

Neuropsychological Assessment of Percheron Artery Infarction: Case Report

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Abstract

Introduction: The bilateral paramedian thalamic infarct habitually associated to the infarct of the artery of Percheron (also named as Percheron Syndrome) is an uncommon neurological condition, which includes the infarct of both thalamus and occlusion of the posterior cerebral circulation due an ischemic stroke. The neuropsychological assessment is an important approach to be able to establish not only the foundations for neurorehabilitation but to realize the consequences of the person at the social, personal and work level.

Case Report: A 46-year-old man has the following symptomatology: fluctuations in the level of consciousness, skew deviation, limitation in vertical eye movement (Parinaud Syndrome), left facial paresis, dysphagia and difficulties in the elevation of the palate.

Conclusion: Neuropsychological evaluation reveals anterograde amnesia, attentional difficulties, and executive dysfunction.

Keywords: *Percheron Artery; Thalamus; Bilateral Thalamic Infarct; Thalamic Bilateral Stroke; Posterior Cerebral Circulation; Neuropsychological Assessment*

Introduction

The bilateral paramedian thalamic infarct habitually associated to the infarct of the artery of Percheron (also named as Percheron Syndrome) is an uncommon neurological condition that accounts for only 0.6% of the first stroke episodes. Strokes in these territories are infrequently diagnosed due the great number of variants of the blood supply in the posterior cranial fossa, especially the high variability of presence and size of P1 segments of the posterior cerebral artery (from now on PCA), which give rise to the paramedian [1].

The irrigation of thalamus, described by Percheron in the 1960s, comes mainly from connections between the internal carotid artery and basilar artery [2]. The blood supply is done through perforating branches from the posterior cerebral artery and the posterior communicating artery, categorized into four territories: anterior, paramedian, inferolateral and posterior.

The Percheron artery is a variant of irrigation of the paramedial region of both thalamus, the P1 segment of the PCA, which connects the basilar artery with the posterior communicating artery. This artery is also named as “the mesencephalic artery” or “basilar communicating artery” [1,3].

According to Percheron, there are four normal variants of the paramedial arteries [1]:

1. Variant I: Each perforating arteries arises from each left and right PCA. Is the most common one.
2. Variant II-a: Each perforating arteries arise directly from the proximal segment of one of the PCAs. Is an asymmetrical variant and less common.

3. In variant II-b: Both bilateral perforating thalamic arteries arise from a single arterial trunk (the artery of Percheron), which arises from the P1 segment of one PCA. It supplies the paramedian thalami and the rostral midbrain bilaterally.
4. Variant III: Is perforating by several small branches arising from a single arterial arc that connect the P1 segments of both PCAs. Is the most arcade one.

In addition, the paramedian thalamic arteries supply the interpeduncular nucleus, the decussation of the superior cerebellar peduncles, the medial part of the red nucleus, the third and fourth cranial nerve nuclei and the anterior portion of the periaqueductal grey matter. As a result of the occlusion of the artery of Percheron it becomes a bilateral paramedian thalamic infarction with or without midbrain infarction [1,4].

Clinical symptoms

The complexity of thalamus and the vascular overlap with the midbrain causes a wide variety of symptomatology.

The most common symptoms of an ischemic stroke of the artery of Percheron are mainly three: vertical gaze palsy, memory impairment (specially learning new information and autobiographical) and altered sensorium.

Other clinical symptoms includes: consciousness disorders (confusion, somnolence, loss of consciousness or altered sensorium), cognitive (temporary disorientation) and behavioral (confabulation, impairment apathy, agitation access and aggressiveness) [5].

The altered mental status is explained by involvement of reticular activating system and the disrupted connections between the thalamus and the anterior, orbitofrontal and medial prefrontal cortices [6].

In addition, there are often accompanied by rostral midbrain symptoms, producing a “mesencephalothalamic” or “thalamopeduncular” syndrome: oculomotor (nuclear or supranuclear), hemiplegia, cerebellar ataxia and other movement disorders [1].

Case Presentation

A 46-year-old man, with an education up to 13 years old, right-handed and trucker by profession, is picked up by emergency services, after being 4 hours unconscious in his truck.

In the medical history, the following background information is highlighted: poor compliance with high blood pressure and dyslipidemia, sleep apnea over the past few years, myopia, astigmatism, obesity, smoker of 40 cigarettes/day and alcohol consumption in the past (but not currently).

He was found inside the truck with decreased level of consciousness, being in the resting area of drivers. The emergency services found him disoriented, with apparent dysarthria and with Glasgow Coma Scale score (shall henceforth be referred to as, GCS) fluctuating. At the first assessment, the patient was hemodynamically stable with frequent fluctuation of the level of consciousness and mobilization of the 4 limbs correctly. Analytically no pathological findings are evident. He was treated with flumazenil and naloxone, but the patient was not responding to treatment. Urine and ethanol abuse drugs are negative. Lumbar puncture is performed which is negative and simple cranial CT that is reported as normal.

