Cystic meningioma

J.Sales-Llopis

Neurosurgery Service, Alicante University General Hospital, Spain.

Among 7,950 meningioma cases, the proportion of primary intracranial Chordoid meningiomas was 0.43% (34/7,950). The median diagnosis age was 47 (ranging from 12 to 74) and the gender ratio (male to female) was 2.1:1. For radiological features, heterogeneous enhancement, skull base, and ventricular localization, cystic degeneration and dural tail sign were common in chordoid meningioma cases [1)]

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Cystic meningioma is a rare form of intracranial meningioma. Meningiomas are typically solid tumors but may rarely have cystic components. The diagnosis of cystic meningioma is clinically challenging as the finding of multiple intra-axial tumors, including metastatic tumors, is relatively common.

The term cystic meningioma is applied to both meningiomas with intratumoral degenerative cyst formation as well as those with peritumoral arachnoid cysts or reactive intraparenchymal cysts.

They should not be confused with microcystic meningiomas, a distinct variant, in which the cysts are microscopic.

Epidemiology

Meningiomas are uncommonly associated with cysts and account for 1.6–10% of intracranial

meningiomas [2) 3) 4)]

Those with more numerous smaller peripheral cysts are more frequent (8-23% of cases). They are over-represented in male patients and the paediatric population.

Classification

Cystic Meningioma Classification.

Etiology

The exact cause of cyst formation is not entirely known, although many mechanisms have been proposed. These include cystic degeneration of the tumor, secretion of fluid from tumor cells, or loculated cerebrospinal fluid from scar tissue within or adjacent to the tumor [5)].

Clinical presentation

Patients present clinically in the same way as patients with non-cystic meningiomas, with either symptoms related to increased intracranial pressure (ICP), focal neurology, or seizures.

Pathology

Various mechanisms have been proposed, and probably more than one is applicable depending on the location of the cysts:

degeneration or necrosis

direct secretion by meningioma

reactive changes (peripheral arachnoid cysts)

Diagnosis

Cystic meningioma is not easy to diagnose preoperatively and is often misdiagnosed as a cystic glioma or metastatic brain tumor.

The tumor itself has imaging features identical to non-cystic meningiomas. The cysts are of variable size and can be entirely surrounded by tumors (types 1 or 2) or clearance between the tumor and the brain (type 4) or within the adjacent brain (type 3). On imaging, it is sometimes difficult to distinguish between these types.

Differential diagnosis

The differential is dependent on the location of the tumor. For tumors around the base of the skull, cystic schwannomas (e.g. acoustic schwannoma, trigeminal schwannoma) are the main differential, as they share the bright contrast enhancement, and are commonly cystic when large.

CT whole-brain perfusion (CTP). 4D-CTA showed the arterial supply feeding the tumor and late enhancement of the tumor nodule, similar to that seen in meningioma by conventional angiography. CTP showed that the tumor had a higher cerebral blood flow and cerebral blood volume and a longer mean transit time than adjacent brain tissue. These findings were consistent with meningioma and reinforced the other imaging findings, resulting in the correct preoperative diagnosis. The new techniques available for 320-row CT can potentially be used to improve differential diagnosis and preoperative assessment of cystic tumors with nodules [6].

Intracranial hemangiopericytoma/solitary fibrous tumor (SFT/HPC) was found to have more invasion to venous sinus ($p = 0.001$), more cystic components ($p < 0.001$), and more heterogeneous enhancement patterns ($p < 0.001$) [7].

Case series

Among 1214 surgeries for intracranial meningioma, Boukobza et al. identified 43 cases of cystic meningioma, corresponding to an incidence of 3.5 %. The most common localization was convexity meningioma (17/43 cases). Twenty-eight patients had intratumoral cysts, nine peritumoral, and five mixed intra and extratumoral. In 29 patients with available diffusion imaging, ADC coefficients were significantly lower in grade II-III tumors compared to grade I ($p = 0.01$). Complete resection of the cystic components was possible in 27/43 patients (63 %); partial resection in 4/43 (9 %); in 6/43 (14 %) cyst resection was not possible but multiple biopsies were performed from the cystic walls; in another 6/43 (14 %) the cystic wall was not identified during surgery. Cells with neoplastic features were identified within the cyst walls at pathology in 26/43 cases (60 %). All patients were followed-up for 24 months; long-term follow-up was available only in 32 patients for an average period of 49 months (range, 36-96 months). No recurrence requiring surgery was observed.

Cystic meningiomas are rare. Cells with neoplastic features are often identified within the cyst walls. Complete cyst resection is recommendable when considered technically feasible and safe [8].

A retrospective analysis of 13 patients (mean age: 49.9 years) who underwent surgical resection of intracranial cystic meningiomas from January 2006 to February 2014. There were 5 male and 8 female patients. The Glasgow Outcome Scale was used to assess the clinical outcome at 6 months. Results. Headache was the main presenting clinical feature. Most of the tumours were located on the right side. The frontal convexity was the most common site. Gross total resection was performed in 10 patients. The most common histopathological type was meningothelial variety. Conclusion. Intracranial cystic meningiomas are usually benign that occur in relatively young patients. Resection

of cysts that show contrast enhancement is essential to reduce recurrence [9].

Ramanathan et al. report a case of cystic meningioma initially diagnosed as a metastatic tumor from a recurrence of acute lymphoid leukemia. However, postoperative histopathological examination demonstrated an atypical meningioma [10].

Case reports

A 59-year-old female patient, presenting with persistent headaches, who was diagnosed with a left parieto-occipital purely cystic lesion. The patient underwent a complete resection of this cystic lesion because of increasing headaches and volumetric progression. Interestingly, the histological assessment confirmed a cystic WHO grade I meningioma. The evolution was favorable and there was no recurrence after 3 years of follow-up. We also perform a systematic review of the literature concerning purely cystic meningiomas and we discuss the particular histological features of cystic meningiomas as well as the possible pathogenesis. This challenging clinical entity can easily be misdiagnosed as hemangioblastoma or glial/metastatic tumor with a cystic component [11].

A case of atypical cystic meningioma Zhao et al. described the detailed MRI findings, which would provide valuable imaging evidence for the localization and classification of cystic meningioma [12]

The present study reported two cases of cystic meningioma. The clinical manifestations, magnetic resonance imaging (MRI) scan and histological aspects of the lesion and the associated cyst were examined. The classification of cystic meningioma was also discussed. The present study focused on the formation, diagnosis, and management of the peritumoral cystic meningioma, and aimed to clarify certain contradictions in the literature concerning the formation of the peritumoral cyst meningioma: MRI alone is inadequate to determine the type of cystic meningioma or to identify neoplastic cells on the cystic wall. In conclusion, surgical removal of the entire cyst is recommended in peritumoral cyst meningioma [13]

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