

وسهلا



أهلا

يُمنع أخذ السلايدات بدون
إذن المحرر واي اجراء
يخالف ذلك يقع تحت طائلة
المسؤولية القانونية
جميع المعلومات للاستخدام
التعليمي فقط

الأستاذ الدكتور يوسف حسين

كلية الطب - جامعة مؤتة - الأردن

دكتورة من جامعة كولونيا المانيا

Prof. Dr. Youssef Hussein Anatomy - YouTube

الواتس (أي استفسار)
00201224904207

Development of blood vessels

[Prof. Dr. Youssef Hussein Anatomy - YouTube](#)

↳ mesoderm in origin

precursor cell that form the Endothelial cells
التي تتألف منها
الغشاء القلبي والوعائي
المعوية
Angioblast
تظهر في
Mesoderm

Caridogenic area قلب Heart tube
منه يتكون
Blood vessels

Blood vessels
من هذه الـ BV
تظهر الـ aorta
تفرعي

- 1- 2 dorsal aorta
- 2- 2 ventral aorta

تندمج مع الشريان وعمل
single dorsal aorta
Common
بعد T4

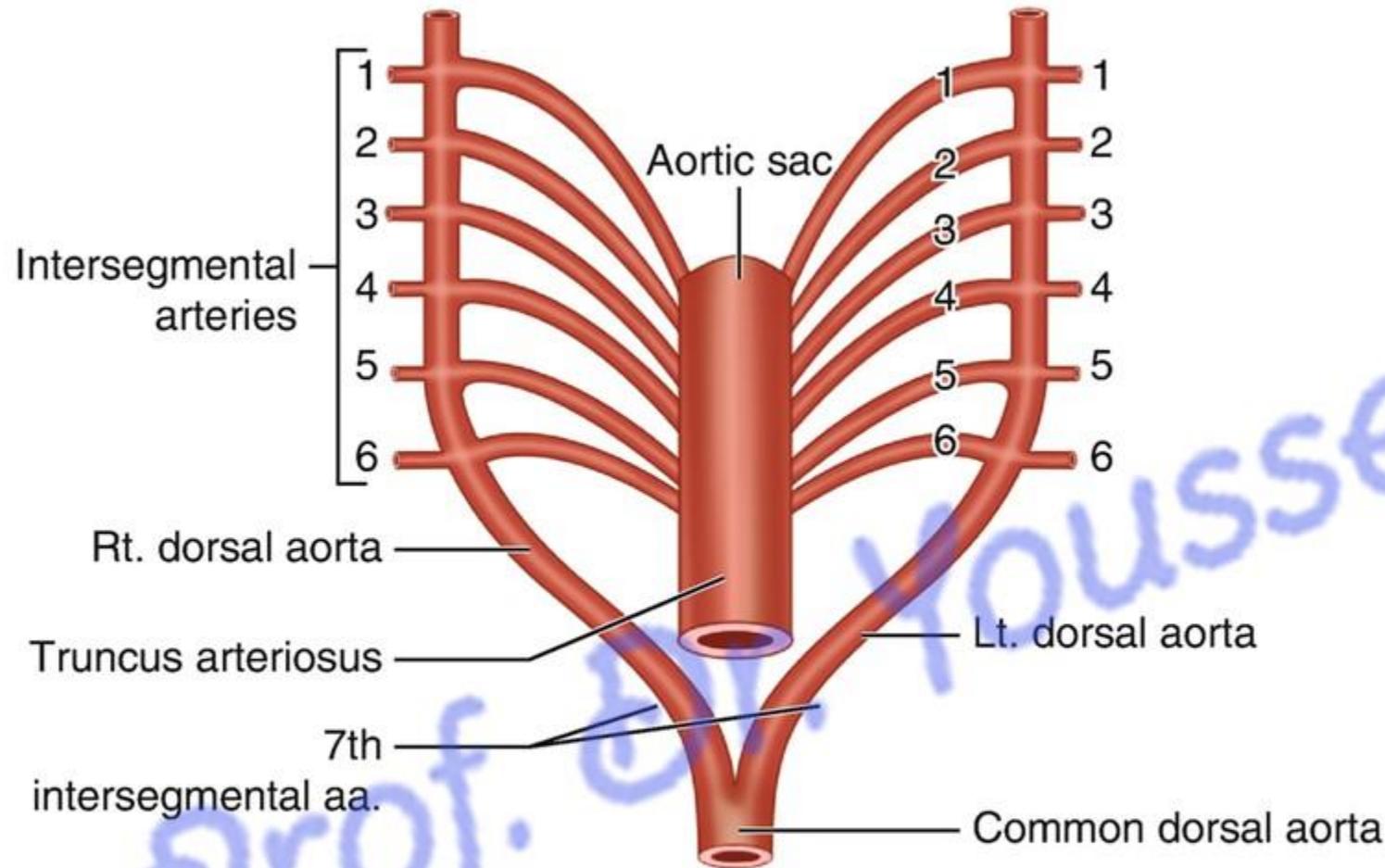
Lateral folding
of the embryo
2 dorsal aorta

2 ventral aorta
تندمج مع بعضهما وعملوا
aortic sac

6 pharyngeal arch arteries
منه يتكون
dorsal aorta
aortic sac

Intersegmental arteries
branches
dorsal aorta

Primitive aorta



1- 2 dorsal aortae. After lateral folding of the embryo, the 2 dorsal aortae caudal to the 4th thoracic somite fused and form one **common dorsal aorta**.

2- 2 ventral aortae fused together to form **aortic sac**.

3- 6 pairs of pharyngeal arch arteries connect the 2 dorsal aortae with aortic sac.

كل arch مشهور يعزل بها

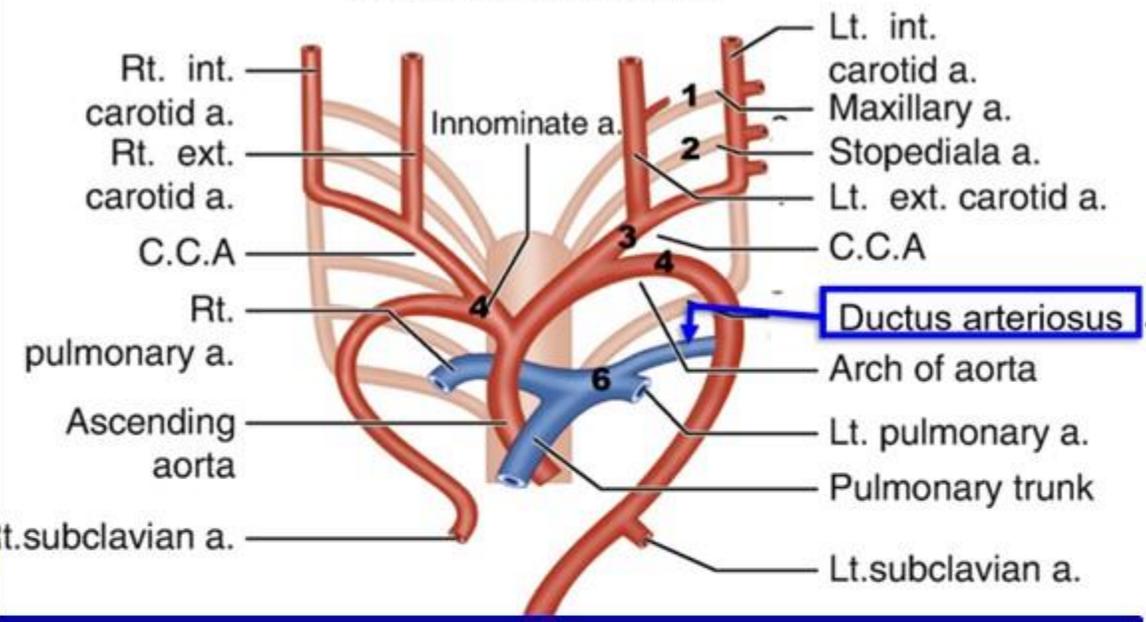
على العنق والاسفل

نضن انوي على وها

لا عملت

- **Derivatives of the pharyngeal arch arteries**
- **1st arch artery (M):** forms **maxillary artery**.
- **2nd arch artery (S):** forms **stapedial (caroticotympanic) artery**.
- **3rd arch artery (C) (3 carotid arteries):** common, internal and external carotid arteries.
 - ① ✓
 - ②
 - ③
- **4th aortic arch artery:** differs on the 2 sides:
 - a- On the **left side:** forms part of the **arch of aorta**.
 - شارك في تكوينه
 - b- On the **right side:** forms **distal part** of right **innominate (brachiocephalic) artery** and **proximal part** of the right **subclavian artery**.
- **5th aortic arch artery:** disappears on both sides

