Case Report

Medial tentorial dural arteriovenous fistula: A rare cause of bithalamic oedema

Cyril Dargazanli, MD, MSc1,2,*, Anais Lippi, MD3,*, Nicolas Gaillard, MD3,*

1Department of Neuroradiology, Montpellier University Hospital Center, Gui de Chauliac Hospital, Montpellier, France
2Institut de Génomique Fonctionnelle (IGF), UMR 5203 CNRS – U 1191 INSERM – Univ. Montpellier, Montpellier Cedex 05, France
3Department of Neurology, Montpellier University Hospital Center, Gui de Chauliac Hospital, Montpellier, France

A R T I C L E   I N F O

Article history:
Received 9 March 2022
Revised 14 March 2022
Accepted 20 March 2022

Keywords:
Neuroradiology
Fistula
Dural arteriovenous fistula
Bithalamic oedema
Embolization

A B S T R A C T

A 39-year-old man was admitted after 1 week of headaches and cognitive changes. CT scan showed bithalamic hypodensities, corresponding to bithalamic vasogenic oedema. Punctate hemorrhage was present, with foci of thalamic enhancement. CT angiography raised the suspicion of arteriovenous shunt. Digital subtraction angiography confirmed a medial falci-tentorial dural arteriovenous fistula. Complete embolization was performed using liquid embolic agent. Although tentorial dural fistulas have already been described as a cause of bithalamic oedema and subacute dementia, they are not generally included in pathologies implied in this radiologic pattern.

© 2022 The Authors. Published by Elsevier Inc. on behalf of University of Washington. This is an open access article under the CC BY license (http://creativecommons.org/licenses/by/4.0/)

Case Presentation

A 39-year-old man without medical history was admitted after 1 week of headaches, cognitive changes with apathy, and loss of language fluence. After initial workup in a psychiatric unit, patient was referred in neurology department. Clinical status quickly worsened with impaired consciousness and akinetic mutism.

Admission CT scan showed bithalamic hypodensities (Fig. 1A), corresponding to bithalamic vasogenic oedema on MRI (Fig. 1B,C). Subtle punctuate petechial hemorrhage was present (Fig. 1D), and enhanced MRI showed small foci of thalamic patchy enhancement (Fig. 1E), without obvious deep venous thrombosis. Lumbar puncture showed slight hyperproteinorachia (0.69 g/L), without increased cellularity or abnormal cells.

CT angiography raised the suspicion of arteriovenous shunt given the opacification of superior vermian vein at the arterial phase (Fig. 1F).

Digital subtraction angiography (DSA) was decided at this time, confirming a medial falci-tentorial dural arteriovenous

* Competing Interests: We have no conflict of interest.
* Corresponding authors.
E-mail addresses: c-dargazanli@chu-montpellier.fr (C. Dargazanli), dr-lippi.cmn@orange.fr (A. Lippi), n-gaillard@chu-montpellier.fr (N. Gaillard).
https://doi.org/10.1016/j.radcr.2022.03.072
1930-0433/© 2022 The Authors. Published by Elsevier Inc. on behalf of University of Washington. This is an open access article under the CC BY license (http://creativecommons.org/licenses/by/4.0/)
Fig. 1 – Noninvasive Imaging A: Plain CT scan showing bithalamic symmetrical hypodensities B: Baseline MRI showing bithalamic FLAIR hyperintensities C: Diffusion MRI depicting increased bithalamic apparent diffusion coefficient (ADC) D: Punctuate hemorrhage in right thalamus on T2* E: Gadolinium enhanced sequence showing small foci of bithalamic patchy enhancement F: Arterialized superior vermian vein (white arrow) draining into vein of Galen (dotted white arrow) and subsequently into internal cerebral vein (black arrow).

MRI performed at 3 months showed complete resolution of thalamic anomalies.

Discussion

A broad list of conditions (vascular, metabolic, infectious or neoplastic) is associated with bithalamic oedema. Although tentorial dural fistulas have already been described as a cause of bithalamic oedema and subacute dementia [1,2], they are not generally included in pathologies implied in this classical radiologic pattern [3]. Diagnostic may be difficult on noninvasive imaging, and these rare dAVF are potentially overlooked. Moreover, non-hemorrhagic presentation (thalamic dementia) may delay angiographic diagnosis, with a mean duration of symptoms at the time of diagnosis around 3 months [1]. Right diagnostic is of paramount importance, and may avoid inadequate brain biopsy.
Fig. 2 – Digital Subtraction Angiography (DSA) A and B: Lateral (A) and anteroposterior (B) arterial phase showing the fistulous plaque (white arrow), the arterialized superior vermian vein (dotted white arrow) and vein of Galen (black arrow) C and D: Small contribution of the medial tentorial branch from the left middle meningeal artery (white arrow) E: Lateral venous phase of left vertebral artery injection showing filling defect of the anterior part of straight sinus, related to deep venous thrombosis F: Post embolization non-subtracted image showing liquid-embolic cast in the arterial feeders, in the fistulous plaque, but away from the vein of Galen.
Tentorial dural arteriovenous fistulas may be classified into 6 types on the basis of shunt location, associated sinus and direction of venous outflow [4]. Arterial feeders for the straight sinus/medial falcotentorial subtype are mainly the posterior meningeal artery, occipital artery or tentorial artery. Both endovascular and surgical procedures may be efficiently performed to cure these aDVF.

In conclusion, medial tentorial dAVF should be evoked in patients with unexplained rapidly progressive cognitive impairment and bithalamic oedema, and complete DSA should be performed in these situations.

**Patient consent**

Informed consent for publication of this case was obtained from the patient.

**References**

[1] Holekamp TF, Mollman ME, Murphy RKJ, Kolar GR, Kramer NM, Derdeyn CP, et al. Dural arteriovenous fistula-induced thalamic dementia: report of 4 cases. J Neurosurg 2016;124(6):1752–65. doi:10.3171/2015.5.JNS15473.

[2] Cox M, Rodriguez P, Mohan S, Sedora-Roman NI, Pukenas B, Choudhri O, et al. Tentorial dural arteriovenous fistulas as a cause of thalamic edema: 2 cases of an important differential diagnosis to consider. The Neurohospitalist 2021;11(1):33–9. doi:10.1177/1941874420944333.

[3] Hegde AN, Mohan S, Lath N, Lim CCT. Differential diagnosis for bilateral abnormalities of the basal ganglia and thalamus. RadioGraphics 2011;31(1):5–30. doi:10.1148/rg.311105041.

[4] Lawton MT, Sanchez-Mejia RO, Pham D, Tan J, Halbach VV. Tentorial dural arteriovenous fistulae: operative strategies and microsurgical results for six types. Oper Neurosurg 2008;62(suppl_1) ONS110-ONS125. doi:10.1227/01.neu.0000317381.68561.b0.