Arterial wall

The fibrous and muscular wall of vessels that carry oxygenated blood from the heart to structures throughout the body, and the pulmonary arteries that carry deoxygenated blood from the heart to the lungs. The wall of an artery has three layers: the tunica intima the inner coat; the tunica media the middle coat; and the tunica adventitia the outer coat. Nerves from the sympathetic system constrict the vessel and thus control the flow of blood into the areas served by the artery. The middle layer in smaller arteries is almost entirely muscular and in larger arteries is more elastic. The thickness of the outer layer varies with the location of the artery. In protected areas, such as the abdominal and cranial cavities, the outer layer of associated arteries is very thin, but in more exposed locations, as in the limbs, it is much thicker.

1/1

The wall of cerebral artery and arterioles consist of three concentric layers: the innermost layer is the tunica intima and the internal elastic lamina (IEL); the next layer out is the tunica media; and the outermost layer is the tunica adventitia. Unlike systemic arteries, cerebral arteries have no external elastic lamina, but instead have a well-developed IEL¹.

Other differences from systemic arteries include a paucity of elastic fibers in the medial layer and a very thin adventitia. The number of smooth muscle cell layers varies depending on the size of the vessels and species, with large arteries such as the internal carotid artery having as many as 20 layers. Smaller pial arteries contain approximately two to three layers of smooth muscle, whereas the penetrating and parenchymal arterioles contain just one layer of smooth muscle. In addition, smooth muscle in the medial layer of cerebral arteries and arterioles are circularly arranged and oriented perpendicular to blood flow with essentially a zero-degree pitch.

False aneurysms, also known as a pseudoaneurysm, requires all three layers of the arterial wall wall to be disrupted, and integrity of the vessel is only maintained by associated hematoma or surrounding connective tissue ².

In true aneurysms, the adventitia is preserved.

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Lee RM. Morphology of cerebral arteries. Pharmacol Ther. 1995;66: pp. 149–173.

McElroy KM, Malone RJ, Freitag WB, Keller I, Shepard S, Roychowdhury S. Traumatic pseudoaneurysm of the basilar artery. Am J Phys Med Rehabil. 2008;87:690–691. doi: 10.1097/PHM.0b013e31817fbaea.

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