Fate of the aortic arches



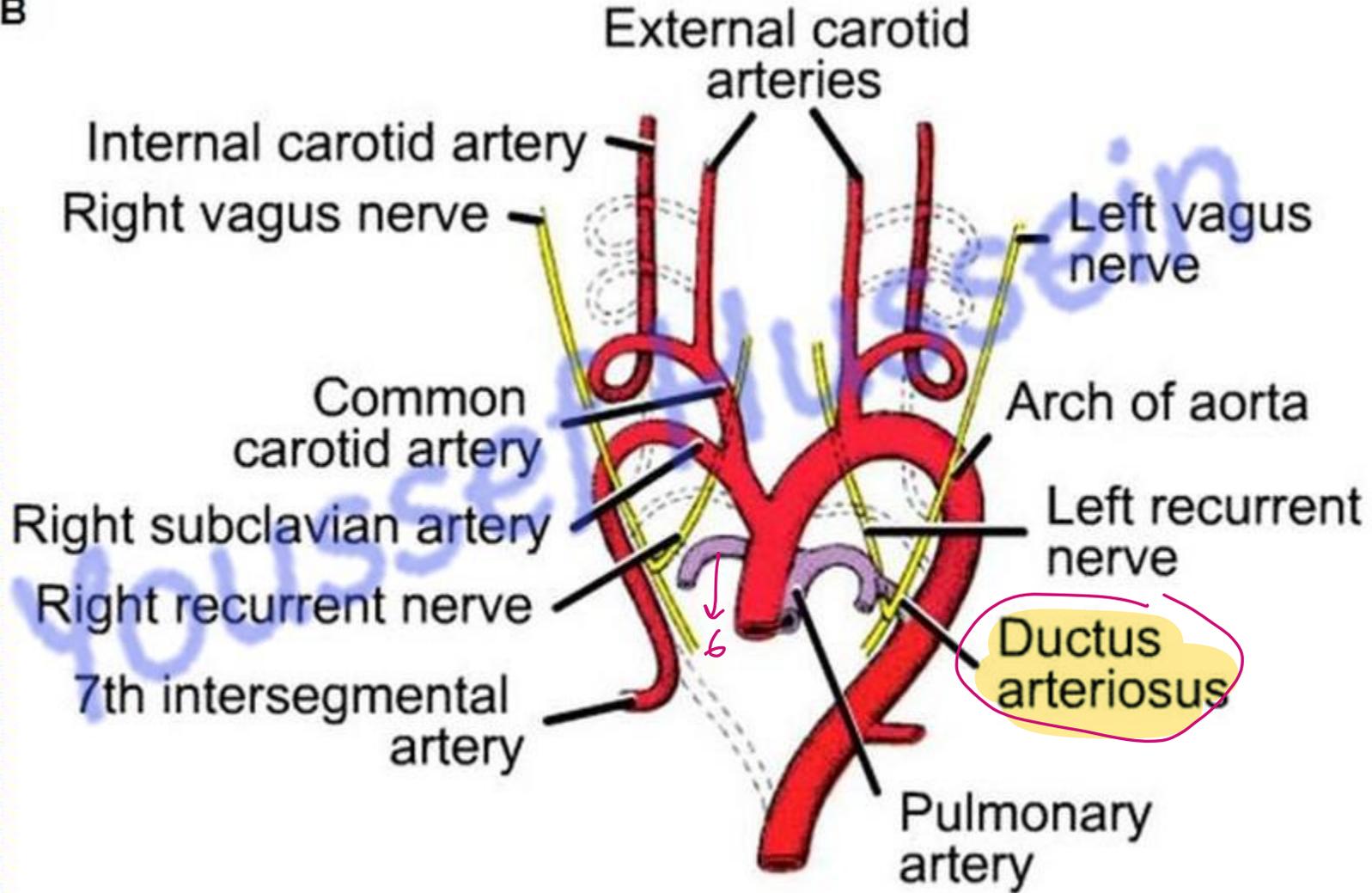
- **6th aortic arch artery:**
 - 1. **Proximal part Pulmonary** arteries on **both sides**.
 - 2. **Distal part:**
 - a) **Right side degenerated**
 - b) **Left side:** **Ductus arteriosus** between left pulmonary artery and arch of aorta. After birth; it is obliterated and forms **ligamentum arteriosum**.
 - distal part
 - only during fetal life

