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A “Pseudo-cavernoma” – an encapsulated Hematoma of the Choroid Plexus

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Abstract

We present the first report of an intraventricular encapsulated hematoma, mimicking cavernous malformation on imaging and gross lesion appearance. A 47-year-old female on anticoagulation therapy for atrial fibrillation presented with left upper extremity apraxia, neglect, and mild gait imbalance. Her brain CT scan and MRI revealed multilobulated lesions involving the choroid plexus in the atria of both lateral ventricles. The intraoperative appearance was that of encapsulated mass, with blood clots at different stages of liquefaction and organization, all consistent with the gross appearance of a cavernous malformation. However, histopathologic examination demonstrated hematoma with components at different ages, and normal vessel infiltration without any hint of cavernous malformation histology, or underlying neoplasia. Encapsulated hematoma should be considered in the differential diagnosis of hemorrhagic intraventricular masses.

Keywords

Encapsulated hematoma; choroid plexus; anticoagulation; cavernoma

1. Introduction

Choroid plexus mass lesions can include a broad range of neoplastic, inflammatory and vascular pathologies. (1) (2) Encapsulated hematoma has never been reported as an expanding intraventricular mass.

2. Case report

A 47-year-old female with past medical history remarkable for atrial fibrillation (treated with oral warfarin at International Normalized Ratios of 1.8–2.5) presented at a local community hospital with symptoms of numbness and subtle incoordination of her left arm and hand. CT scan and MRI of the brain revealed multilobulated lesions involving the

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choroid plexus, with signal features of calcifications and possible hemorrhage, in the atria of both lateral ventricles. Follow-up MRI after 3 months showed interval enlargement of the lesions, more on the right side, and the patient was referred to our institution for further diagnosis and treatment.

Her neurologic examination was normal except for subtle left upper extremity apraxia, neglect, and mild gait imbalance. Her brain MRI revealed bilateral multi-lobulated masses occupying the atrium of the lateral ventricles, larger on the right side, with associated subependymal edema (Fig. 1A–D).

An extensive work-up for a primary or metastatic tumor was negative. The patient was started on dexamethasone (4 mg orally twice per day), her warfarin was maintained for 1 week, and open surgical biopsy was planned.

The lesion was approached via right parietal craniotomy and transcortical route to the ventricular antrum. Upon opening the ventricular ependyma, the lesion was noted to consist of a thick tan-colored firm capsule containing numerous cystic cavities filled with blood at different stages of organization (Fig. 2). The mass was debulked and mobilized, interrupting its vascular supply from the choroid plexus and resecting it *in toto* (Fig. 1E).

Histologic examination (Figs 3A, B) of the lesion revealed a hematoma of different ages with evidence of recent and old organized blood breakdown products. Some areas contained clusters of cholesterol crystals, and calcifications. Other areas showed intra and extracellular hemosiderin deposition, and a robust inflammatory cell infiltrate. All blood vessels had normal architecture and there were no dilated thin-walled capillaries as would be seen in cavernous malformation. There was an intact muscular layer around larger vessels. The background consisted of normal choroid plexus with psammoma body type calcifications. There was no evidence of underlying neoplasm or infectious process.

The patient had an uneventful postoperative course. Her warfarin was maintained and it was decided to follow the smaller, left-sided lesion with serial scans. Her presenting symptoms resolved following the surgery and she remained well neurologically. Unfortunately, 1 month after her craniotomy, she was admitted to another institution with severe abdominal pain. She underwent emergent cholecystectomy, but developed abdominal sepsis and died.

3. Discussion

Chronic encapsulated hematomas have been reported in the brain (3), but not previously within the cerebral ventricles. Preoperative imaging and the microsurgical appearance of the lesion at biopsy could have been confused with a cavernous malformation. (4, 5) Intraventricular cerebrovascular anomalies have been reported, with similar features on earlier generation imaging. (6, 7)

Cavernous malformation can be differentiated from encapsulated hematoma by histologic examination only. (4) The vessels in our specimen ranged from small to large. The small vessels were normal capillaries, often seen in organizing hematoma. All medium to large vessels had a prominent muscular layer, which is lacking in cavernous malformations. (8) There were no large sized thin walled sinusoidal “caverns”. Xanthogranulomatous reaction may involve the choroid plexus bilaterally, but this typically reveals “foamy” cells, or lipid-laden macrophages and multinucleated giant cells, which our specimen lacked. (9)

A key feature of the lesion resected from this patient is that it showed interval growth in the setting of chronic anticoagulation. Cavernous malformations and organized hematomas both tend to enlarge due to bleeding and organizing, incorporating thrombosed sinusoidal vessels

into the growing capsule. (4, 10) To our knowledge this is the only report of an intraventricular encapsulated hematoma. Most bleeds associated with intraventricular vascular malformations tend to spill into the cerebrospinal fluid, resulting in intraventricular hemorrhage rather than encapsulation. (6) Since histopathologic evaluation of this encapsulated hematoma showed normal architecture of all blood vessels, and there were no dilated thin-walled capillaries or caverns thereby lacking the qualification to fall in the category of true cavernous malformation, we coined the term “pseudo-cavernoma”.

4. Conclusion

Organizing hematoma of the choroid plexus is a rare entity that should be considered in the differential diagnosis of a choroid plexus mass, mimicking imaging features of cavernous malformation.

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Fig. 1.

(A) Axial T2-weighted MRI showing bilateral lateral ventricular masses. The masses are hyperintense with hypointense cystic walls and septations. (B) Axial T1-weighted MRI showing hyperintense intraventricular masses. (C) Axial T1-weighted MRI with gadolinium showing patchy enhancement of stromal elements in the lesion. (D) Axial fluid attenuated inversion recovery showing hyperintensity in the parenchyma around the antrum of the lateral ventricle. There was no hemosiderin staining of the parenchyma and no other lesions elsewhere in the brain. (E) Axial postoperative T2-weighted MRI showing gross total resection of the right ventricular lesion.

Fig. 2.
Intraoperative photomicrograph of the corticectomy showing the thick tan wall of the intraventricular lesion. The lesion wall has been incised.

Fig. 3. Representative histology of the vascular structures in the right-sided “pseudo-cavernoma” after removal showing: (A) vascular channels with normal vessel wall structure with a well-developed smooth muscle layer in a background of organizing hemorrhage with cholesterol clefts, calcification, as well as deposits of hemosiderin and hematoidin (hematoxylin and eosin, $\times 10$, scale bar corresponding to 0.3 mm); and (B) reactive vascular proliferation with enumerable normally formed capillary vessels showing thin vessel walls, and a larger vessel with normal angioarchitecture including well-developed muscular media (Masson trichrome stain; $\times 20$; scale bar corresponding to 0.1 mm).