

Infarction of the Percheron artery, key findings in radiology. Regarding a case

Infarto de la arteria de Percherón, hallazgos claves en radiología. A propósito de un caso

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Summary

The infarction of the Percheron artery refers to the area of cerebral ischemia affecting the paramedian aspect of the thalami, supplied by the artery of the same name. This artery is a common trunk that irrigates both thalami and is considered a normal variant of thalamic irrigation. These lesions are bilateral, asymmetric, and infrequent, with estimates suggesting that only one-third of the population has this variant. Its clinical presentation is typical, known as the Percheron triad, which includes disturbances of consciousness, oculomotor disorders, and cognitive-behavioral issues. When there is involvement of the rostral midbrain, the symptoms can be more varied.

Key words (MeSH)

Thalamus
Brain infarction
Mediodorsal thalamic nucleus

Palabras clave (DeCS)

Tálamo
Infarto cerebral
Núcleo talámico dorsomedial

Resumen

El infarto de la arteria de Percherón se refiere al área de isquemia cerebral que afecta el sector paramediano de los tálamos, irrigado por la arteria del mismo nombre. Esta arteria es un tronco común que irriga ambos tálamos, es considerada una variante de la normalidad de la irrigación talámica. Las lesiones son bilaterales, asimétricas e infrecuentes y se estima que solo la tercera parte de la población tiene esta variante. Su clínica es típica, se denomina *triada de Percherón,* y consiste en trastornos de la conciencia, oculomotores y cognitivo- conductuales. Cuando hay afectación del mesencéfalo rostral, su sintomatología es más variada.

Introduction

Percheron artery infarction, also known as Percheron syndrome or bilateral thalamic infarction, is rare, as it corresponds to infarction of a rare anatomical variant of the thalamic circulation. Its global prevalence is 4-12%, in which the irrigation of the paramedian thalamic sector is provided by a single trunk; Its clinical presentation is characterized by Percheron's triad, which consists of mental status changes ranging from confusion to coma, ocular disorders with vertical gaze paralysis, and memory impairment, with characteristic imaging findings showing synchronous bilateral thalamic ischemic lesions that may or may not affect the midbrain (1).

Case

We present the case of a 79-year-old male with several comorbidities: hypertension, diabetes mellitus, bilateral hearing loss, and Ménière's syndrome. In the morning, his family found him confused, lethargic, and unresponsive to their calls, so he was assessed at his home by ECU-911 personnel and transferred to the medical institution where the authors work. Upon arrival, he had a Glasgow Coma Scale score of 5/10, so he was intubated for advanced airway management.

A simple computed tomography (CT) scan of the skull was performed, revealing an area of bilateral thalamic low density in a paramedian location, with no evidence of hemorrhage (Figure 1). This was complemented by a brain magnetic resonance imaging (MRI) scan, which showed that this area exhibited diffusion restriction (DWI), specifically in a bilateral paramedian location with involvement of the central mesencephalic regions, predominantly in the right red nucleus, visible in cerebrospinal fluid attenuation sequences (FLAIR) and T2-weighted images, consistent with a subacute ischemic lesion in the region of the Percheron arteries (Figure 2).

Discussion

The thalamic arterial supply is provided by perforating vessels originating from the posterior cerebral artery (PCA), which is subdivided into four vascular territories: anterior, paramedian, inferolateral, and posterior.

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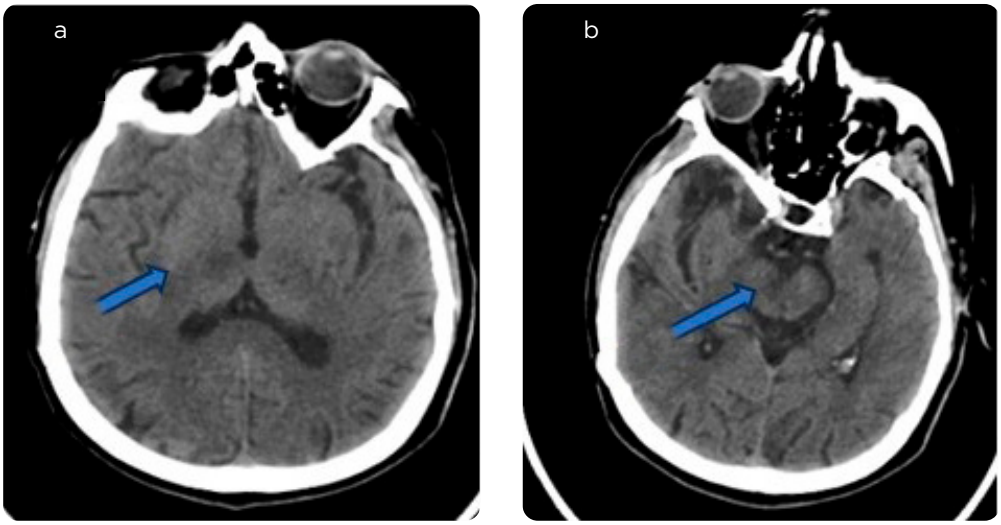


