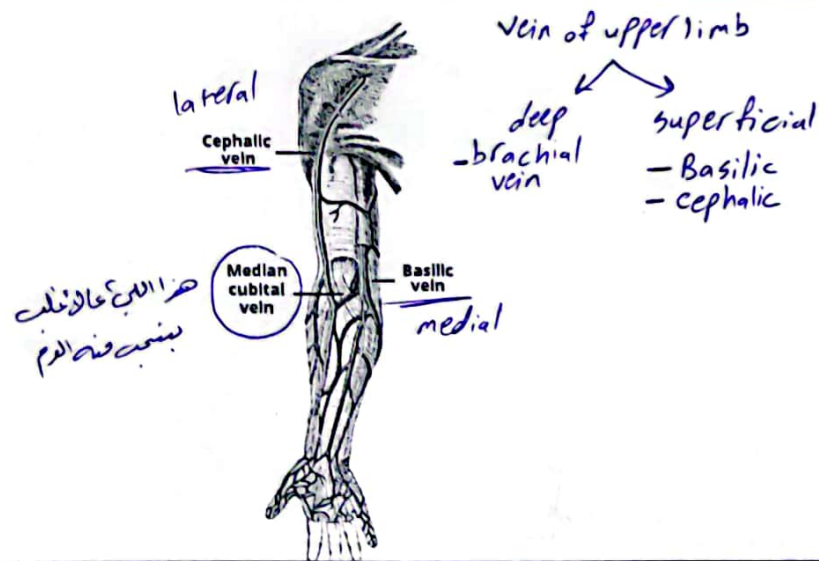
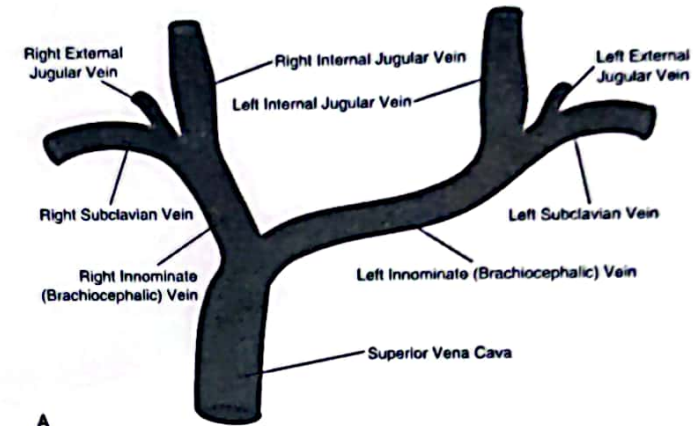
تنگی
subclavian +
internal jugular vein

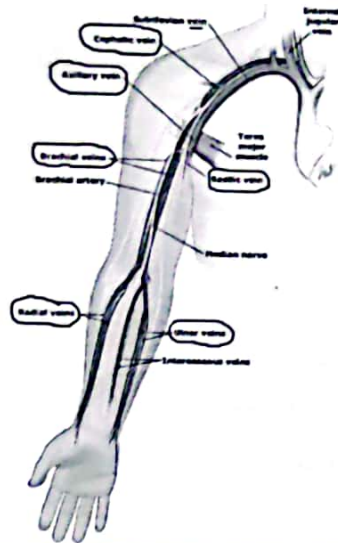


external jugular vein
subclavian vein
axillary vein
اینها با هم
جایگاه

- **Brachiocephalic Veins (Innominate Veins):**

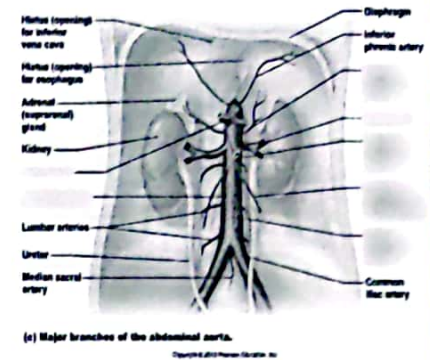
- The right brachiocephalic vein is formed at the root of the neck by the union of the right subclavian and the right internal jugular veins.
- The left brachiocephalic vein has similar origins.
- The right and left brachiocephalic veins join each other to form Superior Vena Cava.





