

Aortic arches

Pharyngeal arch arteries & their fate

- The first arteries to appear in embryo are
- Right primitive aortae
- left primitive aortae,
- they are continuous with two endocardial heart tubes ,
- each primitive aorta consist of a portion lying ventral to foregut (**ventral aorta**)
- a dorsal portion lying dorsal to gut (**dorsal aorta**)

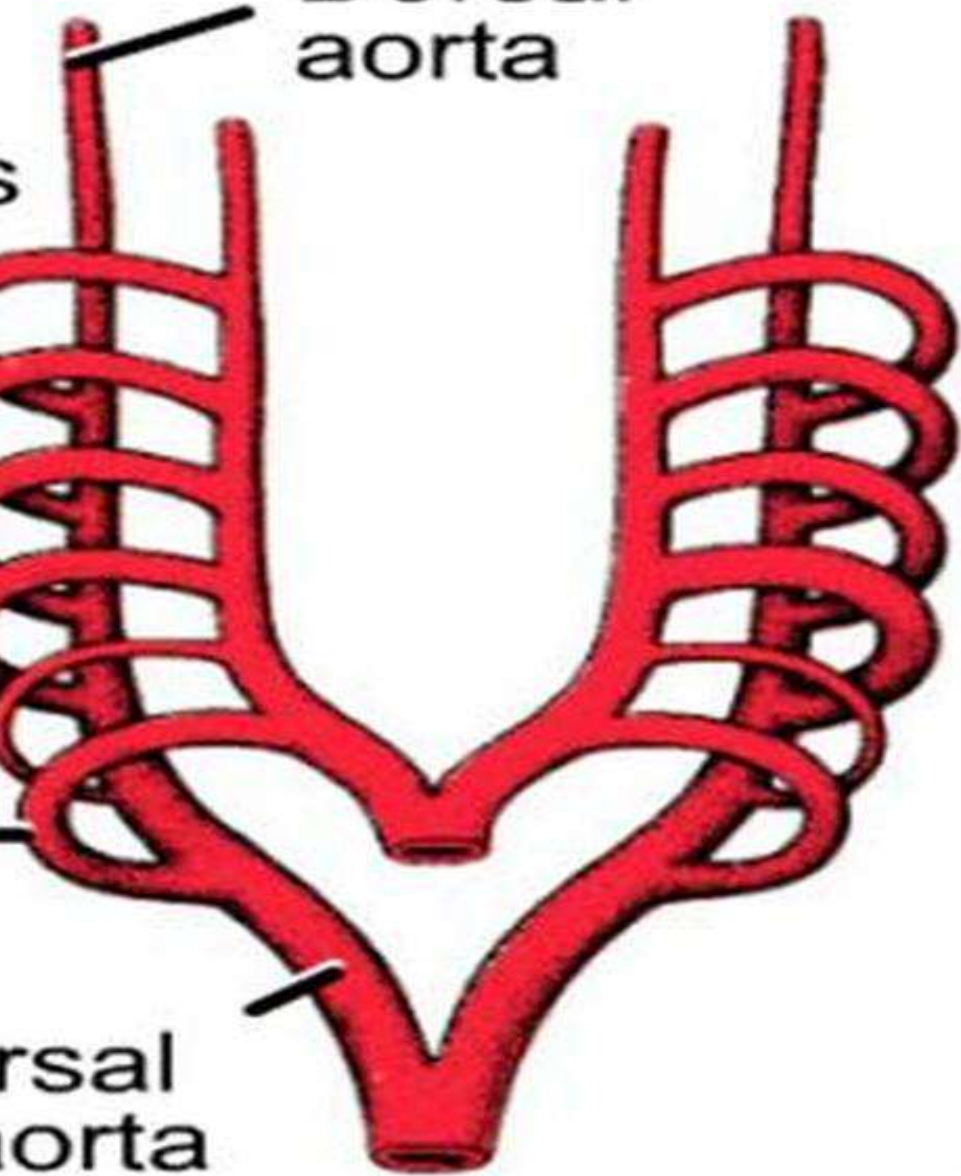
A

Dorsal aorta

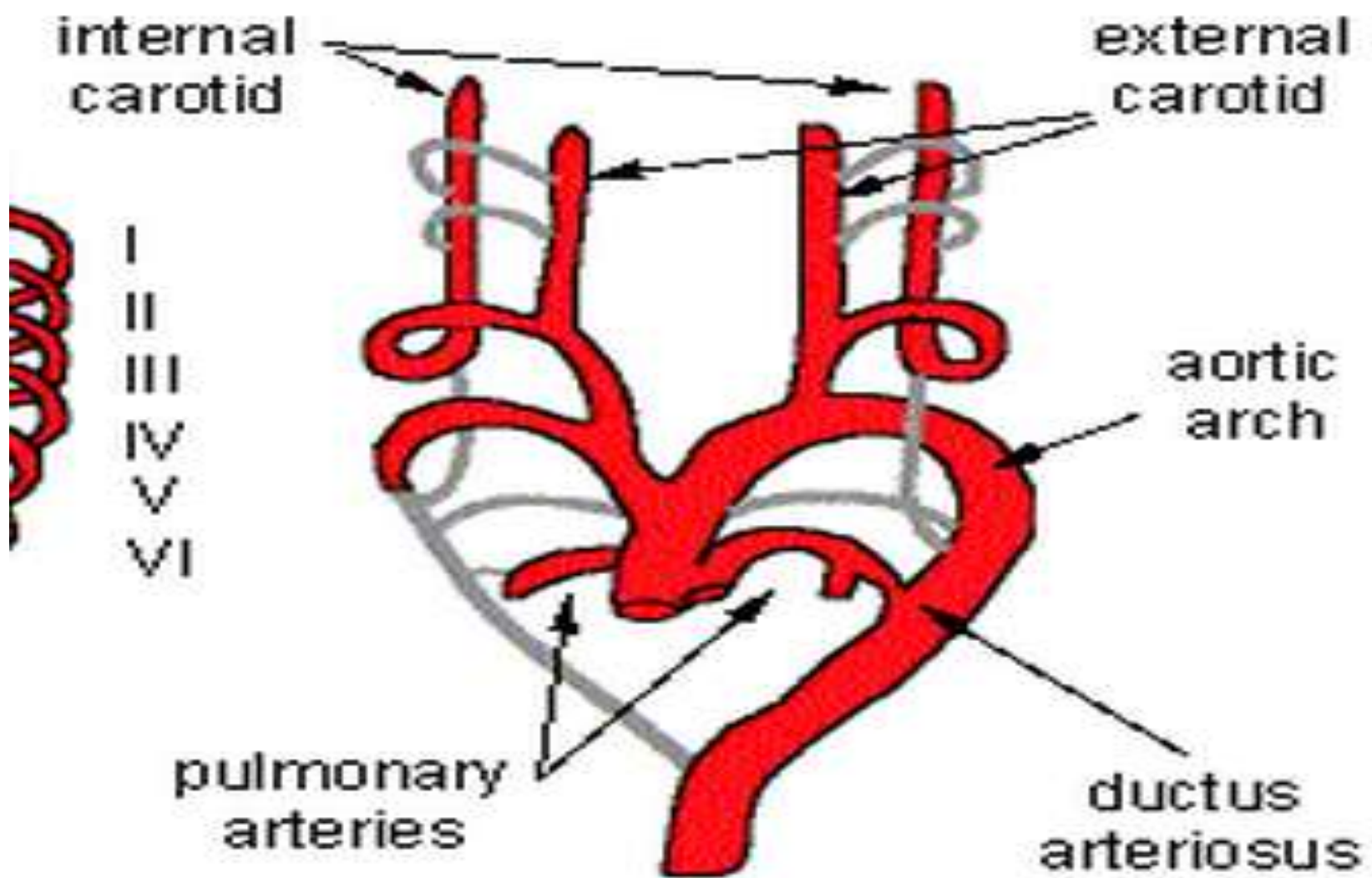
Aortic arches

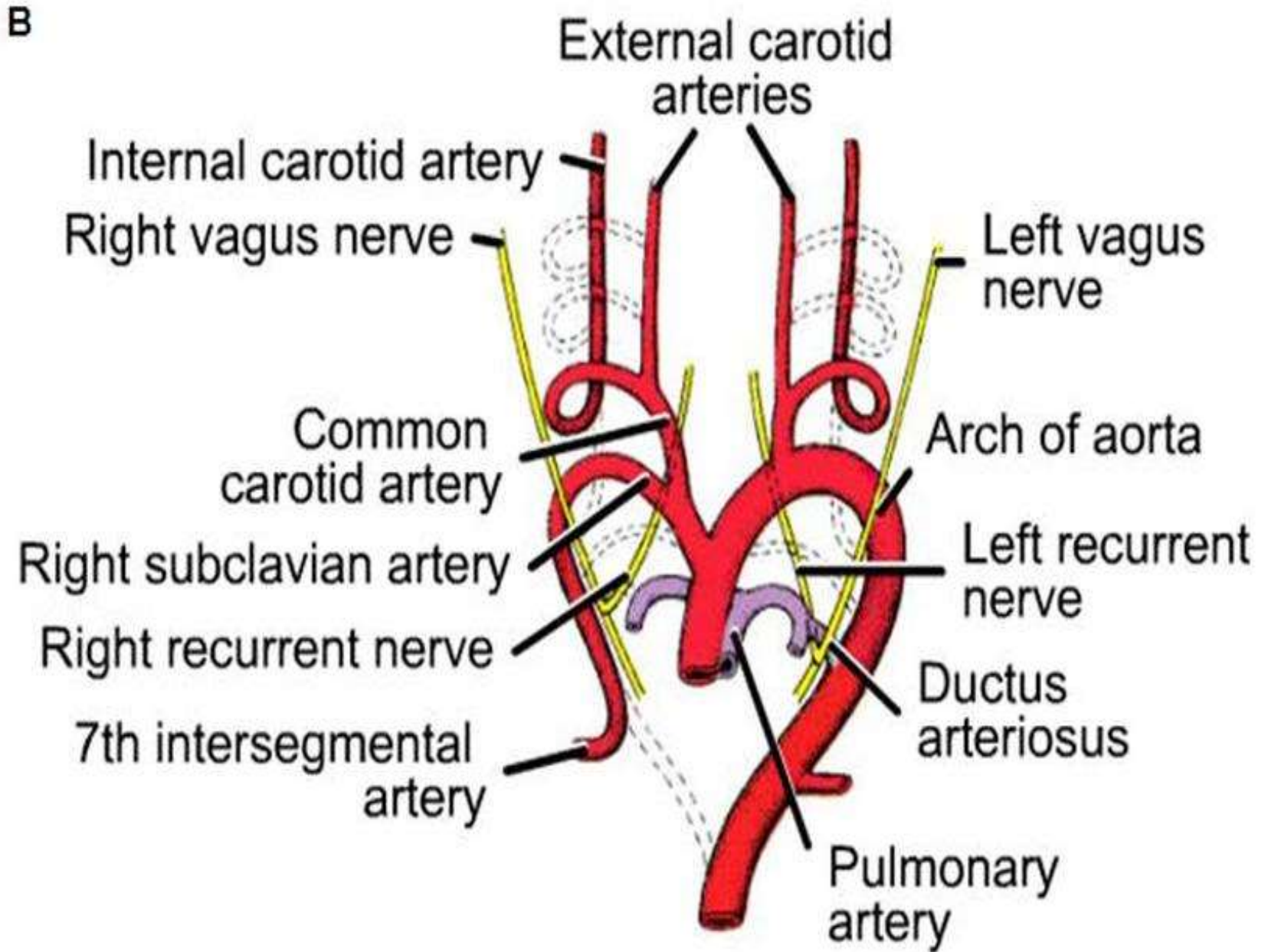
- I
- II
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- IV
- V
- VI