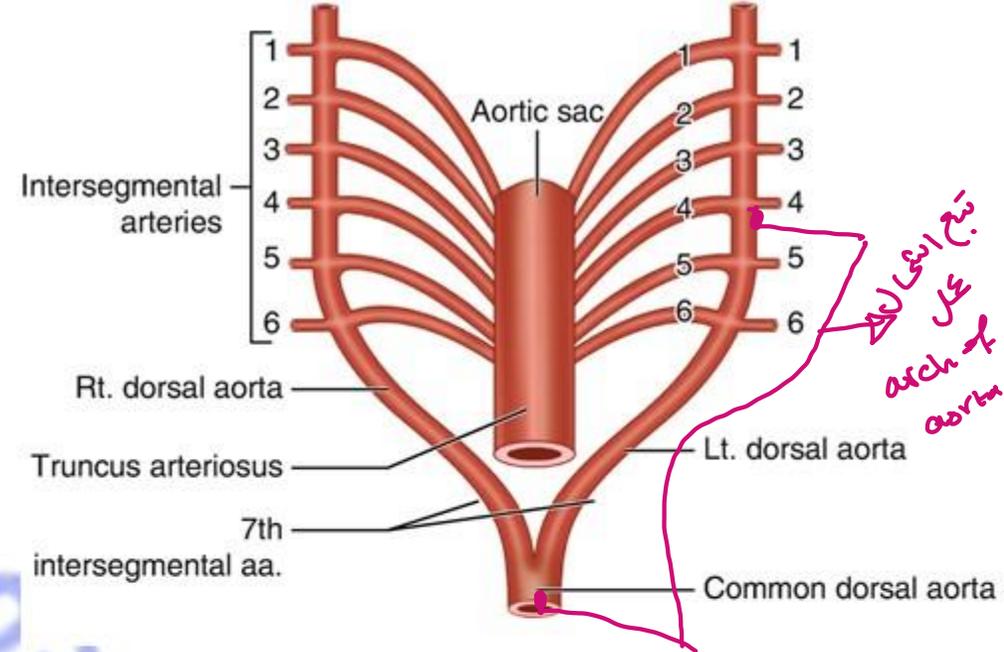
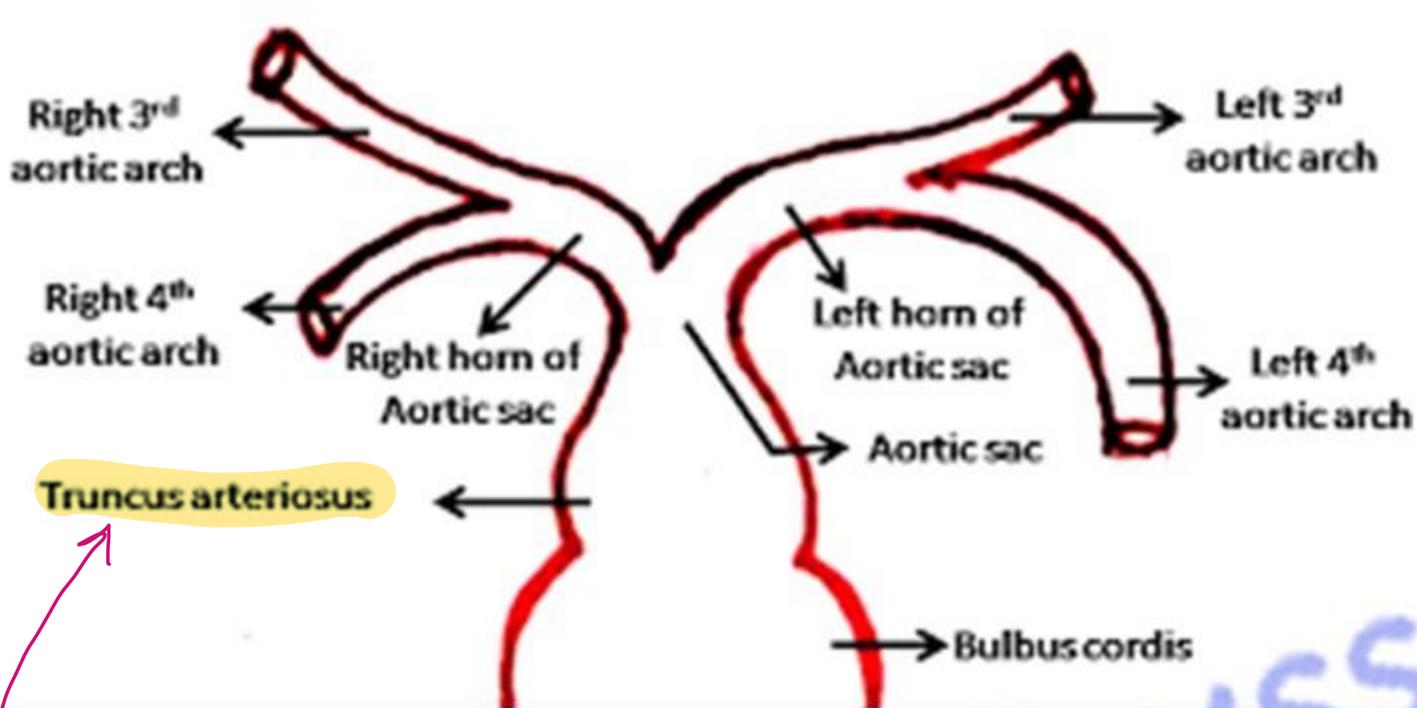
N. B. During the development of the arteries:

1- The right recurrent laryngeal nerve turn around the right subclavian in the neck because degeneration of the distal part of the right 6th arch artery.

2- The left nerve turn around the ligamentum arteriosum in the thorax.

B





- **Development of the Arch of aorta** *تكون من 4 قطع*
 - 1st part**, from the **aortic sac**.
 - 2nd part**, from the **Left horn of the aortic sac** (The right horn forms the proximal part of brachiocephalic artery)
 - 3rd part**, from the **Left 4th pharyngeal arch artery**.
 - 4th part**, from the **left dorsal aorta** ** * * * ** from the left 4th pharyngeal artery to the common dorsal aorta at 4th thoracic somite. **Right dorsal aorta disappear**
- **Truncus arteriosus of the bulbus cordis gives** Ascending aorta ¹ and pulmonary trunk ²

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Intercostal

تقسيمه

• Intersegmental arteries

- Blood vessels that originate from the embryonic dorsal aorta and supply blood to segments of the developing body,

1- Occipital intersegmental arteries, disappear.

ماتوا

2- Cervical intersegmental arteries:

a- The upper 6 arteries disappear.

ماتوا

b- The 7th cervical intersegmental artery: gives subclavian

artery

① right distal part
② left subclavian

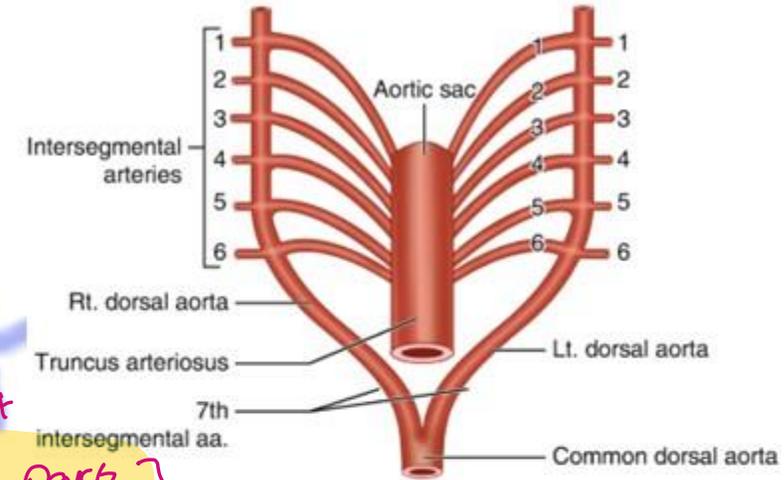
3- Thoracic intersegmental arteries: form posterior

intercostal and the subcostal arteries.

4- Lumbar intersegmental arteries gives lumbar arteries

5. Sacral intersegmental arteries: form lateral sacral

arteries.



• b- On the right side: forms distal part of right innominate (brachiocephalic) artery and proximal part of the right subclavian artery.

proximal

Congenital anomalies of arch of aorta

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Double arch of the aorta:

- It is caused by persistence of the **right dorsal aorta**.

