What Are Arterial Branching Patterns?

Worksheet

Arterial branching patterns describe how vessels divide and connect: end (terminal) arteries supply a region with no useful backup connections, while anastomotic arteries interconnect so blood can reroute around a blockage. Branching itself may be dichotomous (splitting into two similar vessels, as at the aortic bifurcation) or axial/lateral (small branches given off sequentially from a main trunk, as with intercostal arteries).

Questions

1. Which best describes an 'end artery'?

A) An artery with rich collateral connections
B) An artery with no functionally significant connections to neighbors
C) The last branch of the aorta
D) An artery found only in the limbs

2. Which structure is a classic example of arterial anastomosis?

A) Central retinal artery
B) Circle of Willis
C) Coronary artery
D) Splenic artery segment

3. The aorta splitting into the two common iliac arteries is an example of which branching pattern?

A) Axial branching
B) Dichotomous branching
C) Anastomotic branching
D) Radial branching

4. Why is occlusion of a coronary artery more dangerous than occlusion of the radial artery?

A) The coronary artery is larger
B) The heart needs more oxygen at rest
C) Coronary arteries function as end arteries with poor collaterals
D) The radial artery has no branches

5. The abdominal aorta divides into the two common iliac arteries at vertebral level L4. What branching pattern is this?

6. A patient has sudden occlusion of a coronary artery branch. Why does this cause tissue death (infarct) instead of the heart simply rerouting blood?

7. The posterior tibial and dorsalis pedis arteries connect via the plantar arch in the foot. What advantage does this give?

8. Define: What is an end (terminal) artery?

9. Define: What is an anastomosis?

10. Define: Give two organs supplied largely by end arteries.

Answer Key

1. B) An artery with no functionally significant connections to neighbors - End arteries lack useful collateral connections, so occlusion causes infarction downstream.

2. B) Circle of Willis - The circle of Willis links anterior and posterior cerebral circulations, providing collateral protection.

3. B) Dichotomous branching - One trunk dividing into two similar daughter vessels is dichotomous (bifurcating) branching.

4. C) Coronary arteries function as end arteries with poor collaterals - Coronary circulation has minimal functional anastomoses, so blockage causes infarction rather than being compensated.

5. Look at the geometry: one trunk splits into two roughly equal daughter vessels. This is a dichotomous (bifurcating) branching pattern. Example of dichotomous branching: aortic bifurcation into right and left common iliac arteries.

6. Coronary arteries are functional end arteries - collateral connections between them are minimal in most people. With no alternate route, tissue distal to the blockage is starved of oxygen. Result: myocardial infarction in the territory supplied by that branch.

7. The plantar arch is an anastomosis - a direct connection between two arterial systems. If one artery (e.g., posterior tibial) is narrowed by disease, blood can still reach the foot via the dorsalis pedis through the arch. This collateral pathway protects the foot from ischemia during single-vessel disease.

8. An artery with no significant connections to neighboring vessels, so its occlusion causes infarction of the tissue it supplies.

9. A direct connection between two arteries (or an artery and vein) that allows blood to reroute if one pathway is blocked.

10. The heart (coronary arteries) and the retina (central retinal artery) - occlusion in either quickly causes irreversible damage.