Abstract:
Bilateral thalamic infarctions are rare presentations of stroke, as a result of a complex combination of risk factors and a predisposing vessel distribution. Thalami and midbrain arterial supply arises from many perforating blood vessels with a complex distribution with many variations. One rare variation, named the artery of Percheron, is a solitary arterial trunk that arises from one of the proximal segments of a posterior cerebral artery and supplies the paramedian thalami and the rostral midbrain bilaterally. Occlusion of this artery results in bilateral thalamic and mesencephalic infarctions. We describe one patient with a presumed occlusion of the artery of Percheron.

Keyword: Bilateral thalamic infarct, Percheron, P1 segment

Case report:
A 62-year-old male hypertensive and occasional smoker was admitted in our hospital in a drowsy state. He had history of giddiness, headache followed by decreased level of consciousness 2 days duration with no motor, sensory, cranial or autonomic involvement. There was no history of fever/seizures/trauma. His blood pressure 130/90mmHg, respiratory rate 18/minute, heart rate 78/minute, temperature 37.2°C were within normal limits. Patient was drowsy, responded to verbal commands, pupils, fundi were normal. He moved all 4 limbs, intact deep tendon, brainstem reflexes and Hoffman-Trömner, Babinski reflexes were negative. Blood investigations were: Hemoglobin - 15.3 g/dl, platelets - 2.43 lakhs /cu mm; Total Cholesterol-177 mg/dl, triglycerides-250 mg/dl, high-density lipoprotein- 38 mg/dl, low-density lipoprotein 83 mg/dl; Sugar-81 mg/dl, Urea 21 mg/dl, Creatinine 0.7 mg/dl, Sodium 135 mEq/L, Potassium 3.6 mEq/L, Total Bilirubin 0.9mg/dl, SGOT 18 U/L, SGPT 75U/L, Total protein-6.6 g/dl.His cardiac examination was normal. Patient’s consciousness level improved slightly on day 3, and bilateral vertical gaze palsy, with memory disturbances were noted. CT Brain was taken on Day 1 which showed bilateral paramedian thalamic hypodensity.
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CT Brain showing bilateral paramedian thalamic hypodensities
Magnetic resonance imaging (MRI) and magnetic resonance image angiography (angi-MRI) was taken subsequently, which showed hyper intensities in the bilateral paramedian thalamus.

MRI Brain T1 T2 weighted images showing hyperintensities in the bilateral paramedian thalami
Patient was treated with antiedema measures, antiplatelet agents, hypo lipidemics, antihypertensives and other supportive measures. The state of consciousness and third nerve function improved during the course of two weeks, with fluctuant periods of somnolence.

Discussion
The thalami and the midbrain receive their blood supply from both the anterior (internal carotid arteries) and posterior (vertebro-basilar system) circulations, and several variations in this supply are known to exist. The anterior circulation usually supplies the anteroinferior aspects of the thalami and midbrain with thalamo-perforator arteries arising from the posterior communicating arteries. The posterior circulation usually supplies the medial aspects of the thalami and midbrain via branches arising from P1 segments and the lateral and superior aspects with branches arising from P2 segments of the posterior cerebral arteries (PCAs). The mesencephalic-diencephalic junction arterial supply defines the size and location of the ischemic damage. Perforating arteries arising from both P1 segments of the PCA supply predominantly the hypothalamus, medial ventral thalami, and subthalamic-mesencephalic junctions. Most of the perforating branches from the P1 segments have an ipsilateral distribution (78%); bilateral or even contralateral distributions may be observed in 22% of individuals. Percheron described three possible variations involving the paramedian thalamic-mesencephalic arterial supply: small branches arising from both P1 segments, an asymmetrical common trunk arising from a P1 segment (this variation is called the artery of Percheron), or an arterial arcade emanating from an artery bridging the two P1 segments. Occlusion of the artery of Percheron results in bilateral medial thalamic and rostral mesencephalic infarctions with a relatively symmetrical distribution. Strokes affecting both paramedian thalamic territories are unusual and may lead to a
suspicion of an occlusion of a single arterial trunk known as the artery of Percheron\(^6\). Although not visible on angio-MRI, the presence of this anatomic variant must be suspected when bilateral symmetric paramedian thalamic infarcts are revealed on image studies in the context of a patent basilar artery and posterior cerebral arteries\(^7\). The thalami contain strategic nuclei and integrate several important cortical functions. Thus, infarcts at the mesencephalic-diencephalic junctions may result in complex clinical syndromes, with patients exhibiting a wide range of symptoms varying from motor deficits to behavioral and sensory alterations. An understanding of thalamic anatomy is important to explain the pathophysiology of bilateral paramedian thalamic infarction. Paramedian nuclei consist mainly of a dorsomedian nucleus and intralaminar nuclei. The intralaminar nuclei consist of parafascicular, centromedian, central medial, paracentral and central lateral nuclei\(^8\). Smaller nuclei of the 'midline', such as the paraventricular, rhomboid and reunions nuclei, are also included in the intralaminar group. Both nuclear groups are characterized by important and reciprocally activating connections with the anterior, orbitofrontal and medial prefrontal cortices through the thalamic peduncles\(^9\), thus explaining the neuropsychiatric impairment and the loss of self-activation characteristic of paramedian infarctions. The rostral midbrain can also be involved after occlusion of the artery of Percheron\(^10\). Patent vertical gaze limitation\(^11\) has been reported as part of thalamic syndromes, perhaps related to a remnant affecting the rostral interstitial nucleus of the medial longitudinal tract, precisely located between the diencephalon and the midbrain. Our patients presented with different symptoms, all of them described as part of the paramedian thalamic syndrome. In this syndrome, the prominent changes in mental status may be due to involvement of the reticular activating system\(^12\).

The clinical pattern of this unique presentation of posterior circulation stroke usually consists characteristic triad\(^13\) of altered mental status, vertical gaze palsy, and memory impairment. In most cases, the cognitive and behavioral changes become obvious when consciousness resumes\(^14\).

**Conclusion:**

We propose that, when bilateral medial thalamic infarctions are found, occlusion of the artery of Percheron should be considered as the main diagnosis. Performing conventional angiography may not be indicated, as lack of visualization of the artery does not exclude its presence (because it is occluded). MRI is an essential tool for diagnosis. When bilateral medial thalamic infarctions are encountered, the differential diagnosis also includes the "top of the basilar artery" syndrome\(^15,16\). In this latter entity, infarctions tend to involve also the territories supplied by the superior cerebellar and PCAs.

**References:**

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