↪ Lt + Rt
↻ left dorsal

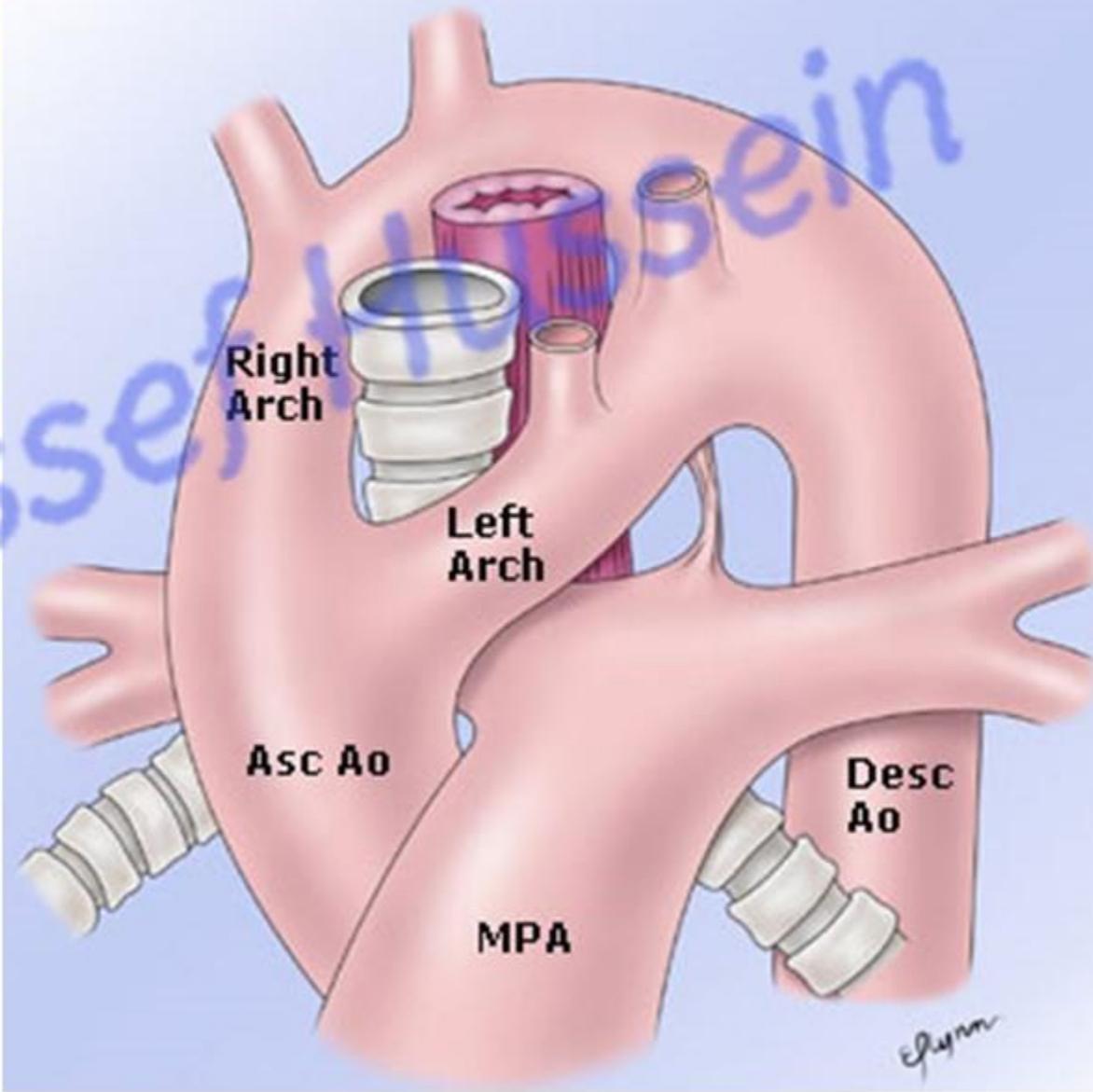
- **They form a ring around**

1. **Trachea** leading to difficult in breathing (**dyspnea**)
2. **Esophagus** leading to difficult swallowing (**dysphagia**).

Right side arch of aorta:

** مقل العكس*

- due to persistence of right dorsal aorta and degeneration of the left dorsal aorta



• Coarctation of the aorta:

منقبض
شده بنوعه ال arch بطنوي

- It means narrowing of the aorta distal to the origin of the left subclavian artery.

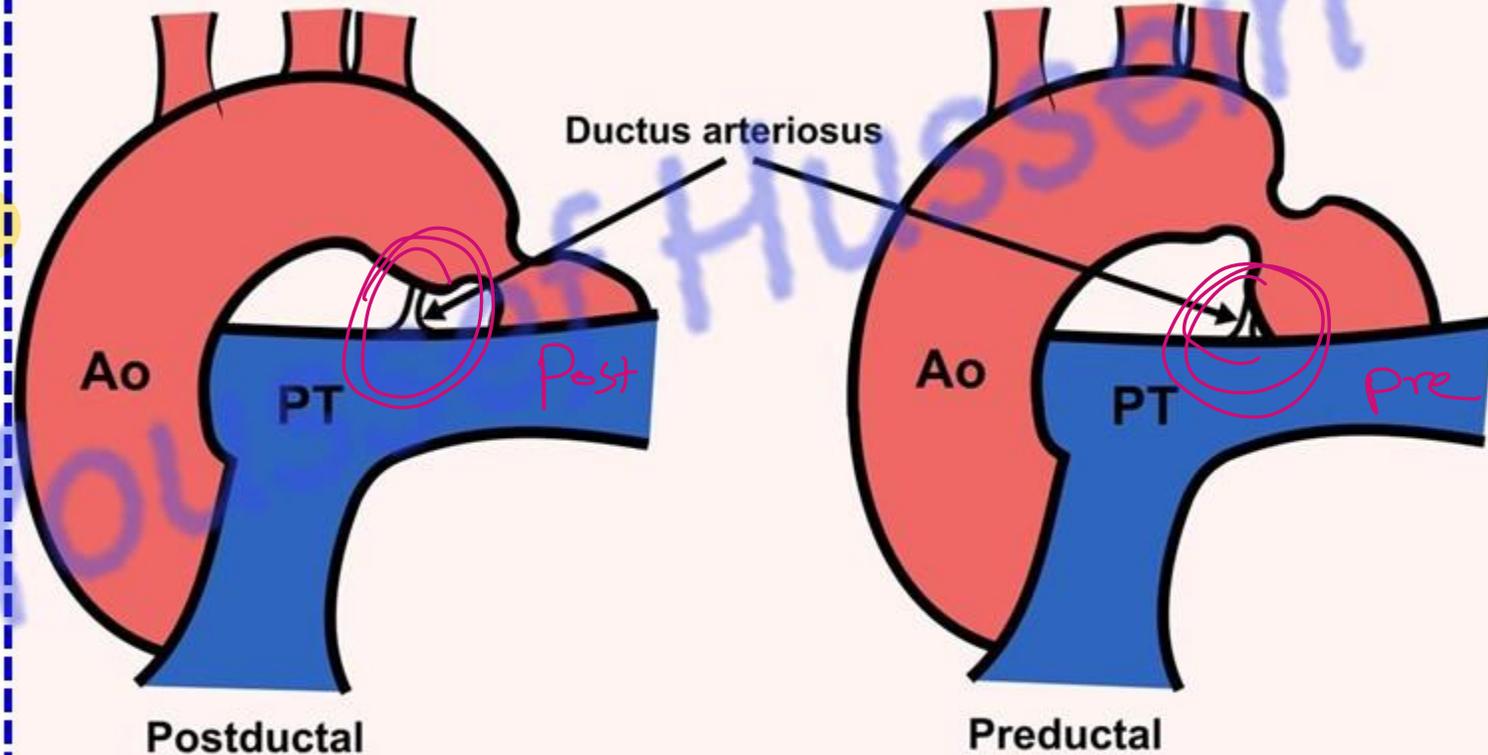
- **Causes,** Contraction and shortening of ductus arteriosus.

- **Types:**

a. **Preductal:** proximal to the opening of ductus arteriosus.

