**CASE REPORT**

**STROKE IN THE ARTERY OF PERCHERON TERRITORY: THE TWO EDGES OF ONE DIAGNOSIS**

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**ABSTRACT**

Occlusion of artery of Percheron is a rare condition caused by a peculiar anatomic variation in cerebral blood supply, leading to a bilateral thalamic infarction. Strokes in artery of Percheron account for 0.1% to 2% of all cerebral infarctions. Thalamic area is supplied by the arteries arising directly from the P1 segment of the posterior cerebral artery. However, in 1/3 of cases the supply is provided by a single trunk referred to as artery of Percheron (AOP). Early diagnosis of stroke in AOP can be very challenging due to an ambiguous clinical presentation and the absence of neurovisualization findings.

This article presents two clinical cases of stroke in artery of Percheron observed at Lviv Emergency Hospital. Different clinical progression of a cerebrovascular accident contrasted with a similar neurovisualization pattern was a distinctive feature in these patients. Taking into consideration the rarity of this condition and a characteristic clinical presentation, these clinical cases were retrospectively analyzed and compared.

A stroke in AOP should be suspected in all patients with symptoms of interrupted blood supply in the vertebrobasilar territory. The diagnosis primarily depends on clinical features; patients with paramedian bilateral thalamic lesions may develop sudden problems with consciousness, vertical gaze palsy and memory disorders. Early diagnosis of this condition allows for more effective therapeutic interventions and improves patient prognosis.

**KEY WORDS:** Stroke in artery of Percheron; Bilateral thalamic infarction; Artery of Percheron

**INTRODUCTION**

Occlusion of the artery of Percheron is a rare condition, which develops due to a peculiar anatomic variation in cerebral blood supply, leading to a bilateral thalamic infarction. Strokes in the artery of Percheron territory account for 0.1% to 2% of all cerebral infarctions.

The thalamic area is supplied by the arteries arising directly from the P1 segment of the posterior cerebral artery. However, in 1/3 of cases the supply is provided by a single blood vessel referred to as artery of Percheron (AOP).

Early diagnosis of stroke in the AOP territory can be very challenging due to an ambiguous clinical presentation and the absence of distinctive neurovisualization findings.

This article reports two cases of stroke in the artery of Percheron territory observed at Municipal Non-profit Enterprise 'Lviv Clinical Emergency Care Hospital'. As a distinctive feature in these patients, we noted different clinical progression of cerebrovascular accidents contrasted with similar neurovisualization patterns.

Taking into consideration the rarity of this condition and the variety of clinical presentations, a retrospective analysis was performed with a comparison of the two cases.

The thalamus and the midbrain have a complex blood supply with multiple nourishing arteries. The arterial blood supply of the thalamus and the midbrain consists of an integrated system embracing the territories of the carotid artery and the basilar artery. The ventral and the caudal part of the midbrain and the thalamus are nourished primarily from the internal carotid artery territory, while the medial, lateral and caudal parts of the thalamus are nourished from the vertebrobasilar territory [1].

Four principal vascular territories are distinguished in the thalamus: the anterior, the paramedian, the inferolateral and the posterior. The paramedian territory receives its blood supply from the paramedian (thalamoperforating) arteries that arise from the proximal segment of the posterior cerebral artery [2]. In 1973, Gerard Percheron described four anatomic variations of blood supply of medial thalamus, including artery of Percheron, a rare variation where one common thalamoperforating artery comes off the posterior cerebral artery and divides to provide blood supply to both paramedian thalami and also (in some cases) to a part of midbrain [3]. The occlusion of this artery leads to a characteristic bilateral infarction of both thalami with or without mesencephalic ischemia.

Bilateral paramedian thalamic infarctions are characterized by a classic triad of symptoms: acute impairment of consciousness, neuropsychiatric symptoms and impairment of vertical gaze.

Various degrees of impaired consciousness are seen in all patients. Impaired function of vertical gaze manifests as a palsy of upward gaze or a combination of upward/downward gaze impairments. Horizontal dysfunction is less typical. Neuropsychiatric disorders escalate with the level of loss of consciousness and manifest as amnesia, abulia and/or thalamic dementia [4].
Patients with bilateral thalamic infarction with lesions in mesencephalic area may have hemiplegia, cerebellar ataxia, movement disorders or oculomotor disorders [5].

The available literature sources report that thalamic strokes account for 11% of the strokes in the vertebrobasilar territory. Paramedian strokes account for 22–35% of all thalamic strokes; these are predominantly cardioembolic strokes [6].

The pattern of infarctions in the artery of Percheron territory includes the following: bilateral paramedian infarction with a mesencephalic stroke (43%), isolated bilateral paramedian thalamic infarction (38%) and bilateral paramedian infarction with involvement of the anterior thalamus and the midbrain (14%) [7].