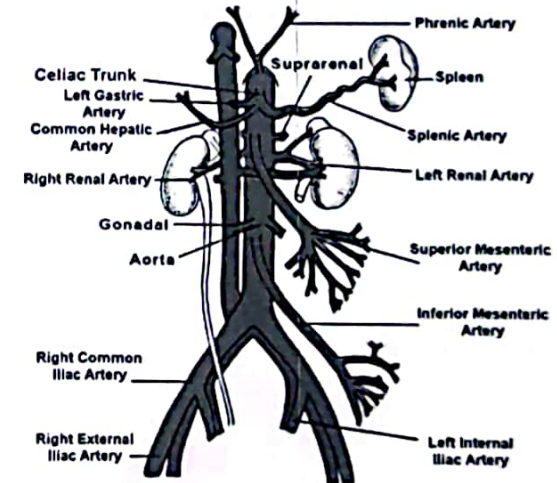
Abdomen – Abdominal Aorta

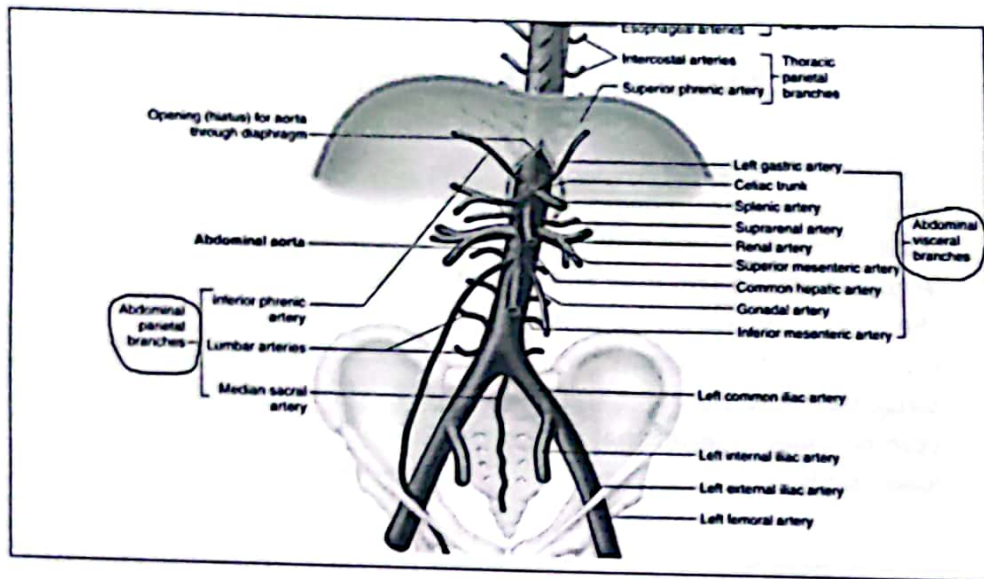
- The abdominal aorta is a continuation of the thoracic aorta beginning at the level of the **T12** vertebrae. It is approximately **13cm** long and ends at the level of the **L4** vertebra. At this level, the aorta terminates by bifurcating into the **right and left common iliac arteries** that supply the lower body.



Abdominal Aorta - Branches

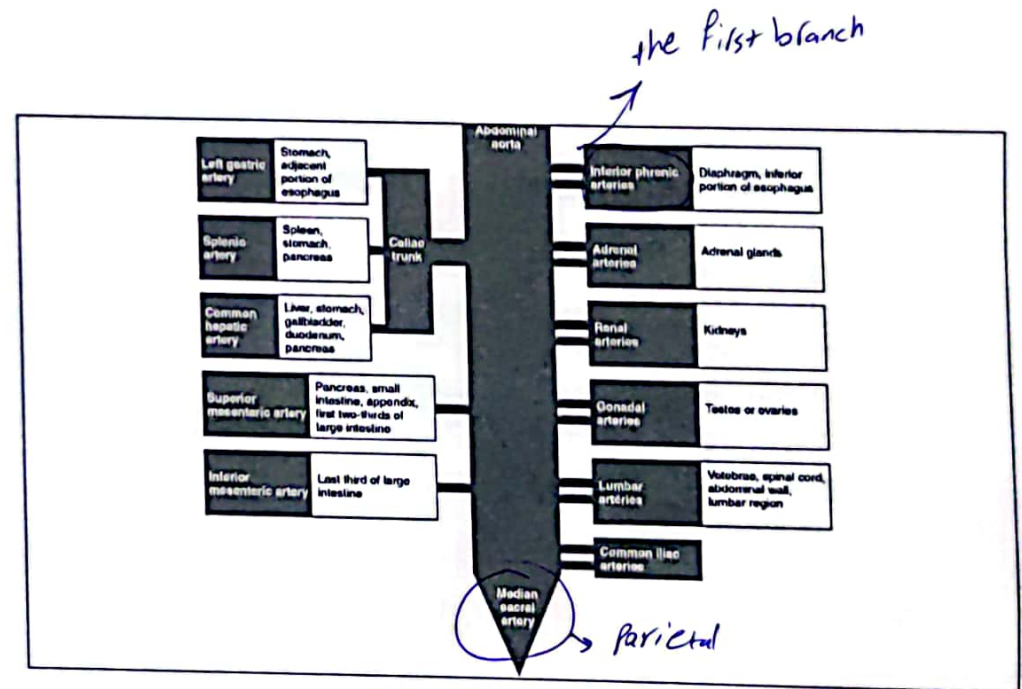
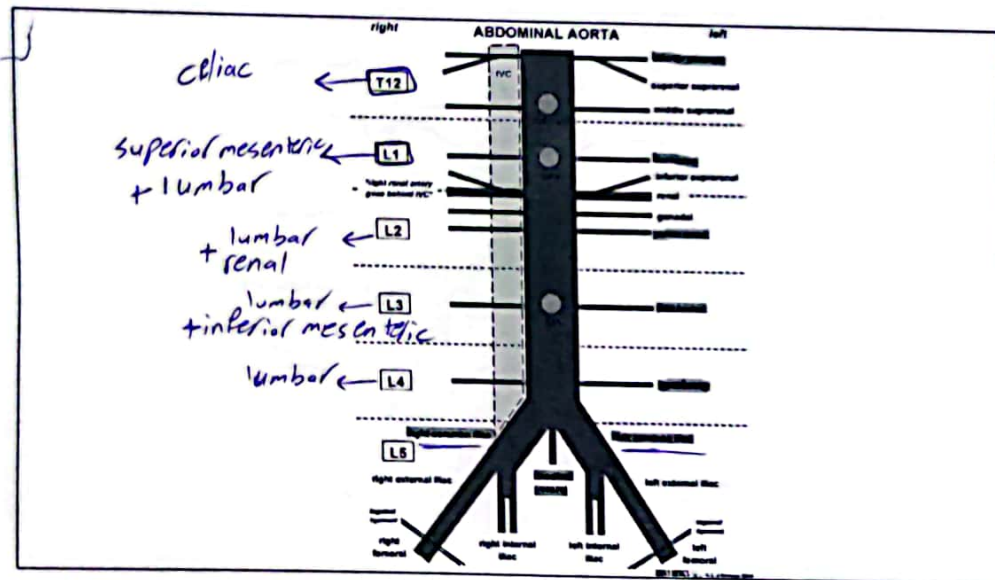
- 3 anterior visceral branches**
 - The **celiac artery**, with three branches: Splenic artery, common hepatic artery and left gastric artery.
 - The **Superior mesenteric artery**: artery of midgut.
 - The **inferior mesenteric artery**: artery of hindgut.
- 3 lateral visceral branches**
 - Renal** (paired)
 - Suprarenal** (paired) *male* *female*
 - Gonadal arteries** (testicular or ovarian artery). (paired)