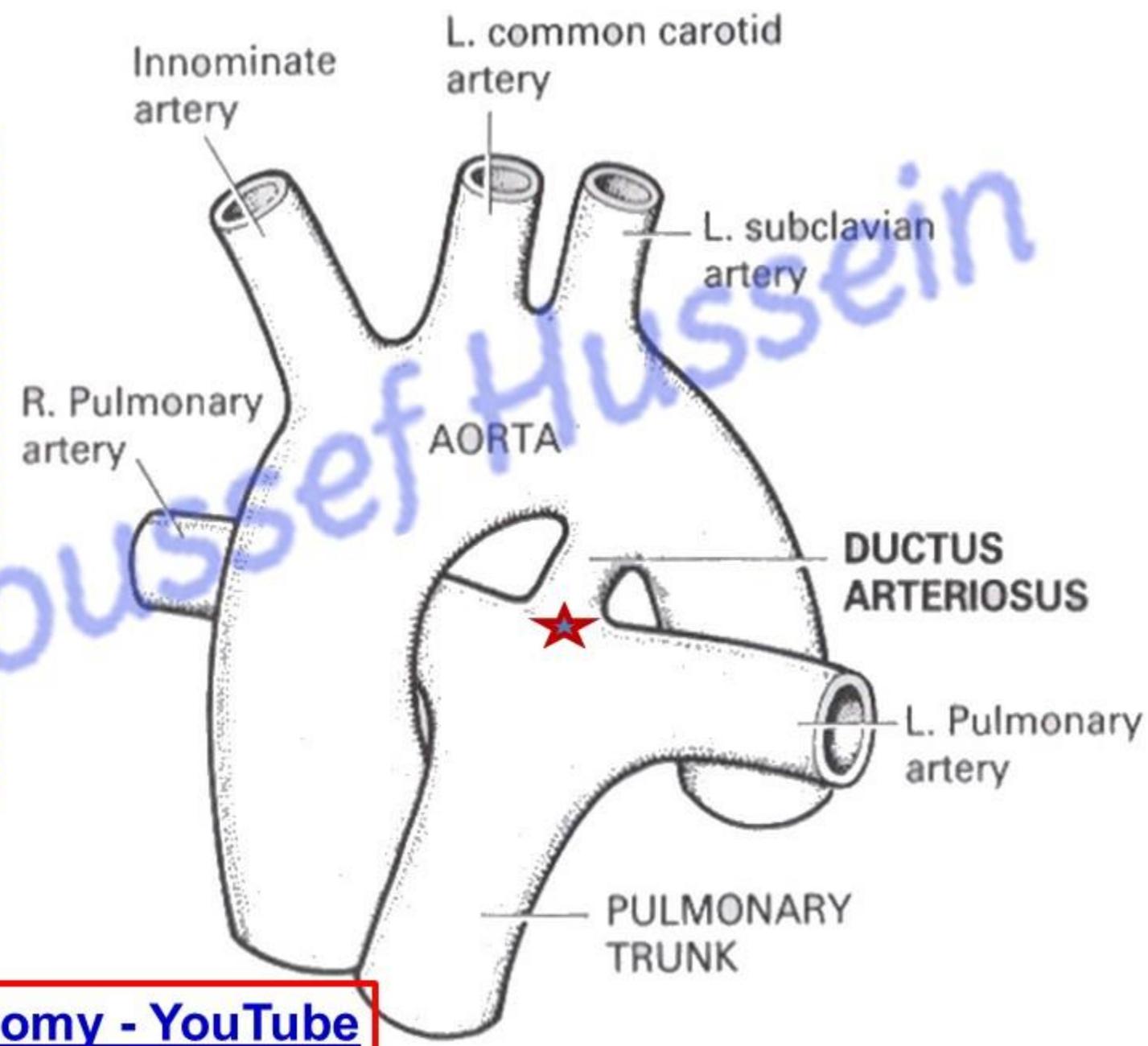
b. **Postductal:** distal to the opening of ductus arteriosus.

Coarctation of the Aorta



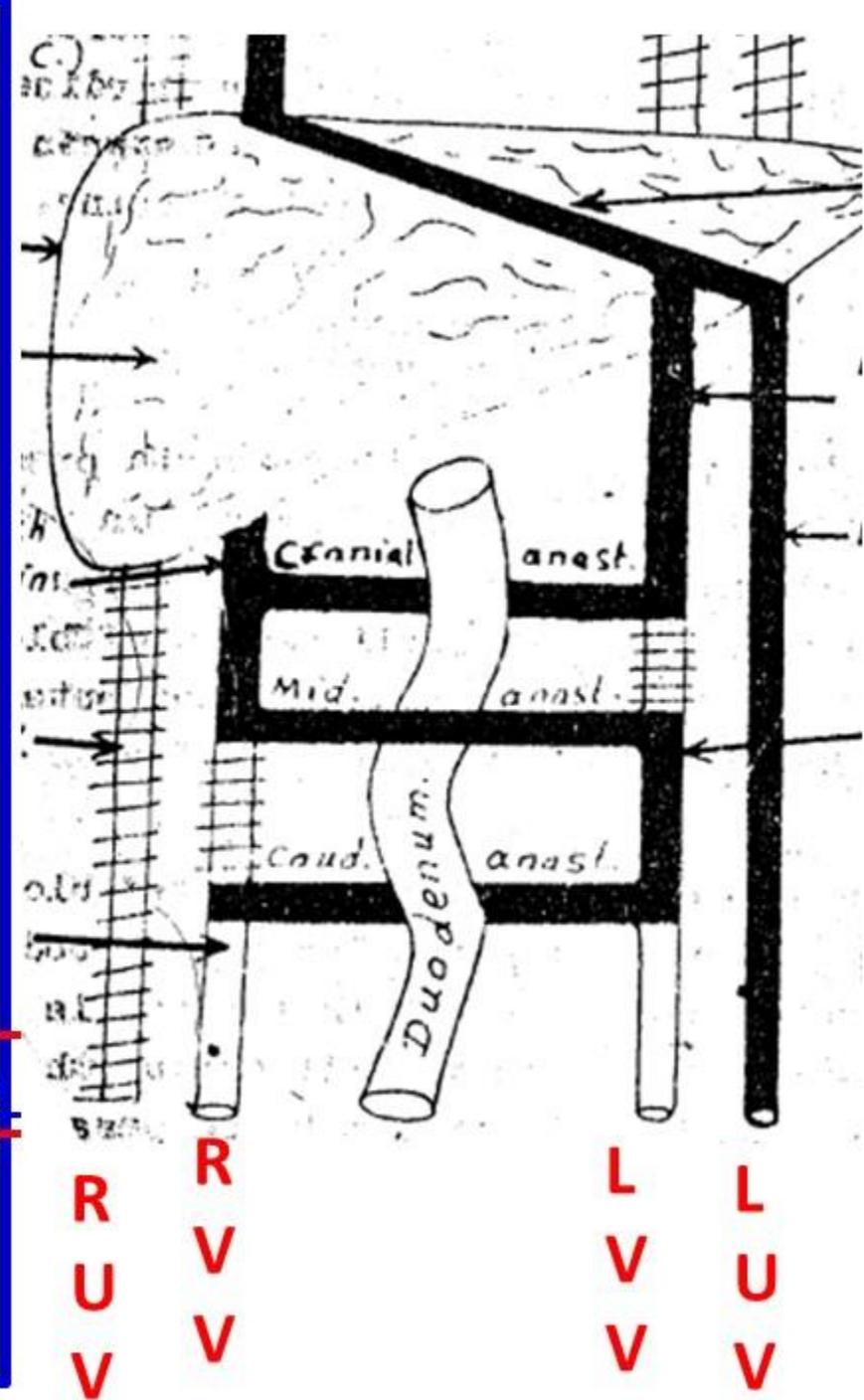
تخلج حفتوية وواسية

- **Patent ductus arteriosus**
- failure of obliteration of the ductus arteriosus leading to communication between the aorta and left pulmonary artery.



• Development of the portal vein ²⁵

- * **3 transverse anastomotic veins** develop between the right and left vitelline veins around the duodenum.
- * The right and left vitelline veins caudal to the caudal transverse anastomosis **disappear**.
- * The right vitelline vein between the caudal and middle anastomosis **degenerated** while the left vein between the middle and cranial anastomosis **degenerated**.
- * These changes resulted in formation of **S-shaped vessel** that forms the portal vein.



ChatGPT

☆ الفكرة الأساسية:

الـ **Portal vein** يتكوّن من الـ **Vitelline veins** (اليمى واليسرى) ومن ٣ وصلات عرضية **Duodenum (Transverse Anastomoses)** بينها، تحيط بالـ

الهدف من التغييرات هو:

♦ اختفاء أجزاء معينة

♦ وبقاء أجزاء معينة

→ حتى يتكوّن وعاء واحد على شكل S = الوريد البابي.

