Cystic Lesions in Giant Intraventricular Meningioma: Cases Report

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Case report

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Abstract

Background: Giant meningioma stemming from intraventricular zone has been reported to be extremely few. Two cases of supersize (>8 cm) intraventricular meningiomas presenting with cystic lesions and their clinical characteristics were collected in our study.

Case description: One patient was a 56-year-old man who hospitalized for blunt headache and weakness of right lower limb along with defect of right visual field for 12 months. The other patient is a 22-year-old lady presented with slight headache accompanied with right facial numbness for one week. Computed tomography and magnetic resonance imaging of both patients revealed a giant heterogeneous, enhancing tumor mainly in the left trigonum with a low-density or hypointense cystic lesions located within or around the tumor. Total resection was performed via a transcortical approach in both cases. The pathological and immunohistochemical staining indicated fibroblastic meningioma (case one) and atypical meningioma (case two) respectively. Postoperatively, both of patients recovered free from episodes of symptoms and imaging examinations confirmed no evidence of regrowth of the meningioma during an average 24 months follow-up.

Conclusions: Cystic lesions may indicate the histopathologic malignancy of intraventricular meningioma. Transcortical approach through the posterior temporal lobe or the parieto-occipital lobe is an effective technology for giant intraventricular meningiomas.

Introduction

Meningiomas are the most common non-malignant intracranial tumors with an incidence of 37.6% [1, 2], while they involving the intraventricular space are rare, which account for only 0.5–5% of intracranial meningiomas.³ Intraventricular meningiomas (IVMs) are usually described as insidious enlargement of the size leading to generalized hydrocephalus disorders or neurological mass effect, which characterized highly by location and histopathologic features. The most common lesion site of IVMs is the trigone area of the lateral ventricle [4, 5]. Being initially ‘silent’, they could be inconceivable large in size before hospitalization, representing a particular challenge for surgical procedure [6, 7].

In this paper, we collected the pathomorphological characteristics, surgical treatment and outcome of two cases of oversize IVM (> 8 cm) with cystic degeneration, which is extremely rare and has not been reported yet as far as we known, so as to improve the understanding of this sub-type of IVMs.

Case Report

Clinical Presentation

The first patient was a 56-year-old man, who complained of blunt headache and weakness in right lower limb along with defect of right visual field for 12 months. The second patient was a 22-year-old female presented with slight headache accompanied with right facial numbness for one week. The system

disorder history was negative in both cases. The CT examination of both patients demonstrated radiographic features of a giant iso-density, peritumoral/intratumoral low-density cystic lesions mass mainly in the left lateral ventricle (Nauta [8] type II and type I), and CTA indicated an affluent blood supply stemming from choroidal artery (Fig. 1–2). The MRI showed that the solid part of the tumor was isointense on T1-weighted images, slightly hyperintense on T2-weighted images comparing with brain tissue, and enhanced MRI revealed well-demarcated dimension of 10.5x6.2x6.1 cm and 8.5x6.4x6.2 cm respectively in left intraventricular mass with midline shift in both patients. The cysts were hypointense on T1 weighted images and hyperintense on T2-weighted images (Fig. 1–2).

Surgical Management and Outcome

An entire resection procedure through temporo-occipital approach was performed in case one and a parieto-occipital approach in case two. The cortical incision was determined by the distance between the cortex and the tumors, and the direction of long axis and growth of the tumors, paying equal attention to the protection of the functional structures. When the tumor was exposed, the operative field was expanded by the assistance of brain retractor. The tumor was primarily excised in blocks within the capsule under the microscope, followed by the peritumoral separation and tumor feeding artery occlusion. We observed that the tumors were elastic and had a rich vascularity that favored growth and invasion, and seemed to arise from the choroid plexus of trigone. A ventricular drainage tube was placed for 24–48 hours routinely after removed the tumor. At a mean follow-up of 24 months, both of patients were neurologically intact and reported no further episodes of symptoms and CT/MRI showed no evidence of regrowth of the meningioma (Fig. 1–2).

Histopathology

The gross appearance of both tumors were grayish-red soft tissue fragments (Fig. 3A). Histological examination demonstrated a fibroblastic meningioma in patient 1 while an atypical meningioma in patient 2. Hematoxylin and eosin (H&E) staining revealed a multi-vascularity tumor biopsy, interpenetrating thin-walled dilated vessel in both patients; Additionally, infarction of partial tumor tissue, necrotic foci and mitotic figures were obviously observed in patient 2 (Fig. 3F-G). Immunohistochemical labeling showed active expression of Ki-67 (2%, 5% respectively), positive for vimentin (Vim) and epithelial membrane antigen (EMA) in both patients (Fig. 3H-J); Besides, S-100 and P53 were positive in patient two. Accordingly, the tumor diagnosis was consistent with World Health Organization [9] (WHO) grade I in patient 1 and grade II in patient 2.

Discussion

Cystic meningioma is uncommon and account for 1.7–11.7% of all intracranial meningiomas, which is more incline to occur in children than in adults [10–12]; Besides, they were reported mostly in the cerebral convexity and parasagittal areas, but rare in intraventricular region [11, 12]. Thus, the cystic IVMs may highly misdiagnosed as ependymomas, choroid plexus papillomas or neurocytomas, which are more prone to appear with lesions of cyst and calcification in the ventricular zones. In the absence of

histopathological examination, we know of no way to differentiate the cystic lesions with certainty by radiographic means.

