Brainstem infarct

- Right vertebral artery arising from the extreme proximal right subclavian artery and entering the C3 transverse foramen diagnosed by magnetic resonance angiography
- Lesion Topography and Clinical Features Associated With Respiratory Failure in Patients With Medullary Infarction
- Brainstem Stroke
- Predictors of malignant swelling in space-occupying cerebellar infarction
- Transverse diameter of brainstem infarction is a strong predictor of miserable outcome after mechanical thrombectomy for acute basilar artery occlusion
- Concurrent Middle Cerebral Artery and Basilar Artery Occlusions Treated With Mechanical Thrombectomy in a Patient With Active COVID-19 Infection
- Motor cortex stimulation for the treatment of trigeminal neuralgia after brainstem infarction: A case report
- Prognostic significance of serum cystatin C in acute brainstem infarctions patients

Brainstem stroke is the most lethal form of all strokes. Both hemorrhagic and ischemic brainstem strokes account for a significant cause of morbidity and mortality on the global front. An ischemic form has a higher incidence compared to its hemorrhagic brainstem counterpart. Knowledge pertaining to brainstem stroke syndromes is prudent for early diagnosis and timely management to ensure better clinical outcomes.

The brainstem is composed of the midbrain, the pons, and the medulla oblongata, situated in the posterior part of the brain. It is a connection between the cerebrum, the cerebellum, and the spinal cord. Embryologically, it develops from the mesencephalon and part of the rhombencephalon, all originating from the neural ectoderm. The brainstem is organized internally in three laminae: tectum, tegmentum, and basis. Gray matter in the brainstem is found in clusters all along the brainstem forming mostly the cranial nerve nuclei, the pontine nuclei, and the reticular formation. White matter in the form of various ascending and descending tracts can be found mainly in the basis lamina, which is the most anterior part. The brainstem is responsible for multiple critical functions, including respiration, cardiac rhythm, blood pressure control, consciousness, and the sleep-wake cycle. The cranial nerve nuclei in the brainstem have a crucial role in vision, balance, hearing, swallowing, taste, speech, motor, and sensory supply to the face. The white matter of the brainstem carries most of the signals between the brain and the spinal cord and helps with its relay and processing.

The vascular territories of the brainstem have been categorized as:

Medulla oblongata (4 arterial territories):

Anteromedial -from the anterior spinal artery (ASA) and the vertebral artery (VA)

Anterolateral-from the ASA and VA

Lateral - from the posterior inferior cerebellar artery (PICA), and

Posterior -from the posterior spinal artery (PSA).

Pons (3 arterial territories):

Anteromedial-from perforating arteries of the basilar artery (BA)

Anterolateral-from the anterior inferior cerebellar artery (AICA)

Lateral zone -from lateral pontine perforators of the BA, AICA, or from the superior cerebellar artery (SCA).

Midbrain (4 arterial territories):

Anteromedial-from the posterior cerebral artery (PCA)

Anterolateral -from the PCA or a branch of the anterior choroidal artery

Lateral group -from the collicular, choroidal, and posterior cerebellar arteries

Posterior group -from the superior cerebellar, collicular and posteromedial choroidal artery.

Brainstem infarction is an area of tissue death resulting from a lack of oxygen supply to any part of the brainstem. The knowledge of anatomy, vascular supply, and physical examination can be life-saving in the setting of an acute infarct and provide precise diagnosis and management. Time becomes an essential factor in management. Early intervention has shown dramatically reduced morbidity and mortality. Brainstem, accounting for almost one-third of all ischemic strokes, leads to high morbidity and mortality on the global front. The pons is predominantly affected. Medullary infarction accounts for 7% of all ischemic brainstem strokes with lateral subtypes being the most common. There is a male preponderance (3:1). Atherosclerosis and VA dissections are the most common causes.The pontine infarction can present as isolated or as a subset of a larger posterior circulation infarction. Ventral infarcts are the most common subtype. Atherosclerosis of the perforating arteries and occlusion of the BA are the most common causes. This can present as a lacunar variant presenting ubiquitously as pure motor, dysarthria-clumsy hand, ataxic hemiparesis syndrome, and pure sensory stroke patterns. Isolated midbrain infarctions are rare and most commonly present with concurrent involvement of the cerebellum, pons, or thalamus.

Dorsal Pontine involvement is the most common anatomical site for the location of brainstem hemorrhagic stroke [1)]

1)
Gowda SN, Munakomi S, De Jesus O. Brainstem Stroke. 2023 Jun 24. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan–. PMID: 32809731.