In our clinic, we observed two clinical cases of cerebral infarction in the artery of Percheron territory with different neurological symptoms and different disease outcomes. These cases are given below.

**CASE REPORT 1**

A 71 y.o. woman was brought to the Admissions Department of the Emergency Care Hospital with sudden deterioration of health manifest as confusion and impaired speech. According to her relatives, these symptoms appeared suddenly in a setting of feeling well during recent months. The patient did not verbalize any complaints due to her inability to talk. Medical history included coronary artery disease and stage II hypertension. The patient had 11 points on Glasgow coma scale; the NIHSS score was 9 points.

On examination, the patient’s general condition was moderately severe. Visible mucous membranes were pale pink in color. Heart tones were rhythmic; BP 140/80 mm Hg. Neurological status: the patient was conscious, poorly oriented to space and time; retrograde amnesia. The patient was not answering any questions but performed the physician’s instructions adequately. Cranial nerves assessment: the pupils were S=D, eye movements were unrestricted, photoreactions were inhibited; the face appeared symmetrical and the tongue was on the midline. Tendon reflexes were S=D. The subcortical reflexes of oral automatism were positive. No abnormal foot signs, impaired sensation or meningeal signs were documented. The patient performed the finger-to-nose test satisfactorily. The patient was not able to perform Romberg’s maneuver.
On admission, an urgent computed tomography of the head was performed, with findings including bilaterally reduced density of brain tissue in basal ganglia, a tentative diagnosis of CVA and vascular encephalopathy. ECG findings included sinus rhythm, pronounced diffuse myocardial changes and left ventricular hypertrophy. Hematologic test: hemoglobin 13.7 g/dL, WBCs 8,800 cells/µL and blood glucose 6.5 mmol/L. The patient’s condition stabilized with treatment; her consciousness was restored and the patient was able to perform the physician’s instructions. However, retrograde amnesia and speech impairment (manifest as motor aphasia) were retained. When hospitalized, the patient had a brain MRI with the following findings: bilateral thalamic infarctions and a typical presentation of artery of Percheron occlusion (Fig. 1).

The patient stayed in the hospital for 12 days. With neurological treatment, her status improved; there was a partial recovery of speech and improvements of coordination and gait. On discharge, the patient had pronounced cognitive problems, including retrograde amnesia and disorientation to time, space and person.

The patient’s status was retrospectively reviewed one year after discharge from the hospital. The patient continued to have a cognitive deficit; her memory had partially recovered and disorientation to time, space and person had disappeared.

CASE REPORT 2
A 79 y.o. female patient was hospitalized in a severe condition. Conscience status: coma II (5 to 10 points on Glasgow coma scale), 29 points on the NIHSS scale. No contact could be established; no instructions were performed by the patient. The eye fissures were closed, the eyeballs were fixed; a divergent strabismus to the left has been documented. The pupils were S=D, mydriasis, photoreactions are absent. The face was asymmetric; the tongue was in oral cavity. Tendon reflexes were D>S in the upper extremities and hypostenic in the lower extremities. The muscles of the upper extremities were hypotonic; hypertonus in leg extensors. Babinski sign was bilaterally positive. Rigidity of neck muscles (1 finger wide range of neck mobility). No coordination and/or sensation tests were performed.

The medical history was positive for atrial fibrillation, hypertension and uncontrolled use of hypertensive medications.

The patient had brain CT scan on her admission and on Day 12 of hospital stay. The findings of brain CAT scan included the following: ischemic–type CVA in the territories of left and right PCAs. The first two CT sections contain evidence of an acute stage; the third section contains evidence of CVA in the territory of both PCAs, the stage of resorption (Fig. 2).

In course of treatment, there was only a modest improvement of patient’s condition; the level of consciousness stabilized at the level of deep sopor; the movements in the extremities have not restored. The patient was discharged from the hospital under the care of a neurologist.

Taking into consideration a large number of variations in blood supply of posterior cranial fossa, it may be concluded that the presence of artery of Percheron is not that rare and that strokes in this artery remain largely undiagnosed.

A stroke in AOP should be suspected in any patient with a sudden onset of symptoms of impaired circulation in the vertebrobasilar territory. The diagnosis of stroke in the artery of Percheron territory primarily depends on clinical features: patients with paramedian bilateral thalamic lesions may develop sudden problems with consciousness, vertical gaze palsy and memory disorders.

Therefore, in a bilateral cerebral infarction in the distal portion of the basilar artery but provided that no occlusion of the basilar artery proper was found, a possibility of a stroke in the artery of Percheron territory must be considered.

REFERENCES

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