Abdominal Aorta - Branches

- 5 lateral parietal branches
- 4 lumbar arteries (paired)
- Inferior phrenic artery (paired)
- 3 terminal branches
- The 2 common iliac arteries
- The median sacral artery.

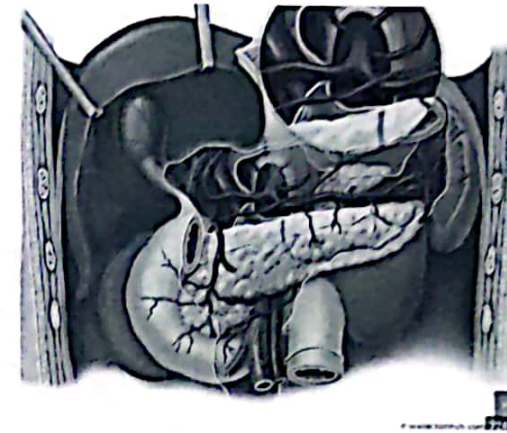


Abdominal Aorta – Celiac Trunk

- Arises on the anterior aspect of the aorta just inferior to the aortic orifice of the diaphragm at the level of the lower border of **T12 vertebra**. Shortly after its origin, the trunk gives off its three branches; left gastric artery, hepatic artery and splenic artery.