☆ الخطوة 1: تكوّن 3 Anastomoses

يتكوّن بين الوريد المعى الأيمن والأيسر (Right & Left Vitelline veins) حول الاثني عشر ثلاث وصلات:

1. **Cranial anastomosis** (فوق الدودينوم)
2. **Middle anastomosis** – أهم واحدة
3. **Caudal anastomosis** (تحت الدودينوم)

هذه الجسور الثلاثة ستمثل أجزاء من الوريد البابي لاحقاً.



Ask anything

الجزء السفلي من:

Right vitelline vein

☆ النتيجة النهائية:

البقاء + الاختفاء → يتكوّن:

✓ وعاء واحد **S-shaped**

يمر:

من الأمعاء → خلف الاثني عشر → إلى الكبد

وهذا هو الـ **Portal Vein** النهائي.

☆ الخطوة 2: اختفاء الأوردة أسفل الوصلة السفلية

الجزء السفلي من:

• **Right vitelline vein**

• **Left vitelline vein**

تحت الوصلة السفلية

(caudal) الوصلة السفلية

→ يختفي تمامًا.

هذا يقلل عدد القنوات ويبقى فقط الأجزاء المهمة في الأعلى.

☆ الخطوة 3: ما الذي يبقى وما الذي يختفي بين الوصلات؟

♦ الجزء من **Right vitelline vein**

– بين الوصلة السفلية والقرس الأوسط → يختفى (degenerates)

♦ الجزء من **Left vitelline vein**

– بين الوصلة الوسطى والقرس العلوي → يختفى



Ask anything

بعد عمليات الاختفاء:

Left Vitelline Vein

Right Vitelline Vein

↓

3 Anastomoses (cranial – middle – caudal)

↓

↓

↓

اختفاء أجزاء محددة من الوريدين

ببقاء:

Left Vitelline Vein

Right Vitelline Vein

↓

3 Anastomoses (cranial – middle – caudal)

↓

↓

↓

↓

↓

↓

↓

• middle anastomosis

• right vitelline جزء من

• left vitelline جزء من

↓

→ **S-shaped Portal Vein**

☆ الخطوة 3: ما الذي يبقى وما الذي يختفي بين الوصلات؟

♦ الجزء من **Right vitelline vein**

– بين الوصلة السفلية والقرس الأوسط → يختفى (degenerates)

♦ الجزء من **Left vitelline vein**

– بين الوصلة الوسطى والقرس العلوي → يختفى

☆ الخطوة 4: ماذا يتبقى؟

بعد عمليات الاختفاء:

1. الوصلة الوسطى (**Middle anastomosis**)

→ تصبح الجزء الرئيسي من الوريد البابي خلف الدودينوم.

2. الجزء العلوي المتبقي من الـ **right vitelline vein**

→ يُشكّل جزءاً من الوريد البابي قبل دخوله الكبد.

3. الجزء السفلي المتبقي من الـ **left vitelline vein**

→ يُشكّل جزءاً من الوريد البابي بعد خروجه من الأمعاء.

↓

هذه الأجزاء معاً تتلف بشكل طبيعي حول الإثني عشر لتعطي شكل S.



Ask anything

☆ النتيجة النهائية:

Development of IVC

1- **Suprahepatic part:** from proximal part of **right vitelline vein.**

degeneration of left side

2- **Hepatic part:** from **anastomosis** between right vitelline vein and right subcardinal vein.

1+3

3- **Suprarenal (Pre) part:** from **right subcardinal vein.**

4- **Renal part:** from **anastomosis** between right subcardinal and right supracardinal veins.

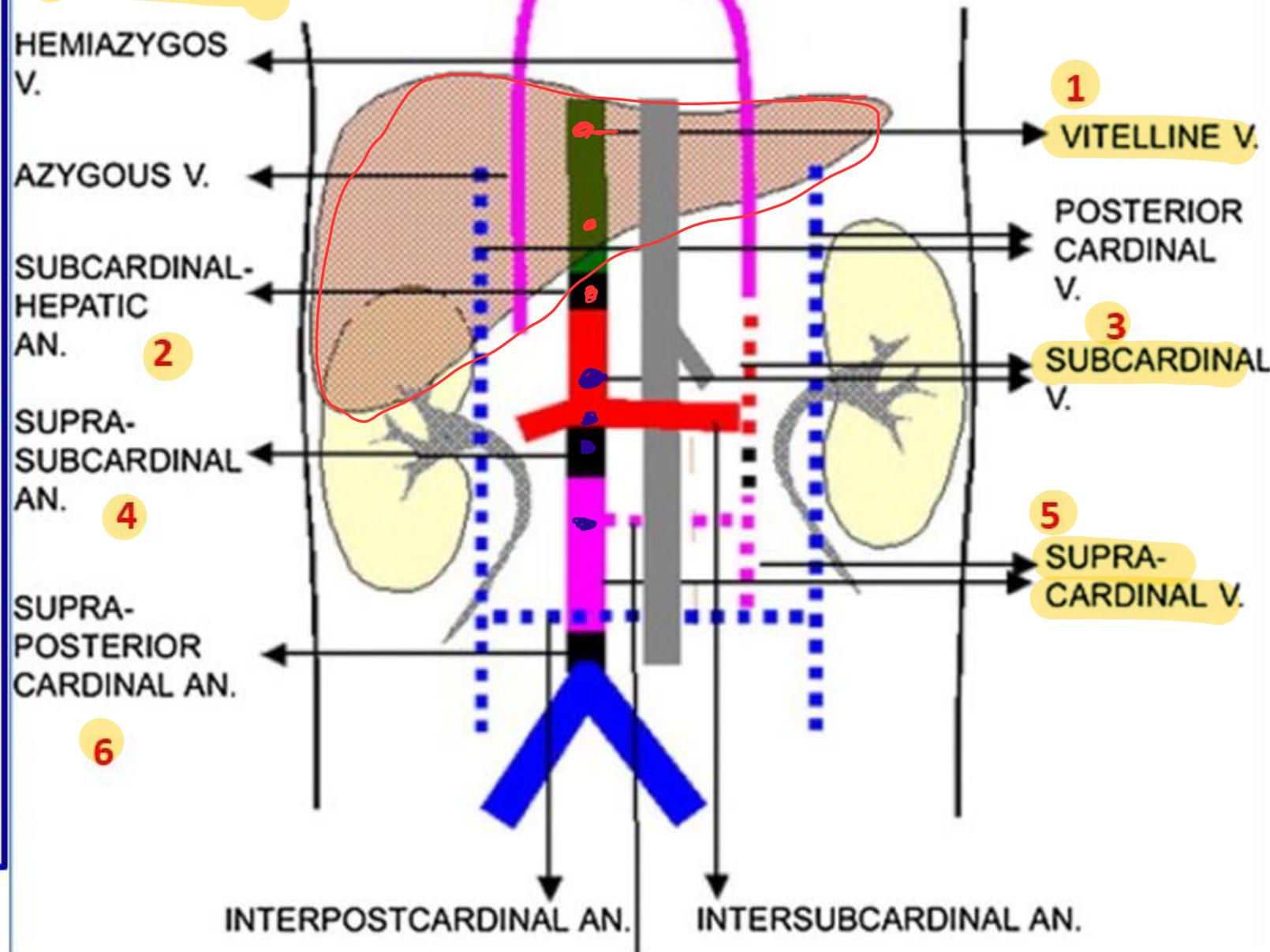
5- **Infrarenal (post) part:** from **right supracardinal vein.**