Figure 1. Axial CT scan of the skull. a and b). Poorly defined low density in the medial aspect of the thalami and the right aspect of the midbrain.

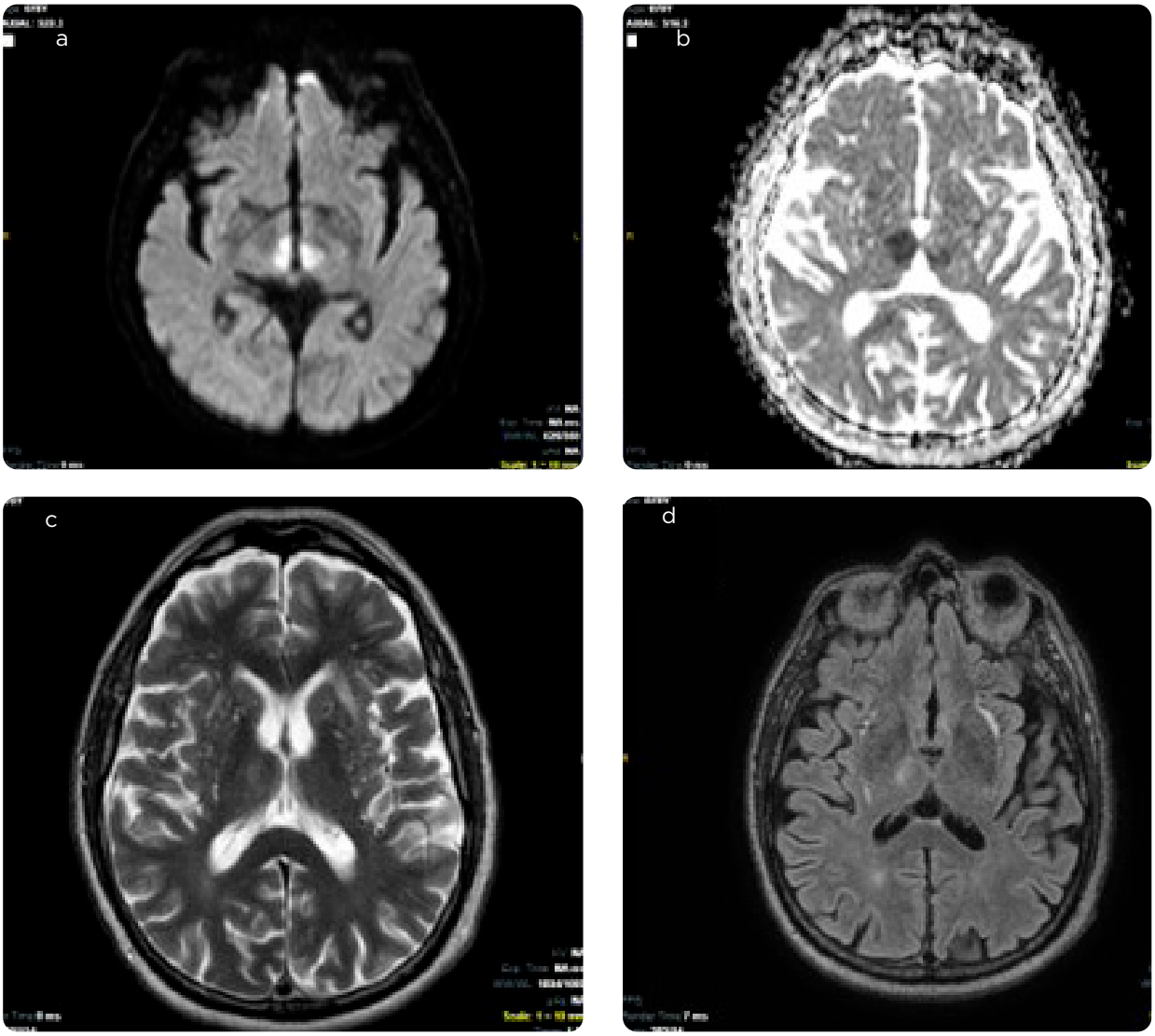


Figure 2. Brain MRI. a) Axial DWI acquisition. b) ADC map. c) FSE spin echo sequence with T2 information. d) FLAIR sequence with T2 information. Water diffusion restriction in a and b, with representation in the sequences with T2 information (c and d) on the medial aspect of the thalami due to infarction of the Percheron artery.