Due the persistence of the symptomatology: fluctuation of the level of consciousness (deterioration of the GCS to 10 points), skew in the primary gaze with centered right eye and left eye with tendency to under version with internal rotation, limitation in the upper gaze, paresis left facial, difficulty raising the palate and tendency to dysphagia with saliva, doctors decided to treat the patient as a possible case of stroke.

The following medical tests were performed on the patient:

- **Echocardiogram:** It was found a 17 mm tunnelized oval foramen (onwards, FOP), with basal separation of 2'5 mm and left right spontaneous shunt that impresses secondary to the broad movement of the septum primum at that level vs fenestration thereof, with a baseline 0'3 cm defect.
- **Cranial magnetic resonance:** Acute-subacute ischemic paramedial ischemic lesion, Percheron's posterior circulation territory.

The patient was finally diagnosed as a possible vertebro-basilar stroke.

Later, the patient was transferred to the cardiology unit, where he underwent surgery on the closure of percutaneous FOP.

Neuropsychological assessment

The neuropsychological evaluation provides valuable clinical information in the case of congenital or acquired brain injuries in order to offer the therapeutic goals for neurorehabilitation and subsequent reinstatement of the patient to the activities of daily life with the maximum possible autonomy.

In this case, at the time of neuropsychological evaluation, the patient refers bradyphasia, problems with the gaze, some difficulty in swallowing and locution, memory difficulties (he does not remember anything of the episode).

The following neuropsychological tests were performed on the patient.

Discussion

The following results were obtained from the neuropsychological examination: The patient was cooperative during the examination. His lateral dominance is right-handed, the exploration was carried out in his mother tongue and it is important to highlight the visual limitations, causing fatigue in the patient as a consequence of the stroke, so some adaptations had to be made.

Since the patient was in the process of being declared unfit for work, a simulation test was administered even though the objective of the assessment was not forensic but clinical.

The patient's premorbid cognitive level is slightly low, due to the fact that the patient had training up to 13 years of age and subsequently, throughout his life, has not undergone any further training nor has he remained cognitively active.

Difficulties were noted in sustained attention, preserving the capacity for selective attention.

Despite the visual fatigue, the tests are aimed at preserving the visuoperceptive and visuoconstructive capacity.

The memory difficulties were present with both verbal and visual information.

Overall, the pattern of deficits shown by the patient responded to anterograde amnesia, with difficulties in coding, short-term memory, long-term memory and resilience.

Depending on the location of the lesion, the mnemonic pattern objectified from the patient's results is congruent in terms of significant coding difficulties, which is to be expected depending on the lesion.

However, some inconsistencies are also noted, since no impairment of short-term memory or inferior performance is expected in the recognition phase compared to phases of free recall of the information presented, without clues. This suggests the possibility of simulation/magnification.

Test	Result
Vocabulary Subtest of Wechsler Adult Intelligence Test-IV	
Copy of the Rey Complex Figure Test	
Memory of the Rey Complex Figure Test	Low average
Rey Auditory Verbal Learning Test	Average
<ul style="list-style-type: none"> • Learning 	Low average
<ul style="list-style-type: none"> • Interference 	Very impaired
<ul style="list-style-type: none"> • Short term memory 	Average
<ul style="list-style-type: none"> • Long term memory 	Impaired
<ul style="list-style-type: none"> • Recognition 	Very impaired
Logic Memory Subtest of Wechsler Adult Memory Scale-IV	Very impaired
<ul style="list-style-type: none"> • Short term memory 	Very impaired
<ul style="list-style-type: none"> • Long term memory 	Impaired
<ul style="list-style-type: none"> • Recognition 	Very impaired
Symbol Digit Test	Very impaired
Digit Span subtest of Subtest of Wechsler Adult Intelligence Test-IV	Impaired
<ul style="list-style-type: none"> • Digit Span Forwards 	Impaired
<ul style="list-style-type: none"> • Digit Span Backwards 	Very impaired
<ul style="list-style-type: none"> • Digit Span Sequencing 	Impaired
Trail Making Test	Very impaired
<ul style="list-style-type: none"> • Part A 	Impaired
<ul style="list-style-type: none"> • Part B 	Very impaired
Path 3 Subtest of Path Evaluation for Executive Dysfunction Test	Very impaired
Wisconsin Sorting Card Test	Impaired
FAS Word Fluency	
Test of Memory Malinger	

Table 1: Neuropsychological tests administered to the patient.

Such a simulation pattern is found in the TOMM simulation test, which shows that the patient underperforms compared to the average performance of people with dementia.

Next, in relation to performance in executive functions, the patient showed good capacity for alternation, planning and prospective memory although with a slow execution time.

However, difficulties were noted in phonological and semantic fluency as well as cognitive flexibility, without benefit from the errors made in the Wisconsin Sorting Card Test.

Conclusion

In conclusion, the patient presents cognitive deficits compatible with anterograde amnesia, executive dysfunction and dysnomia, which are to be expected depending on the bithalamic stroke injury. He also presents bradypsychia. Rest of cognitive functions preserved.

However, indicators of magnification of the deficits mentioned above are detected, according to the mnemonic patterns, the differences between tests measuring the same cognitive skills and the results in the TOMM simulation test.

Disclosure

No potential conflict of interest was disclosed.

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