• The left supracardinal and subcardinal veins mostly regress

بشورت

جاء من سلة انان

anastomoses



1- Supra-hepatic part

↳ Right vitelline

2- Hepatic part

↳ rt vitelline + rt subcardinal

3- Pre renal part

↳ rt subcardinal

4- Renal part

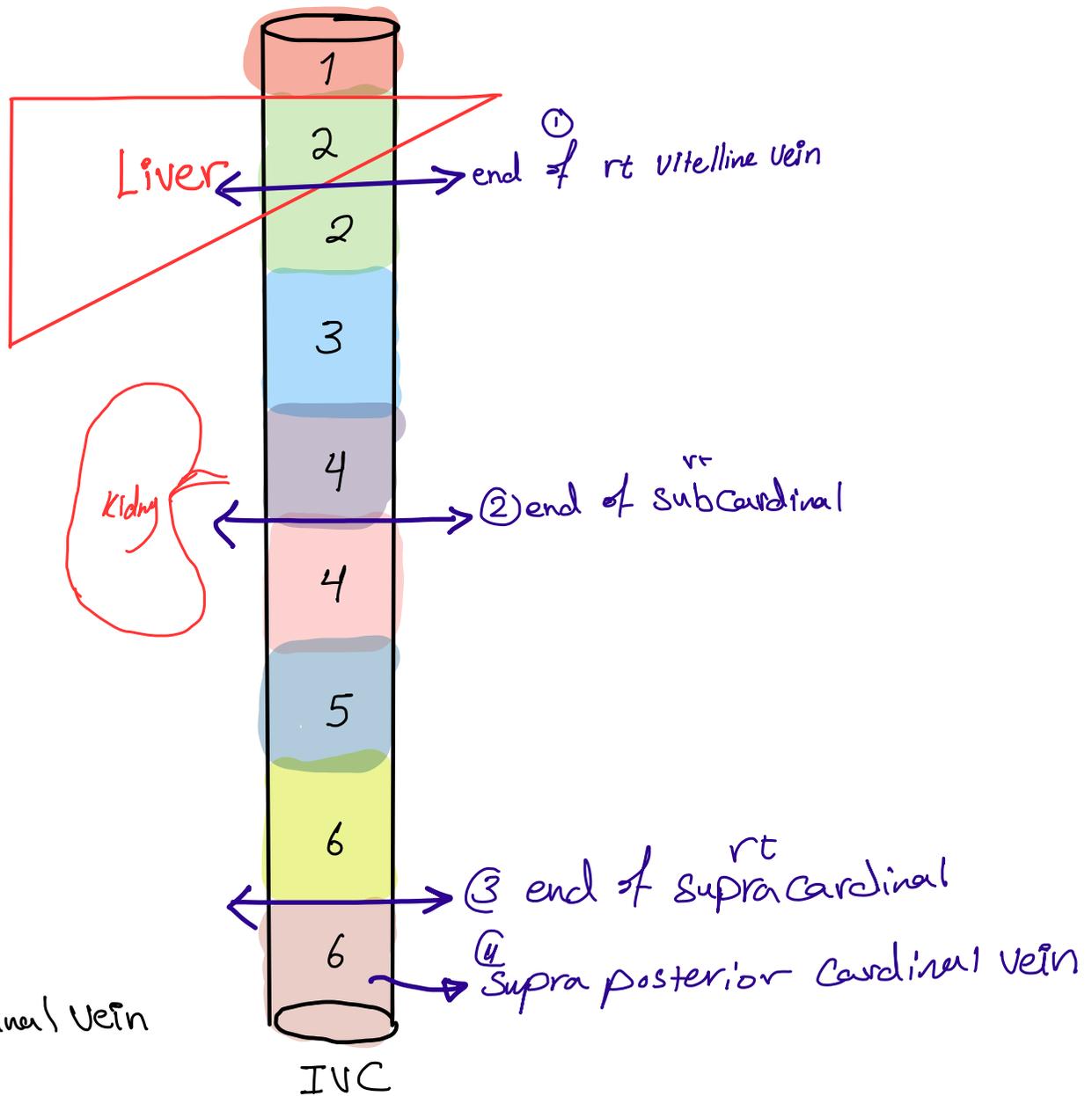
↳ rt subcardinal + rt supra-cardinal

5- Post renal part

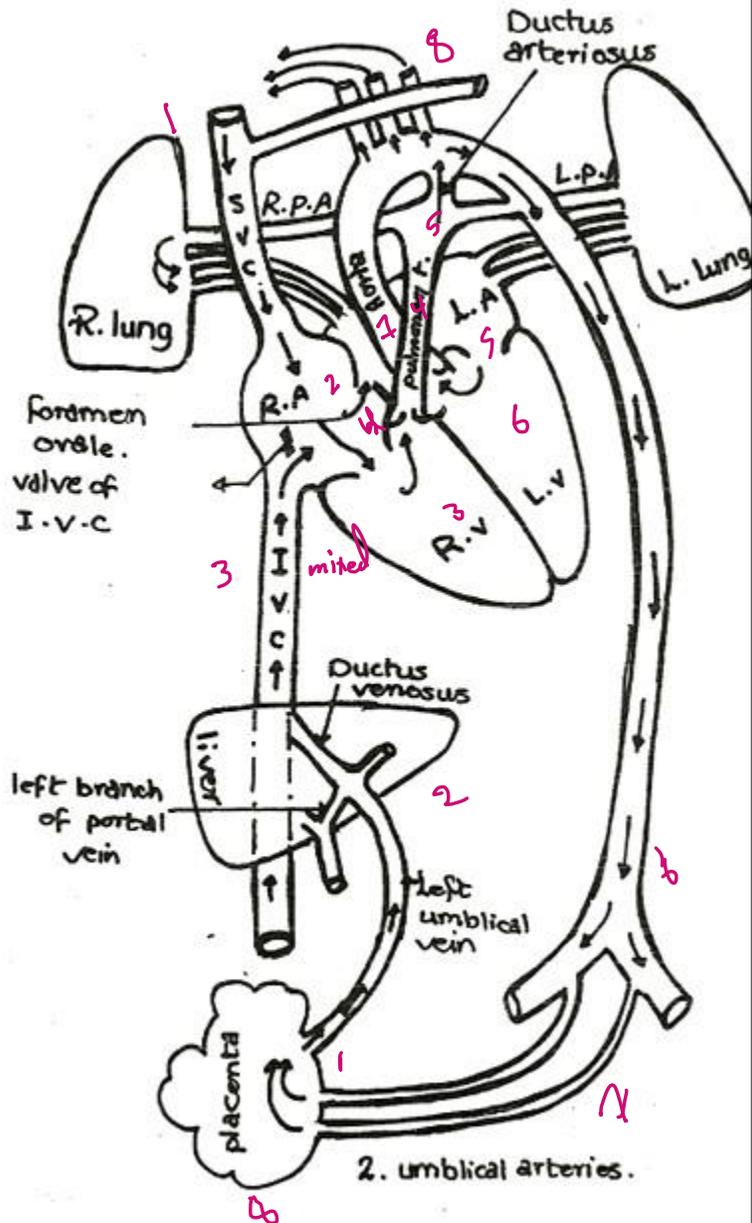
↳ rt supra-cardinal

6- Caudal part

↳ rt supra-cardinal + post. cardinal vein



Foetal circulation ** the lung collapsed*



- **Placenta** --oxygenated blood along the **left umbilical vein** -- **liver** -- **Ductus venosus** --**IVC** (the oxygenated blood mixes with small amount of the venous blood coming from the lower half of the body) -- **Right atrium** --**foramen ovale** --**left atrium** - directed by **1**. The opening of IVC lies **opposite** the **foramen ovale**, **2**. Valve of IVC directs the blood **toward** the **foramen ovale**. **Through mitral valve** to **Left ventricle** -- **ascending aorta** -- arch of the aorta to supply mainly the **heart and the upper half of the body** which are **rapidly growth**.
- **Venous blood from upper half of the body** ---**SVC** -- right atrium --**Nonoxygenated blood** mixed with small amount of oxygenated fall from IVC valve --Through tricuspid valve to **RV- pulmonary trunk** ---**Pulmonary arteries**-- **Ductus arteriosus** (between the left pulmonary artery and arch of the aorta, Because the lungs are not functioning during fetal life)---**descending thoracic aorta** --- **lower half of the body**
- **Blood return through** --**two umbilical arteries** -----**placenta**