Right dorsal aorta



- after the fusion of two endocardial tubes , the two ventral aortae partially fuse to form aortic sac.
- The unfused parts remaining as right & left horns of sac .
- successive arterial arches now appear in second to sixth pharyngeal arches ,each being connected ventrally to right or left horn of aortic sac and dorsally to dorsal aorta .
- major arteries of head and neck are derived from these arches as --







- Greater part of first and second arteries disappear.(in adult life , the first arch is represented by **maxillary artery** .the second artery persist for some part of fetal life as **stapedial artery**. It may contribute to formation of external carotid artery)
- fifth arch artery disappears.
- aortic sac is now connected only with arteries of 3rd, 4th 6th arches.

- 3,4,6th arch arteries open into ventral part and sixth arch artery into dorsal part of aortic sac .
- the spiral septum ,that is formed in truncus arteriosus ,extend into aortic sac ,and fuses into posterior wall in such a way that blood from pulmonary trunk passes only into 6th arch artery while from ascending aorta passes into 3,4th arch arteries.

- several changes now take place in arterial arcades to produce adult pattern as ---
- the two dorsal aorta grow cranially , beyond point of attachment of first arch artery.
- portion of dorsal aorta , between attachment of third and fourth arch arteries (**ductus caroticus**) disappear on both sides.
- portion of right dorsal aorta , **between point of attachment of fourth arch artery and point of fusion of two dorsal aortae** disappears.

- each sixth arch artery gives off an artery to developing lung bud .on the right side ,the portion of sixth arch artery between this bud and the dorsal aorta , **disappears** .

on left side ,this part remains patent and forms the **ductus arteriosus** . the ductus arteriosus carries most of blood from right ventricle to dorsal aorta .it is obliterated after birth & seen as **ligamentum arteriosum**.

- each third arch artery gives off a bud that grows cranially to form external carotid artery .
- the dorsal aortae give off a series of lateral intersegmental branches to body wall .it comes to be attached to dorsal aorta near attachment of fourth arch artery.

To summarise

- ascending aorta & pulmonary trunk ----from truncus arteriosus.
- arch of aorta ---ventral part of aortic sac, its left horn & left fourth arch artery.
- descending aorta -- left dorsal aorta below attachment of fourth arch artery along with fused median vessel.
- brachiocephalic artery – right horn of aortic sac.

- right subclavian artery ----right fourth arch artery,remaining part of artery being derived from seventh cervical intersegmental artery
- left subclavian artery – 7th intersegmental artery which arise from dorsal aorta opposite attachment of fourth arch artery.

- common carotid artery – on either side is derived from third arch artery , proximal to external carotid bud.
- internal carotid artery -- portion of third arch artery distal to bud, along with original dorsal aorta cranial to attachment of third arch artery.
- pulmonary arteries – derived from part of 6th arch artery lying between pulmonary trunk & branches of lung buds.

- part of 6th arch artery between the branch to lung bud & aorta ---forms ductus arteriosus.

Applied

- double aortic arch
- right aortic arch,
- ductus arteriosus is normally occluded soon after birth if patent ---patent ductus arterioses.
- right subclavian may arise as last branch of aortic branch.
- ductus caroticus may remain patent, left internal carotid artery arises directly from aortic arch & right internal carotid from subclavian.

- Interrupted aortic arch.narrowing of lumen of aorta—corctation of aorta,frequently seen near attachment of ductus arterisus.