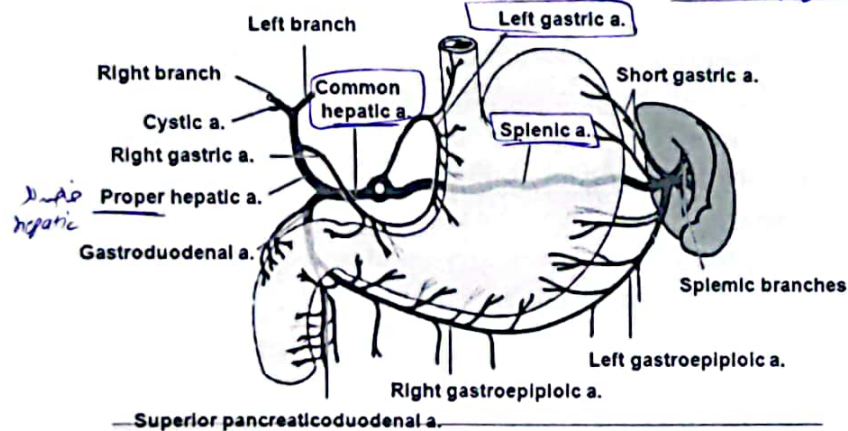
انجبر واحد
وسط
انجبر واحد
وبنوع متفرع

Abdominal Aorta – Celiac Trunk

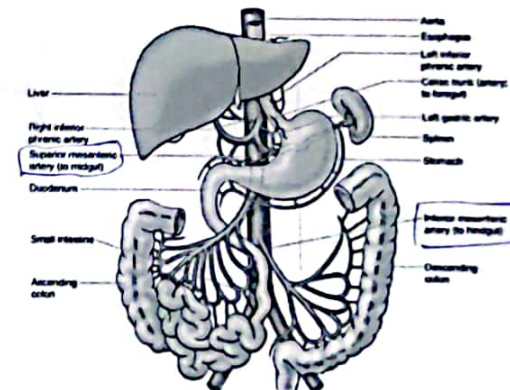


Celiac trunk →

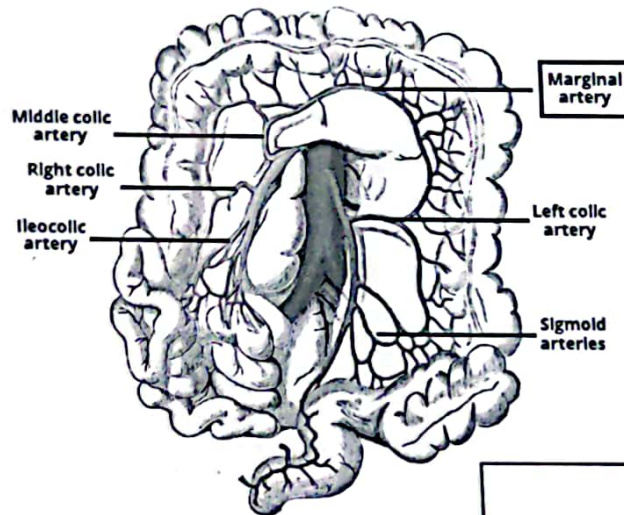
منقول بشكل مباشر إلى
blood supply of stomach



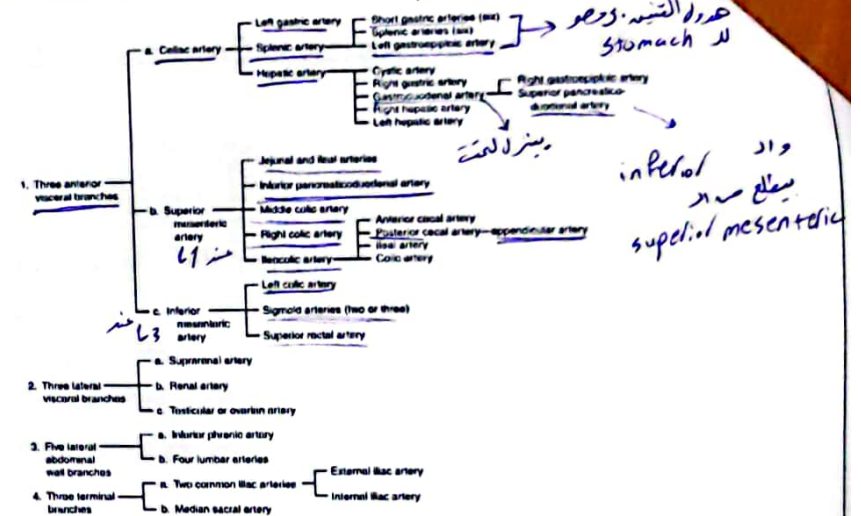
Abdominal Aorta – Superior and Inferior Mesenteric Artery



Superior and Inferior Mesenteric Artery



hilum of spleen



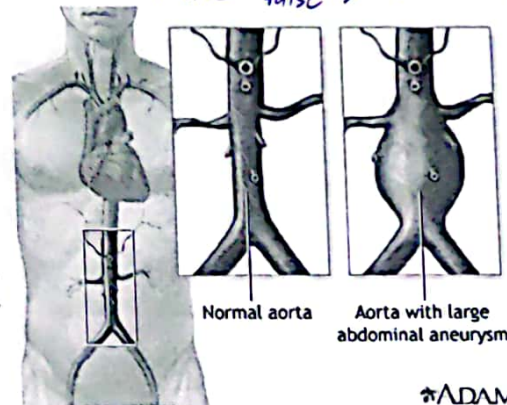
لضعف عضلات البطن
numbness 6 nerve

abdominal aorta

Clinical Relevance: Aortic Aneurysm

dilation
true false layer dilation
aorta

- Aortic aneurysm describes a dilation of the artery to more than 1.5 times its original size. The abdominal component of the aorta is the most common site for aneurysmal changes.