* Placenta → Lt umbilical vein ^① → Liver ^{طريق جاني} → Ductus Venosus → IVC

oxygenated Blood



Liver from portal circulation



* In IVC → mixed with Blood from lower part of the body ^{Non oxy}

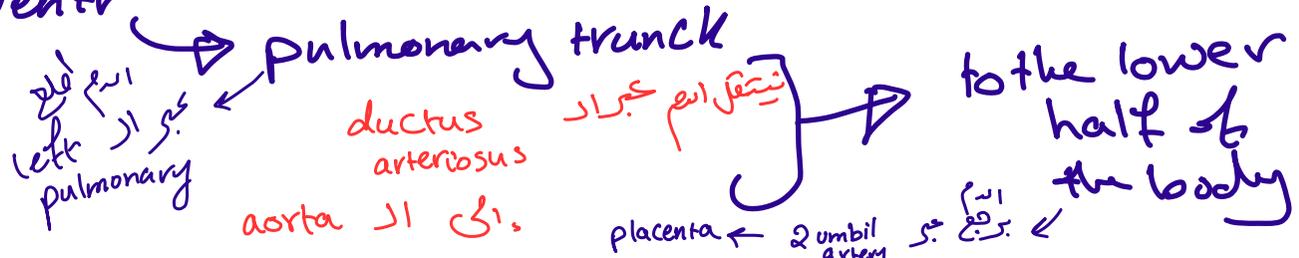
* IVC → rt atrium ^{من الفتح} → Lt atrium ^{through foramen ovale} → Lt ventricle → ascending aorta

well developed upper part of the body ^{عقل , branches}

* SVC → rt atrium ^{ربع ذئب فودج} → rt ventr ^{ذئب الذئب IVC وهو رابع للatrium}

Mixed ← rt atrium ^{جزء من بيوح و rt atrium}

↑ oxy blood with non oxy blood from SVC



Foetal circulation
A- Circulation of the oxygenated blood
 - Placenta -----oxygenated blood along the left umbilical vein -----liver -----ductus venosus or portal circulation -----IVC (the oxygenated blood mixes with the small amount of the venous blood coming from the lower half of the body) ----- right atrium -----foramen ovale -----left atrium----- ((This is directed by 1) The opening of the inferior vena cava lies opposite the foramen ovale, 2) valve of inferior vena cava directs the blood toward the foramen ovale) -----left ventricle ----- ascending aorta ----- to supply mainly the heart and the upper half of the body which are rapidly growth.
B- Circulation of the non-oxygenated blood
 - Venous blood from the upper half of the body -----superior vena cava -----right atrium (non-oxygenated blood mixed with small amount of oxygenated fall from IVC valve) ----- right ventricle ----- pulmonary trunk -----ductus arteriosus (because the lungs are not functioning during foetal life) -----descending aorta ----- lower half of the body -----two umbilical arteries -----placenta

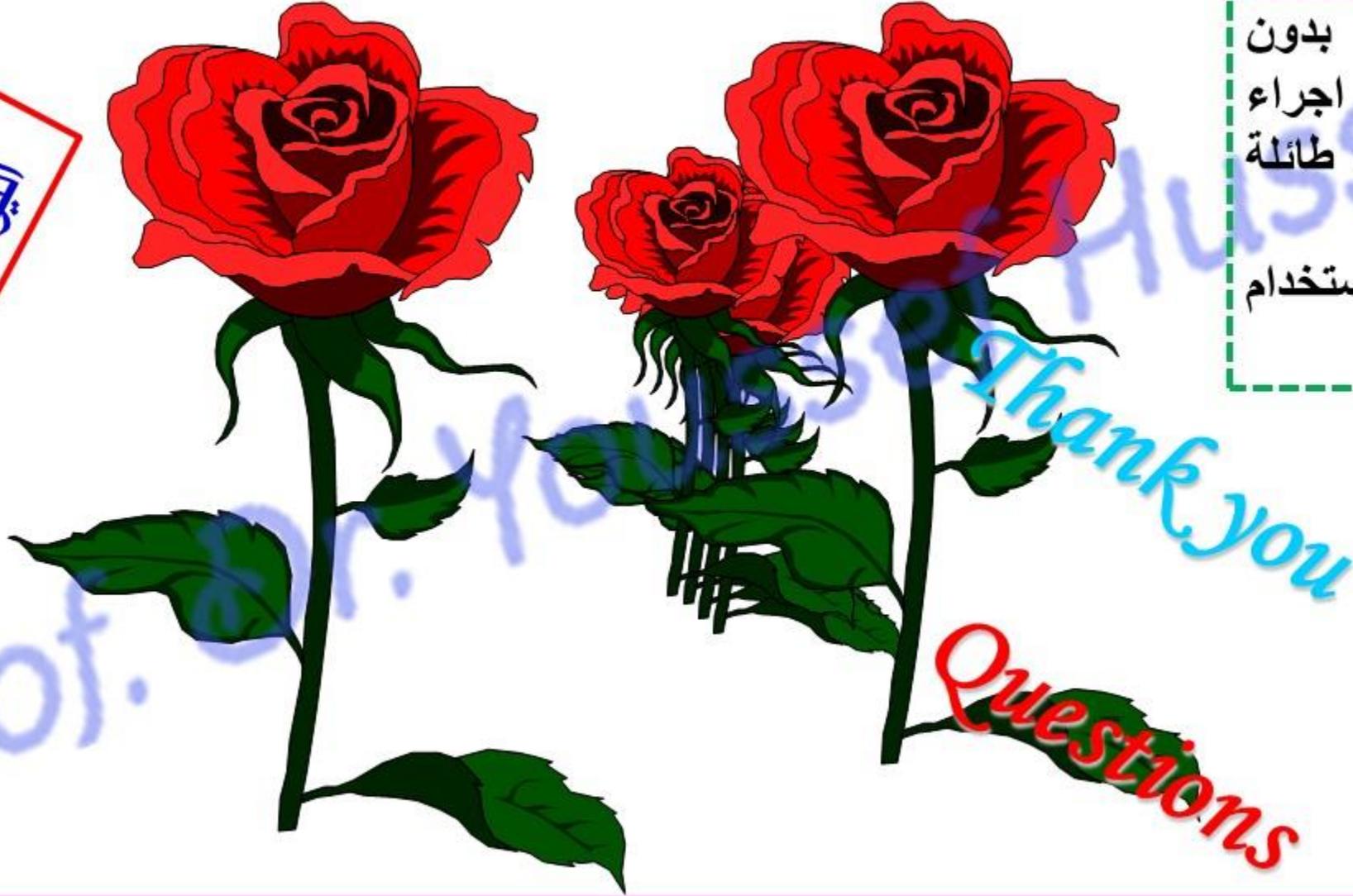
Postnatal changes

- 1- Left umbilical vein** is obliterated to form **ligamentum teres** of the liver.
- 2- Ductus venosus** is obliterated to form **ligamentum venosum** of the liver
- 3- Closure of the foramen ovale:** to form **fossa ovalis**
- 4- Ductus arteriosus** is obliterated to form **ligamentum arteriosum.**
- 5- Two umbilical arteries** are obliterated to form **two medial umbilical ligaments of the urinary bladder.**

https://www.youtube.com/channel/UCVSNqbibj9UWYaJdd_cn0PQ

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جميع المعلومات للاستخدام
التعليمي فقط

اليوتيوب د. يوسف حسين



Thank You
Questions

<https://www.youtube.com/@ProfDrYoussefHusseinAnatomy/playlists>