

CAROTID ARTERY

Authored by
mohammad looti

November 4, 2025

RECOMMENDED CITATION

mohammad looti (2025). *CAROTID ARTERY*. PSYCHOLOGICAL SCALES. Retrieved from <https://scales.arabpsychology.com/?p=67501>

CAROTID ARTERY

Primary Disciplinary Field(s): Anatomy, Physiology, Vascular Medicine, Neurology

1. Core Definition and Function

The **carotid artery** refers to the principal pair of blood vessels responsible for delivering oxygenated blood from the heart to the brain, face, and neck structures. These major vessels are crucial components of the circulatory system, ensuring that the cephalic region receives the constant, high-volume blood supply necessary for metabolic function, particularly that required by the highly demanding cerebral tissue. The primary vessel on each side is known as the **common carotid artery** (CCA). Unlike many arteries that feed into surrounding musculature immediately, the CCA ascends relatively cleanly through the neck before bifurcating, marking its critical junction point for cephalic distribution. Failure or obstruction within the carotid artery system, therefore, has immediate and severe consequences, most notably leading to stroke or transient ischemic attacks (TIAs).

Functionally, the carotid arteries serve as the primary conduits feeding the anterior circulation of the brain. On the left side, the common carotid artery typically originates directly from the aortic arch, while on the right side, it branches off the brachiocephalic trunk. As they ascend through the neck, they are often palpable, running deep to the sternocleidomastoid muscle, providing a vital site for pulse assessment. The integrity of the CCA and its subsequent branches is paramount not only for adequate blood flow but also for maintaining systemic blood pressure homeostasis, a function governed by specialized sensory structures located near the bifurcation point.

2. Gross Anatomy and Bifurcation

The structural organization of the carotid system involves a crucial division point known as the carotid bifurcation, typically located around the level of the upper border of the thyroid cartilage (C3-C4 vertebral level). This bifurcation marks the transition of the **common carotid artery** into its two main terminal branches: the **internal carotid artery** (ICA) and the **external carotid artery** (ECA). This anatomical landmark is highly significant, not just for flow division, but also because it is the location of two specialized sensory organs: the carotid sinus and the carotid body.

The **carotid sinus** is a slight dilation at the beginning of the ICA (or sometimes involving the terminal CCA) containing baroreceptors that monitor blood pressure and communicate with the brainstem to regulate heart rate and vascular tone. This mechanism is critical for preventing abrupt drops in cerebral perfusion. Adjacent to the sinus is the **carotid body**, a small cluster of chemoreceptors that monitor the partial pressures of oxygen and carbon dioxide in the blood. These structures are vital components of the autonomic nervous system, enabling reflexive

responses to changes in physiological conditions, such as hypoxia or severe hypotension.

3. The Internal Carotid Artery (ICA) System

The **internal carotid artery** (ICA) is the primary pathway for cerebral blood supply. Unlike the ECA, the ICA does not supply any structures in the neck; instead, it immediately ascends toward the base of the skull, entering the cranial cavity through the carotid canal in the temporal bone. Its path is complex, consisting of several segments--cervical, petrous, lacerum, cavernous, clinoid, ophthalmic, and communicating--each named after the anatomical region it traverses.

Once inside the cranium, the ICA gives rise to crucial branches, including the ophthalmic artery, which supplies the eye and related structures. Most importantly, it contributes significantly to the formation of the Circle of Willis, an arterial anastomosis that provides collateral circulation to the brain. The ICA terminates by dividing into the anterior cerebral artery (ACA) and the middle cerebral artery (MCA), which collectively supply the vast majority of the cerebral hemispheres, making the ICA indispensable for cognitive and motor function.

4. The External Carotid Artery (ECA) System

The **external carotid artery** (ECA) is responsible for supplying structures external to the brain and cranium. Its branches provide blood flow to the face, scalp, tongue, pharynx, meninges, and thyroid gland. The ECA branches are numerous and systematically distributed, generally progressing anteriorly, medially, and posteriorly as it ascends. Key branches include the superior thyroid artery, lingual artery, facial artery, occipital artery, and posterior auricular artery.

The ECA terminates by dividing into two major arteries within the parotid gland: the superficial temporal artery and the maxillary artery. The superficial temporal artery provides circulation primarily to the scalp and temporal region, while the maxillary artery is a complex vessel with multiple branches supplying deep facial structures, the nasal cavity, and the teeth. Because the ECA primarily services superficial structures, occlusion of its branches is rarely life-threatening, though it can cause significant localized tissue damage or cosmetic impairment.

5. Clinical Significance: Carotid Artery Disease

The carotid arteries are highly susceptible to diseases, most notably **atherosclerosis**, a condition involving the buildup of plaque within the arterial walls. This pathological process, known as **carotid artery stenosis**, causes the arteries to narrow and stiffen, significantly restricting blood flow to the brain. Because the bifurcation point experiences turbulent blood flow, it is a preferential site for plaque accumulation. Severe stenosis is a major risk factor for ischemic stroke, which occurs when a reduction in flow (hypoperfusion) or an embolism (a clot breaking off and traveling downstream) deprives brain tissue of oxygen.

Symptoms associated with significant carotid stenosis often manifest as transient ischemic attacks (TIAs), frequently referred to as "mini-strokes." TIA symptoms, such as temporary weakness, numbness on one side of the body, or fleeting vision loss (amaurosis fugax), are temporary but serve as critical warning signs that a full stroke is imminent. Management of carotid artery disease, therefore, focuses intensely on risk factor modification (e.g., controlling hypertension and cholesterol) and, when necessary, surgical intervention to restore patency.

6. Diagnostic Procedures and Interventions

Diagnosis of carotid artery disease typically involves non-invasive imaging techniques. The gold standard initial test is the **Carotid Doppler Ultrasound**, which uses sound waves to measure blood flow velocity and visualize the degree of plaque formation and narrowing. For more detailed anatomical assessment, especially prior to intervention, computed tomography angiography (CTA) or magnetic resonance angiography (MRA) may be employed to provide three-dimensional reconstructions of the vessel structure and the exact extent of stenosis.

Interventional strategies are tailored based on the severity of the stenosis and the patient's symptomatic status. For asymptomatic patients with severe narrowing (typically >70%), or symptomatic patients with moderate-to-severe narrowing, surgical intervention is often recommended. The primary surgical treatment is **Carotid Endarterectomy (CEA)**, a procedure where the artery is surgically opened, and the atherosclerotic plaque is removed. A less invasive alternative is **Carotid Artery Stenting (CAS)**, where a balloon is used to open the artery, and a metallic mesh tube (stent) is placed to keep the vessel patent, often favored in patients with high surgical risk.

7. Further Reading

[Carotid Artery \(Wikipedia\)](#)

[Circle of Willis \(Wikipedia\)](#)

[What is Stroke? \(American Heart Association\)](#)