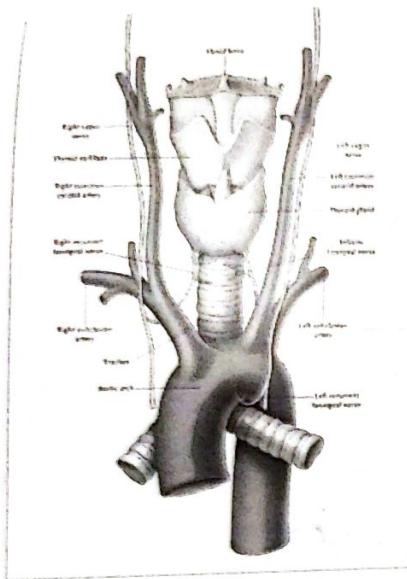


ADAM

ضعف عضلات البطن
aortic Aneurysm

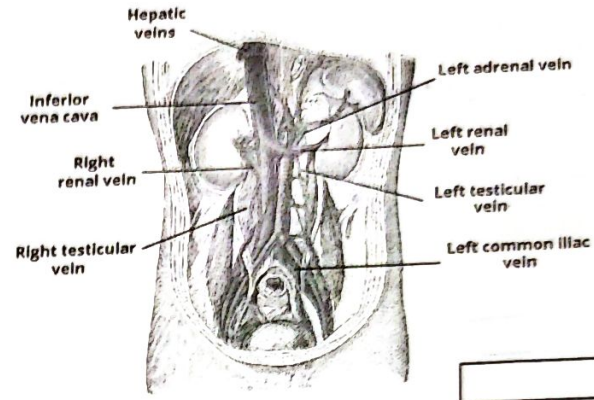
- Patients suffering with an abdominal aortic aneurysm may experience abdominal pulsations, abdominal pain and back pain. The aneurysm may also compress nerve roots causing pain/numbness in the lower limbs. A patient with an aortic arch aneurysm may have a hoarse voice due to the dilation stretching the left recurrent laryngeal nerve. Patients may also not have any symptoms at all.

laryngeal muscle
cricothyroid muscle



* ال IVC منبعه من ال Common iliac veins 2
 2 upward ال
 to the right of aorta
 ويصل ال diaphragm
 على T8 ويصل ال
 right phrenic

Inferior Vena Cava (IVC)

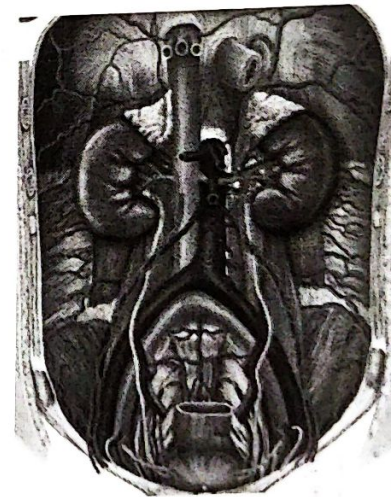


* ال IVC يترأسه ال L5
 ال aorta يترأسه ال L4

Large Veins of abdomen Inferior Vena Cava

- The inferior vena cava is located on the posterior abdominal wall; anterior to the vertebral column and to the right of the Abdominal Aorta
- The vessel is formed by the union of the 2 common iliac veins at the L5 vertebral level just inferior to the bifurcation of the abdominal aorta.
- It ascends superiorly, and leaves the abdomen by piercing the central tendon of the diaphragm at the T8 level (the caval hiatus). Within the thorax, the inferior vena cava drains into the right atrium of the heart.

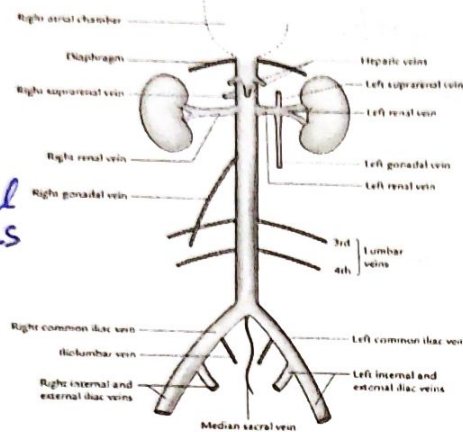
* ال IVC منبعه من ال



IVC ال veins في ال

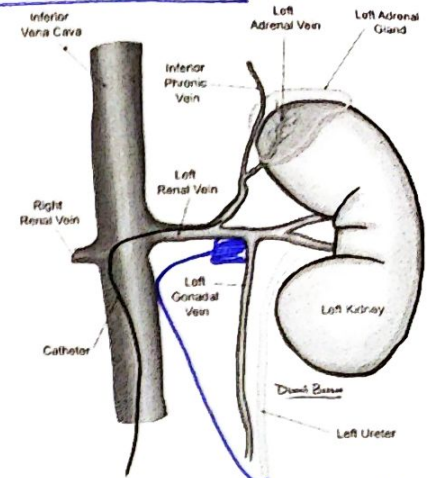
IVC tributaries

- 2 anterior visceral tributaries
hepatic veins → visceral
- 3 lateral visceral tributaries
Renal veins, right Gonadal and right suprarenal vein
- 5 lateral abdominal wall tributaries
inferior phrenic vein
4 lumbar veins
- 3 veins of origin
2 Common iliac veins
median sacral vein



Gonadal and suprarenal Veins

- Right Gonadal and right suprarenal vein drains into the inferior vena cava directly, while left gonadal and left suprarenal vein drains into left renal vein



