Intraventricular Cavernous Malformation Radiologically Mimicking Meningioma

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We report a case of trigonal cavernous malformation (CM) radiologically mimicking meningioma. The computed tomographic (CT) head angiography and magnetic resonance imaging (MRI) showed a partially calcified lesion with slight contrast enhancement located in the area of the left atrium of lateral ventricle. The lesion was completely removed using microsurgery with a parieto-occipital transcortical approach. The resected mass was histologically confirmed as CM. CM should be considered as differential diagnosis in case of the atrial mass lesion due to lack of hemosiderin ring characteristically seen other seated CM.

KEY WORDS: Cavernous malformation · Meningioma · Trigone · Atrium.

INTRODUCTION

Intraventricular cavernous malformations (CM) are very rare vascular malformations that account for 2.5% of all brain cavernous malformations. Finkelnburg first described intraventricular CM in 1905. Since then, less than 50 cases have been reported. On imaging, these lesions may be misdiagnosed as arteriovenous malformations (AVM), meningiomas, or high grade gliomas.

We report a clinical case of trigonal CM which was diagnosed initially as a trigonal meningioma; the results of neuroimaging were more compatible with trigonal meningioma than with trigonal cavernous malformation.

CASE REPORT

A 48-year-old woman presented with sudden-onset severe headache for the first time. Brain computed tomography (CT) and brain magnetic resonance images (MRI) at another hospital revealed a 2.5 cm of maximal diameter, well-defined, partly calcified round mass in the left trigonal region with slight contrast enhancement. There was no perileional edema or midline shift. There was also no hydrocephalus (Fig. 1A, B). Severe headache was gradually decreased and resolved. The physical examination demonstrated right homonymous temporal hemianopia. CT head angiography at the time of admission showed that the lesion was not definitely supplied by feeding arteries (Fig. 1C). The lesion, atypical features of meningioma in radiological images, was diagnosed initially as an intraventricular trigonal meningioma based on incidence and epidemiological factors. A differential diagnosis of choroid plexus papilloma was considered less likely. She underwent left parieto-occipital craniotomy, inferior parietal gyrus approach, and en block excision of the mass. Inferior parietal gyrus corticectomy and track were created to the shortest distance of the lesion under frameless navigation guidance. There was a multi-lobulated purple mass within the atrium extending anteriorly into the temporal horn. The gross appearance of the resected mass, purple colored multiple lobulated, was thought to be more compatible with CM rather than Meningioma (Fig. 2). Postoperatively, the visual field deficit, right upper homonymous hemianopsia, remained to be unchanged. The permanent pathology was reported not as meningioma but as cavernous malformation unlike our initial preoperative radiological diagnosis. Postoperative CT confirmed the total resection of the CM (Fig. 3). We reviewed the preoperative radiological images of the patient with trigonal CM postoperatively. Gradient echo images which were neglected preoperatively showed multiple low signal intensity suggesting thrombosis or hemorrhage (Fig. 1D).
The incidence of CM has been reported in the range of 0.4-0.5% in MRI and autopsy series. CM is typically located in the subcortical areas, deep white matter and basal ganglia. Supratentorial areas account for 80% of locations where cavernous malformation occur. In the infratentorial regions, cavernous hemangiomas mostly occur in the brainstem and cerebellum. CM rarely occurs within the ventricular system. About 50 well-documented cases have been published.

Trigonal cavernous malformation may be misdiagnosed as malignant neoplasms, meningiomas, and AVMs because of their enhancement and heterogeneous appearance of CT and MRI. The intraventricular location, size, hyperintensity, and partial calcification suggest a neoplastic lesion. However, the lack of surrounding edema on the fluid-attenuated inversion recovery and T2 MRI sequences, the peripheral hemosiderin seen on the T2-weighted axial MRI scan, and the lack of enhancement make a tumor less likely and suggest vascular malformation. Typical CT findings of CM usually demonstrate a well circumscribed moderately hyperintense nodular lesion with mild contrast enhancement and calcifications. The characteristic appearance on MRI is a mixed signal intensity resulting from blood products of varying ages. However, Kumer et al. have described intraventricular cavernous angiomas lack of the hemosiderin ring. In retrospective investigation of our case, slight hyper intensity on T2-weighted images and hyper intense on T1-weighted images in radiologic features of our case may be more closely correlated with subacute stage hemorrhage rather than pure mass lesion. Meningiomas generally are hypo- to isointense on T1-weighted images and iso- to hyperintense on T2-weighted images relative to cortex. Homogenous signal intensity with nodular mass lesion may suggest a first episode of hemorrhage within mass lesion without repetitive bleeding. Despite a first attack of hemorrhage, well-circumscribed intraventricular mass lesion should be differentially diagnosed as cavernous malformation; we simply overlooked this lesion as trigonal meningioma on the base of incidence.
without more careful consideration. We reviewed the preoperative radiological images of the patient with trigonal CM postoperatively. Preoperative Brain MRI and Brain CT suggested that the lesion was hemorrhagic with scanty enhancement and well circumscribed tumor. If we had examined the preoperative radiological images carefully, trigonal CM would have been included in the differential diagnoses of the lesion.

