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Case Report

Incidental Discovery of a Developmental Venous Anomaly: A Case Report of a 37-Year-Old Female with Chronic Headaches

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ABSTRACT

Developmental venous anomalies (DVAs) are congenital vascular malformations often found incidentally on neuroimaging. This case report describes a 37-year-old female with chronic headaches and an incidentally discovered DVA in the left frontal lobe. Magnetic resonance imaging (MRI) revealed a classic "caput medusae" pattern without hemorrhage or associated cavernous malformation. This case highlights the importance of recognizing DVAs as incidental findings, differentiating them from other causes of chronic headaches, and understanding the significance of associated imaging findings.

Key words: Developmental venous anomaly, chronic headaches, gliosis, caput medusae, Magnetic resonance imaging (MRI).

INTRODUCTION

Developmental venous anomalies (DVAs) are cerebral vascular malformations. DVAs are the most common form of slow-flow venous malformation in the brain, with an estimated incidence of 2.6%-6.4%, and the overwhelming majority are asymptomatic. [1] A DVA is composed of multiple radiating medullary veins converging centripetally into a single larger collecting vein, which ultimately drains into either the superficial or deep cerebral venous system. [2] They are considered benign anatomical variants resulting from aberrant venous embryogenesis, often functioning as alternative drainage pathways for normal brain tissue. While most DVAs are asymptomatic and discovered incidentally, as in the case of our 37-year-old female patient, their clinical significance can vary depending on associated anomalies, hemodynamic changes, or complications such as hemorrhage or venous hypertension. [1]

CASE REPORT

A 37-year-old female with no significant medical history, other than a one-year history of chronic headaches, presented to the hospital for further evaluation. The headaches were described as bilateral, throbbing, and occurring 2–3 times per week, with no clear triggers or associated symptoms such as nausea, vomiting, or visual disturbances. The patient denied a history of seizures, focal neurological deficits, or trauma. She reported no family history of cerebrovascular disease or migraines.

The neurological examination was unremarkable, with no focal deficits, cognitive impairment, or signs of increased intracranial pressure. Given the chronicity and frequency of her headaches, an MRI of the brain was performed to rule out structural abnormalities.

The MRI revealed a developmental venous anomaly in the left frontal lobe, characterized by the classic "caput medusae" appearance, with radially arranged medullary veins converging into a single transcortical draining vein (Figure 1a). Adjacent to the DVA, there was focal gliosis, evidenced by hyperintensity on T2-weighted and fluid-attenuated inversion recovery (FLAIR) sequences (Figure 1b). No associated hemorrhage, cavernous malformation, or mass lesion was observed. The remainder of the brain parenchyma appeared normal. The developmental venous anomaly enhances after contrast (Figure 1c).

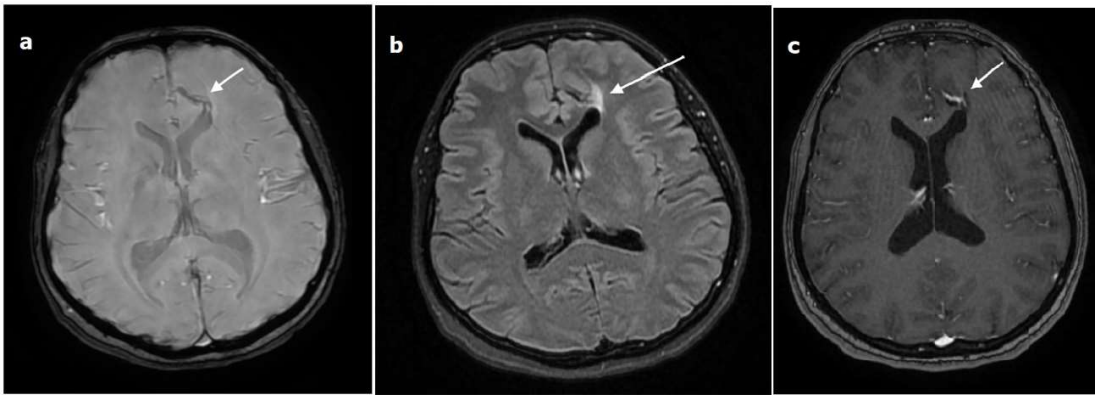

Figure 1. 1a: MRI susceptibility weighted image showing the DVA with "caput medusae" pattern, **1b**: FLAIR sequence highlighting adjacent gliosis (hyperintensity). **1c**: MRI T1 sequence with contrast showing the DVA

DISCUSSION

Developmental venous anomalies (DVA) are cerebral vascular malformations. DVAs are the most common form of slow-flow venous malformation in the brain. It is essential to categorize DVAs according to their drainage territory, as they are normal anatomical variations that are functionally necessary by the parenchymal tissue they drain. A third of DVAs are found in the brainstem and cerebellum, but the majority are supratentorial and most frequently occur in the frontal lobe. [2] Supratentorial DVAs can either drain paraventricularly into superficial cortical veins or subcortically into deep subependymal veins. [3]

In this case, the DVA was supratentorial and isolated, with no evidence of associated cavernous malformations or hemorrhage. However, the presence of adjacent gliosis is noteworthy. MRI findings of parenchymal abnormalities surrounding DVAs may be related to edema, gliosis, or leukoaraiosis secondary to altered hemodynamics in the drainage area. Gliosis is a nonspecific finding that may result from chronic venous hypertension or minor ischemic changes due to altered hemodynamics. [4]

The umbrella-like or "caput medusae" appearance on MRI is pathognomonic for DVAs and results from the convergence of medullary veins into a single draining vein. [5] In our case, MRI revealed a classic DVA in the left frontal lobe, with adjacent gliosis evidenced by hyperintensity on T2-weighted and FLAIR sequences. Other sequences, such as susceptibility-weighted imaging (SWI) and dynamic contrast-enhanced MRI, can further characterize DVAs and assess for associated anomalies or hemodynamic changes. [1] The management of DVAs is conservative in asymptomatic cases, as surgical or endovascular intervention may disrupt normal venous drainage and lead to complications such as venous infarction. [6] Our patient was reassured about the incidental nature of the DVA and the low risk of complications. Her chronic headaches were managed with prophylactic migraine therapy and lifestyle modifications, aligning with current guidelines for headache management. Follow-up imaging is typically not required for isolated DVAs unless new symptoms arise, such as seizures or focal neurological deficits. [7] While no treatment is required for asymptomatic DVAs, patients with new or progressive symptoms (e.g., refractory headaches or focal deficits) should undergo repeat imaging and multidisciplinary assessment. In rare cases of complications such as thrombosis or hemorrhage, surgical intervention may be considered depending on the complication. [8]

CONCLUSION

This case highlights the incidental discovery of a DVA with adjacent gliosis in a patient with chronic headaches. While DVAs are typically benign, the presence of gliosis underscores the importance of advanced imaging techniques and individualized patient management. Recent literature supports conservative management for asymptomatic DVAs and emphasizes the need for patient education and follow-up.

PATIENT CONSENT

A written informed consent was obtained from the patient for publication of this case report.

AUTHORS' CONTRIBUTION

All authors have significantly contributed to the work, whether by following the case at the bedside, conducting literature searches, drafting, revising, or critically reviewing the article. They have given their final approval of the version to be published, have agreed with the journal to which the article

has been submitted, and agree to be accountable for all aspects of the work.

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CONFLICT OF INTEREST

None

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