في ال males يجب

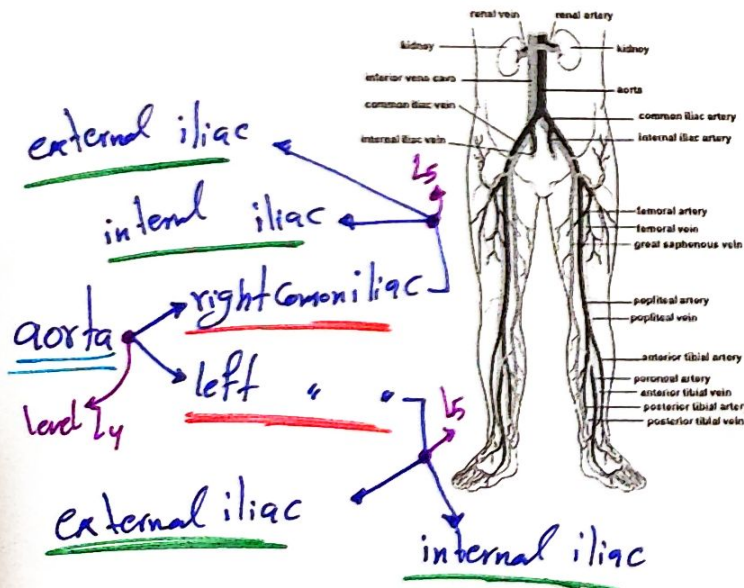
left testicular vein

في ال left renal

كذلك الحفية تكون راية ناحية الشمال أكثر

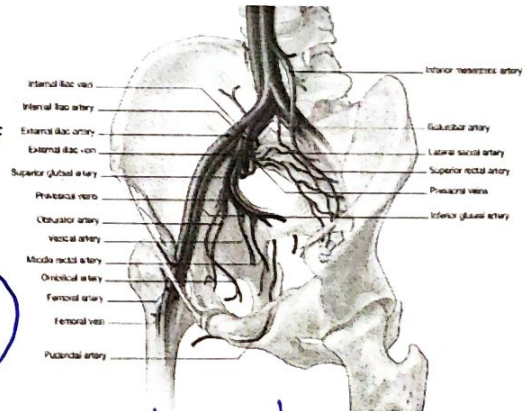
زائدة 9: ال blood سول
بأنه يرجع

Great Vessels of the Lower Limbs



Common iliac arteries

- After the aorta terminates by bifurcating into the right and left common iliac arteries at the level of L4, each common iliac artery gives the internal and external iliac arteries. This approximately occurs at vertebral level L5-S1.
- The common iliac artery is about 4 cm long.

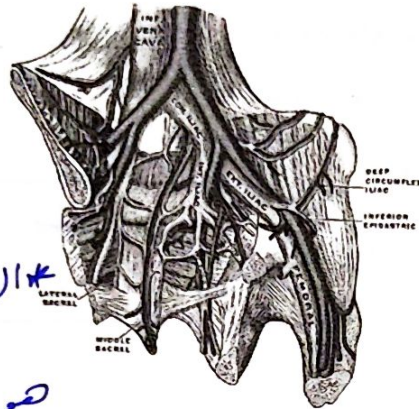


نقسم ال Common iliac artery تقريباً عن نفس ال level ال ال يبدأ عنده ال IVC

internal iliac * عن طانة ال greater sciatic foramen من مؤمنه تقسم الى
 ant., post. trunk كى

Internal iliac artery

- It originates at the bifurcation of the common iliac artery at vertebral level L5-S1.
- As the artery descends inferiorly, At the superior border of the greater sciatic foramen, it divides into anterior and posterior trunks.



greater sciatic foramen * lower border
 sacrospinus ligament هو

Branches of Anterior Trunk

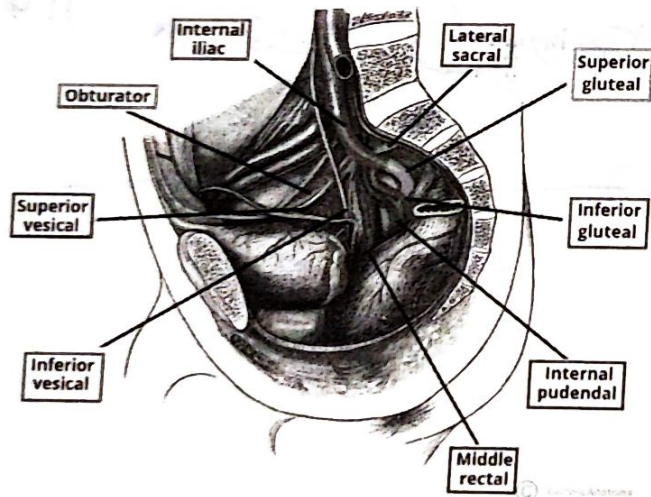
- Obturator artery
- Umbilical artery – Gives rise to the superior vesical artery
- Inferior vesical artery
- Vaginal artery (female) } female
- Uterine artery (female) } female
- Middle rectal artery
- Internal pudendal artery
- Inferior gluteal artery – The terminal branch of the anterior trunk