The natural history of CM is not fully understood. The estimated annual risk of hemorrhage of supratentorial CM is about in the range of 0.25-0.7%9. The natural history of intraventricular CM is not known due to rare incidence. Reins et al.11, in a review of 27 cases of intraventricular CM, found that 64% of patients presented with mass effect and 20% with acute hemorrhage. The tendency of rapid growth and extralesional hemorrhage of intraventricular CM, found that 64% of patients presented with mass effect and 20% with acute hemorrhage. The tendency of rapid growth and extralesional hemorrhage of intraventricular CM is not known due to rare incidence. Using any surgical approach, callostomy should be the gold standard of treatment with no other treatment modalities, are somewhat different from other intraventricular pathologies.

CONCLUSION

Although trigonal CM with unusual radiologic features is extremely rare, they should be considered in the differential diagnosis of trigonal lesions. Because the treatment plan of intraventricular CM, complete removal of the lesion should be gold standard of treatment with no other treatment modalities, are somewhat different from other intraventricular pathologies.

References

1. Anderson RC, Connolly ES Jr, Ozduman K, Laurans MS, Gunel M, Khandji A, et al : Clinicopathologic review : giant intraventricular cavernous malformation. Neurosurgery 53 : 374-378; discussion 378-379, 2003
2. Del Curling O Jr, Kelly DL Jr, Elster AD, Craven TE : An analysis of the natural history of cavernous angioma. J Neurosurg 75 : 702-708, 1991
3. Fagundes-Pereyra WJ, Marques JA, Sousa LD, Carvalho GT, Sousa AA : Carvenoma of the lateral ventricle : case report. Arq Neuro-psiquiatr 58 : 958-964, 2000
4. Ishikawa M, Handa H, Moritake K, Mori K, Nakano Y, Aii H : Computed tomography of cerebral cavernous hemangiomas. J Comput Assist Tomogr 4 : 587-591, 1980
5. Jellinger K : Vascular malformations of the central nervous system : a morphological overview. Neurorsurg Rev 9 : 177-216, 1986
6. Kumar GS, Poonnoose SJ, Chacko AG, Rajishkhar V : Trigonal cavernous angiomas : report of three cases and review of literature. Surg Neurol 65 : 367-371; discussion 371, 2006
7. Majós C, Cucurella G, Aguilera C, Coll S, Pons LC : Intraventricular meningiomas : MR imaging and MR spectroscopic findings in two cases. AJNR AM J Neuroradiol 20 : 882-885, 1999
8. Nieto J, Hinojosa J, Muñoz MJ, Esparza J, Ríov R : Intraventricular cavernoma in pediatric age. Childs Nerv Syst 19 : 60-62, 2003
9. Ogawa A, Katakura R, Yoshimoto T : Third ventricular cavernous angioma : reports of two cases. Surg Neurol 34 : 414-420, 1990
10. Perry RD, Parker GD, Hallinan JM : CT and MR imaging of fourth ventricular meningiomas. J Comp Assist Tomogr 14 : 276-280, 1990
11. Reins N, Assaker R, Louis E, Lejeune JP : Intraventricular cavernomas : three cases and review of the literature. Neurosurgery 44 : 648-654; discussion 654-655, 1999
12. Robinson JR, Awad IA, Little JR : Natural history of the cavernous angioma. J Neurosurg 75 : 709-714, 1991
13. Simson G, Zager EL, Grossman RI, Gennarelli TA, Flamm ES : Cavernous malformations of the third ventricle. Neurosurgery 37 : 37-42, 1995
14. Suess O, Hammersen S, Brock M : Intraventricular cavernoma : unusual occurrence in the region of foramen of Monro. Br J Neurosurg 16 : 78-79, 2002
15. Tatagiba M, Schönmayr R, Samii M : Intraventricular cavernous angioma. A survey. Acta Neurochir (Wien) 110 : 140-145, 1991