Insonation of the Posterior Cerebral Artery Via the Transforaminal Window: An Unusual but Feasible Observation

Insonación de la Arteria Cerebral Posterior a Través de la Ventana Transforaminal: Una Observación Inusual pero Factible

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Abstract

Transcranial Doppler (TCD) ultrasonography typically visualizes the posterior cerebral arteries (PCAs) through the transtemporal window, while the basilar and vertebral arteries are assessed via the suboccipital approach. This report describes an unusual technical finding: visualization of PCA flow through the suboccipital window. During routine TCD in a patient with excellent acoustic access, two vascular structures arising from the distal basilar artery were identified at a depth of 92 mm, with flow characteristics consistent with PCAs. Favorable bone transmission and vascular alignment likely enabled this alternative insonation route. This observation suggests that, in exceptional anatomical conditions, suboccipital PCA assessment is feasible and may expand posterior circulation evaluation.

Keywords: Transcranial Doppler, Posterior cerebral artery insonation, Neurosonology

Resumen

La ecografía Doppler transcraneal (DTC) evalúa habitualmente las arterias cerebrales posteriores (ACP) a través de la ventana transtemporal, mientras que la arteria basilar y las vertebrales se insonan por vía suboccipital. Este reporte describe un hallazgo técnico inusual: la visualización del flujo de las ACP mediante la ventana suboccipital. Durante un DTC de rutina en un paciente con excelente ventana acústica, se identificaron dos estructuras vasculares originadas en el segmento distal de la arteria basilar a 92 mm de profundidad, con características de flujo compatibles con ACP. Condiciones anatómicas favorables permitieron esta vía alternativa, que podría ampliar la evaluación de la circulación posterior.

Palabras clave: Doppler transcraneal, Insonación de la arteria cerebral posterior, Neurosonología

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Transcranial Doppler (TCD) ultrasonography typically accesses intracranial vessels through established acoustic windows. Under standard conditions, the PCA is visualized transtemporally at depths of 60–75 mm, while the BA and VAs are insonated transforaminally at depths of approximately 80–110 mm.[1-3] This report describes an unusual technical finding: visualization of PCA flow through the suboccipital window.

During routine TCD in a patient with excellent acoustic access, suboccipital insonation was performed. At a depth of 92 mm, two vascular structures emerging from the distal portion of the BA were identified (Figure 1). Flow direction and spectral morphology were consistent with PCAs previously recorded through the transtemporal window (Figure 2).

Favorable bone transmission and vascular alignment likely enabled this alternative route for PCA insonation via a transforaminal approach. Classical descriptions allocate PCA assessment exclusively to the temporal window, and systematic documentation of suboccipital PCA visualization is effectively absent. This case suggests that, under exceptional anatomical conditions, PCA insonation through the foramen magnum is technically feasible and may represent an alternative window for posterior circulation assessment. Because flow characteristics may overlap with those of the superior cerebellar arteries, comparison with standard distal PCA recordings obtained transtemporally is recommended.

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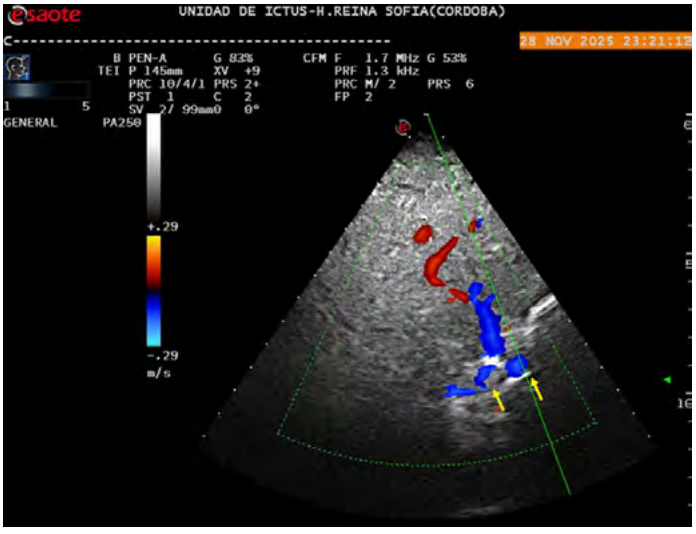

Figure 1. Suboccipital insonation of the basilar artery. At 92 mm, two diverging signals are visualized, consistent with bilateral posterior cerebral arteries arising distal to the basilar bifurcation (arrows).

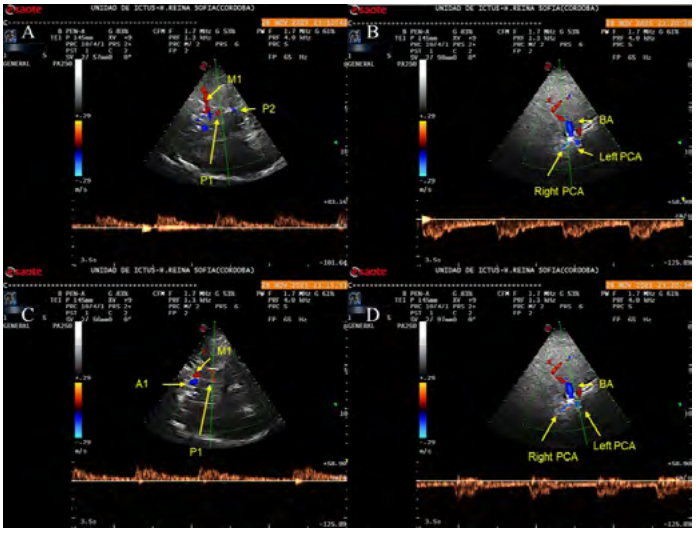

Figure 2. Transtemporal visualization of the (A) right and (C) left P1 segments, shown in B-mode and color Doppler with corresponding spectral waveforms. Panels B and D show the spectral comparison of transforaminal (B) right and (D) left PCA signals, demonstrating closely matching waveform morphology and velocity patterns.

References

1. Purkayastha S, Sorond F. Transcranial Doppler Ultrasound: Technique and Application. Semin Neurol. 2012;32(4):411-20. https://doi.org/10.1055/s-0032-1331812.
2. Schöning M, Walter J. Evaluation of the vertebrobasilar-posterior system by transcranial color duplex sonography in adults. Stroke. 1992;23(9):1280-6. https://doi.org/10.1161/01.str.23.9.1280.
3. `von Büdingen HC, Staudacher T, von Büdingen HJ. Ultrasound diagnostics of the vertebrobasilar system. Front Neurol Neurosci. 2006;21:57-69. https://doi.org/10.1159/000092385.