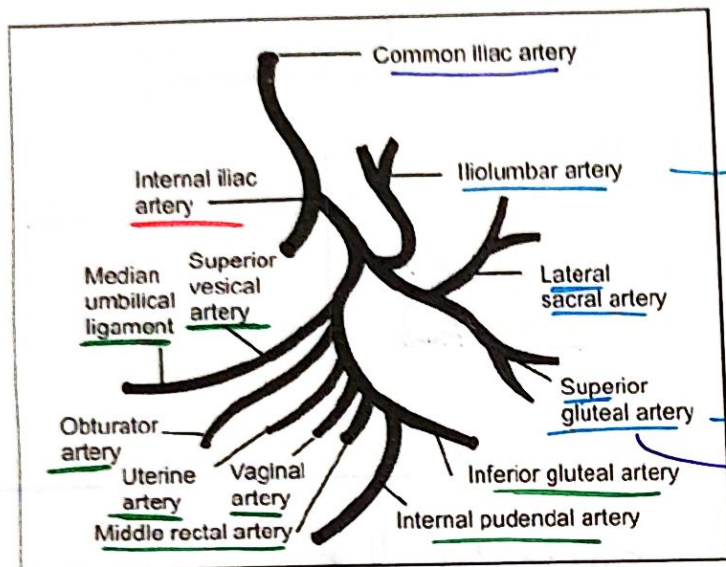
OVM 2U 3I

sup. rectal *
 inf. mesenteric *
 etc!

Branches of Posterior Trunk

- Iliolumbar artery
- Lateral sacral arteries (superior and inferior)
- Superior gluteal artery – The terminal branch of the posterior trunk





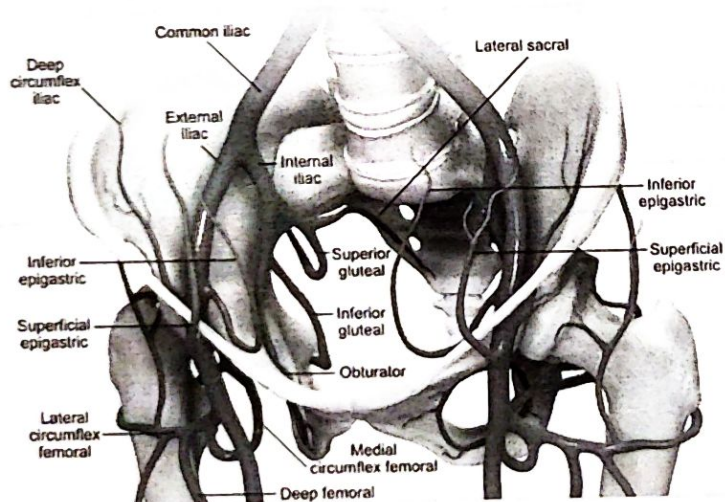
post.
trunk

terminal
branch

L5-S1 ← عصب ← External iliac artery

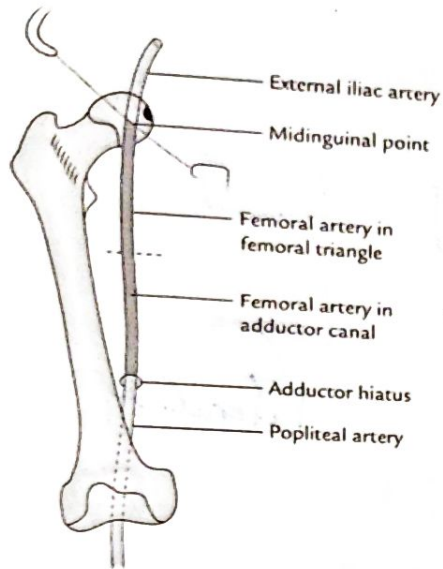
- After the external iliac artery has branched from the common iliac artery, it travels down and passing posteriorly to the inguinal ligament to enter the thigh.
- Before the external iliac artery passes under the inguinal ligament, it gives off two major branches ①
- The two branches are the inferior epigastric artery and the deep circumflex iliac artery. ②

Branches of common iliac artery



femoral artery ← inguinal ligament ←

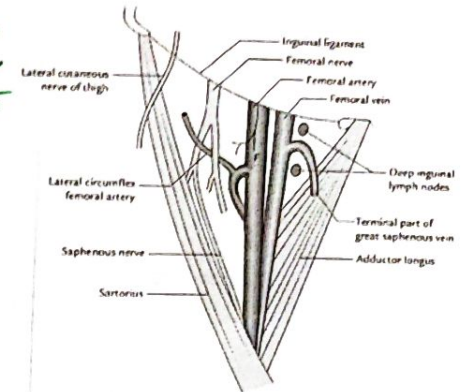
- The external iliac artery becomes the femoral artery as the vessel passes under the inguinal ligament to enter the femoral triangle in the anterior aspect of the thigh.
- it passes through the adductor hiatus to become the popliteal artery on entering the posterior compartment of the thigh and soon thereafter divides into the anterior and posterior tibial arteries.