The paramedian territory is supplied by the artery of the same name, which originates from the first segment of the PCA, segment P1, and has some variations at its origin: a bilateral, multiple origin or a single trunk (1, 2). Three different forms of origin have been described:

- **Type 1:** symmetrical, bilateral origin, each side irrigates its ipsilateral thalamus, the most common presentation (50% of cases) (3, 4).
- **Type 2:** asymmetric origin, irrigation of both thalami depends on a single trunk, has a frequency of 45%, is subdivided into 2A when they originate independently but on the same side, and 2B when they originate from a common trunk and branches emerge from it to both thalami; this is known as the Percheron artery (3, 4).
- **Type 3:** of symmetrical origin, forming an arch that connects both posterior cerebral arteries, from which the paramedian arteries on each side originate; it is rare, with a prevalence of 5% (3, 4).

The Percheron artery is type 2B of the thalamic circulation, as described, a rare variant of the paramedian circulation of the thalamus, consisting of a single trunk that supplies both thalamic nuclei and sporadically the midbrain. This artery is named after Gerard Percheron, a French neurologist and researcher at the Institut National de la Santé et de la Recherche Médicale in Paris, France, who described this variant of thalamic irrigation in 1973 (2). The global prevalence of this variant is very low, between 4% and 12%; therefore, the associated ischemic event is even rarer, occurring in between 0.1% and 0.3% of all cerebrovascular events (2).

It has also been documented that the Percheron artery irrigates other areas of the brain, such as: the red nucleus (medial part), the interpeduncular nucleus, the nuclei of the III and IV cranial nerves, the decussation of the superior cerebellar peduncles, and the anterior portion of the periaqueductal gray matter (5).

Its clinical presentation is characterized by the classic or Percheron triad: altered consciousness, ranging from drowsiness and confusion to coma; oculomotor disorders such as vertical gaze palsy; and cognitive-behavioral disorders characterized by memory impairment (3).

When the midbrain is involved, photophobia, pupil abnormalities, cognitive impairment, amnesic syndrome, social behavior disorders, emotional flattening, hemiplegia, and ataxia are observed (6).

Radiological findings are characteristic. Plain cranial CT shows bilateral thalamic low density in the paramedian sector, which may even go unnoticed in hyperacute stages. At this point, MRI becomes relevant due to its sensitivity and specificity for detecting hyperacute ischemic events, i.e., within the first six hours. It shows high bilateral thalamic signal with diffusion restriction (DWI), then becomes visible in sequences: FLAIR and spin echo with T2 information and with T1 information, depending on the time of the event.

This area of ischemia, when it affects the rostral midbrain, in approximately 50% of cases, has four patterns of presentation, with bilateral paramedian thalamic involvement:

1. With involvement of the rostral midbrain; this is the most common.
2. Without involvement of the rostral midbrain, the second most frequent pattern.
3. Involvement of the bilateral anterior thalamic region with involvement of the midbrain.
4. Involvement of the bilateral anterior thalamic region without involvement of the midbrain (6).

On MRI, when there is a midbrain component, it is associated with a high V-shaped signal in the interpeduncular fossa, visible on T2-weighted FLAIR and DWI sequences; this finding is positive in 30% to 67% of cases (6, 7). This pathology has also been identified by angiography, which is difficult to characterize due to the small caliber of the affected vessel. In the case described here, the radiological findings were evident in the thalamus and midbrain, which are the third pattern of presentation.

Conclusion

Percheron artery infarction is a rare condition with specific and characteristic findings in both clinical and imaging studies, due to the typical cerebral territory supplied by the Percheron artery, which is the bilateral paramedian thalamic sector. However, it should be noted that it can compromise the midbrain associated with the "V" sign in its presentation.

The Percheron artery is one of the normal variants of thalamic irrigation, specifically type 2B, characterized by a single trunk that irrigates both thalamic nuclei.

Cerebral MRI is the method of choice for detecting cerebral ischemic pathology, specifically in cases of hyperacute disorders, when these findings are visible in the diffusion sequence (DWI) and may go unnoticed in a simple cranial CT scan.

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