Notably, the current two cases demonstrated histologically different sub-types, which may be associated with their various pathomorphological features. The first case was a fibroblastic meningioma, filled with mesenchymal elements, including gelatinous fiber, osseous and myxoid tissue, which may lead to calcification or ossification. In contrast, the second case was of an atypical meningioma, which characterized by more blood supply, larger cyst cavity, tumoral infarction, necrotic foci and mitotic figures, and higher positive rate of tumor immune-markers, such as Ki-67, S-100, P53 etc. Consequently, we considered that the pathomorphological mechanisms of cystic changes in current cases may be correlated to the secretion activity of the cystic tumor cells, infarction and necrosis of tumor tissue, peripheral brain edema and loculated widened subarachnoid space.

Total resection of microsurgery for such giant IVMs which straddle the bilateral ventricles remains a considerable challenge because of deep location, bleeding control and operative perseverance, especially in the dominant hemisphere that closely proximity to important structures, and even most patients have minimal deficits before hospitalization. Therefore, basing on the tumor morphology and location, giving consideration to minimize the impairments of eloquent and visual structures and brain retraction around the surgical access, we employed transcortical approaches through the posterior temporal lobe in patient one and the parieto-occipital lobe in patient two. Additionally, in our experience, these routes are often the shortest paths to the tumors and make it possible for earlier control of the feeding vessels, appearing to be the most popular to trigonal IVMs [5–7, 13, 14].

In order to achieve the goal of completely resection and reduce the risk of recurrence, neurosurgeon should make a reasonable procedure to cyst walls according to individual situation of patients and could never peel off the wall blindly [12, 14, 15]. On the basis of the cyst location and the relationship between the tumor and the adjacent brain, Nauta [8] classified cystic meningiomas into four types. In our opinion, for Nauta type I and type II cystic IVMs, total resection should be performed as far as possible when the cyst walls are small and located in an unimportant functional area of the cortex, especially characterized by the contrast enhancement. However, for Nauta type III and type IV cystic IVMs, if the cystic fluid is yellow or green and located around nonfunctional region, the walls of the cyst should be removed as far as possible; Nevertheless, partial residue is permissible if the cystic fluid is clear with cerebrospinal fluid and adjacent to functional structures, but regular follow-up is requisite.

Conclusions

We described two extremely rare cases of giant IVMs with cystic lesions, which may indicate the histopathologic malignancy of intraventricular meningioma. It is imperative to understand the continual updating radiological and pathomorphological features of those patients for diagnostic and treatment purposes. Our report of present paper may help to deepen the understanding of this rare clinical entity.

Abbreviations

IVMs
intraventricular meningiomas; CT:computed tomography; CTA:computed tomography angiography;
MRI:magnetic resonance imaging; H&E:hematoxylin and eosin; Vim:vimentin; EMA:epithelial membrane
antigen; WHO:World Health Organization.

Declarations

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None.

Authors' contributions

YH and HJH were responsible for surgical operations, patients data collection and analysis, YM and CJ were the major contributors in writing the manuscript and literature analysis. The authors read and approved the final manuscript.

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Availability of data and materials

Not applicable.

Ethics approval and consent to participate

All human studies were performed in accordance with ethical regulation and pre-approved by the IRB for the Human Research Protection Program at the Tongde Hospital of Zhejiang Province. (XMSC2017074).

Consent for publication

Written consents were obtained from the patients in order to publish clinical images.

Competing interests

The authors declare that they have no competing interests.

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Figures

Figure 1

Radiographic features of case one in the perioperative period. A-B, CT scans revealed a super size heterogeneously irregular mass in the bilateral ventricle with peritumoral low-density cystic lesions; C-D, Noncontrast enhanced MRI scans showed solid part of the tumor was isointense on T1WIs, slightly hyperintense on T2WIs, and the cystic portion of the tumor was hypointense on T1WIs and hyperintense on T2WIs; E-F, Contrast-enhanced T1WIs suggested significant enhancement of tumoral parenchyma, but

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G 3D reconstruction of the tumor and surrounding vasculature, showing the tumor's relationship to the ACA and PCA.

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Page 9/10

Radiographic features of case two in the perioperative period. A, CT scans revealed a extremely large mass in the left lateral ventricle with intratumoral multiple low-density cystic lesions; B-F, MRI scans showed a similar imaging features of the tumor on T1 weighted sequence, T2WIs and the Contrast-enhanced T1WIs following the injection of a contrast medium; G-H, CTA indicated an affluent blood supply stemming from ACA and PCA; I, postoperative Contrast-enhanced T1WIs demonstrated total resection of the tumor. Abbreviations: CT, computed tomography; MRI, magnetic resonance imaging; T1WIs, T1 weighted sequence; T2WIs, T2 weighted sequence; CTA, computed tomographic angiography; ACA, anterior choroidal artery; PCA, posterior choroidal artery.

Figure 3

Intraoperative exhibition and postoperative features of histopathology. A, gross specimen of tumor; B-D, necrosis, cystic cavity and wall, and feeding artery(ACA) of the tumor under the microscope; E, the fibroblastic pattern of the tumor in patient 1 (H&E, ×50, WHO I); F-G, local infarction, necrotic foci and mitotic figures of the tumor were obviously observed in patient 2 (H&E, ×50, ×400, WHO II); H-J, the tumor strongly expresses VIM, CD34, Ki-67, etc. by immunohistochemical staining (× 200). Abbreviations: ACA, anterior choroidal artery; H&E, Hematoxylin and eosin; WHO, World Health Organization; VIM, vimentin.