Femoral Triangle

• From lateral to medial :

- the femoral nerve (N)
 - the femoral artery (A)
 - the femoral vein (V)
 - lymphatic vessels. (Y)
- NAVY*
- The femoral artery can be palpated in the femoral triangle just inferior to the inguinal ligament and midway between the anterior superior iliac spine and the pubic symphysis



Profunda femoris artery S.S.
= deep femoral artery

femoral artery branch

جیبی سے ال branch
سوال بالترتیب دعو

Femoral artery branches

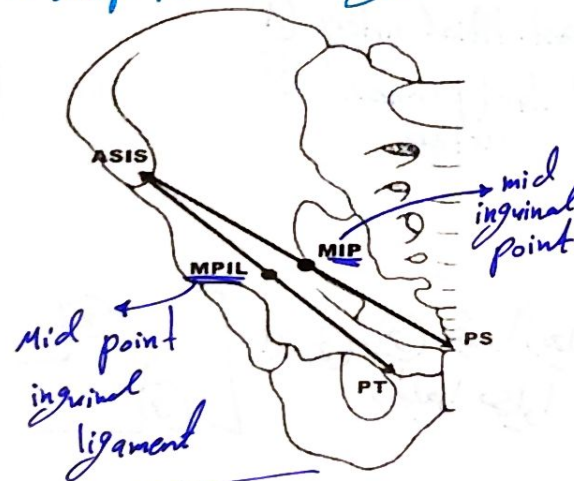
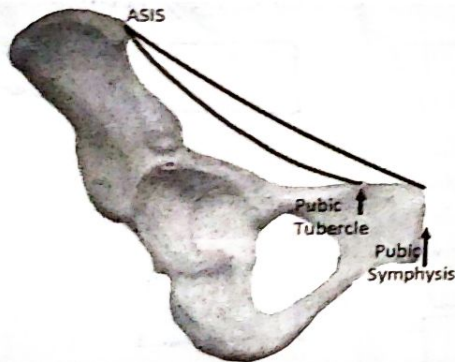
The femoral artery gives off:

■ 5 branches in the femoral triangle:

- Superficial epigastric artery
- Superficial circumflex iliac artery
- Superficial external pudendal artery
- Deep external pudendal artery
- Profunda femoris = deep femoral artery

■ 1 branch in the adductor canal:

- Descending genicular artery

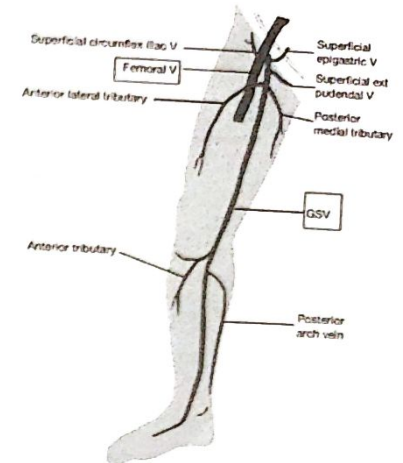


adductor muscles ۱۱ = ۱۱ adductor Canal femoral artery

Superficial veins

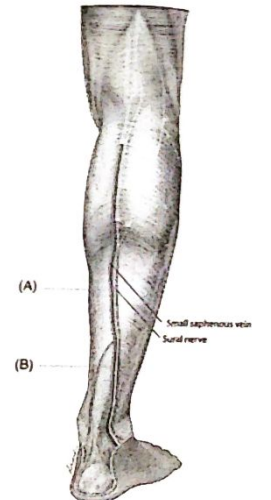
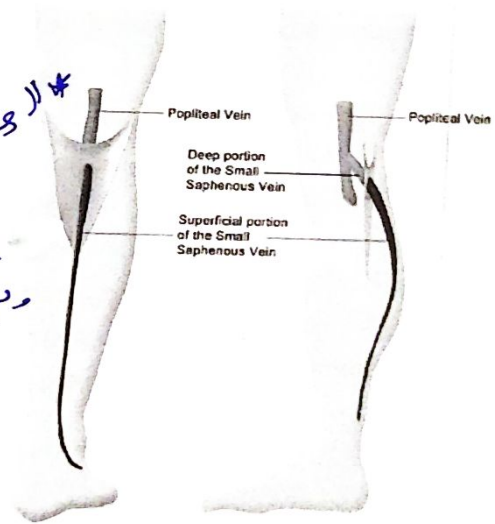
- The Great Saphenous Vein → ② ① ~ انكا > مع ② *
 The great saphenous vein is formed by the dorsal venous arch of the foot, and the dorsal vein of the great toe. It ascends up the medial side of the leg, passing anteriorly to the medial malleolus at the ankle, and posteriorly to the medial condyle at the knee.
- The great saphenous vein terminates by draining into the femoral vein immediately inferior to the inguinal ligament.
- Surgically, the great saphenous vein can be harvested and used as a vessel in coronary artery bypasses.

Great Saphenous Vein



- The Small Saphenous Vein → ② ① ~ انكا > مع ② *
 The small saphenous vein is formed by the dorsal venous arch of the foot, and the dorsal vein of the little toe. It moves up the posterior side of the leg, passing posteriorly to the lateral malleolus, along the lateral border of the calcaneal tendon. It moves between the two heads of the gastrocnemius muscle and empties into the popliteal vein in the popliteal fossa.

Small saphenous vein
 lateral side
 post



Thank you

Zaina Dallah
Sally