

Management and Diagnosis Challenges in Cystic Meningioma. A Case Report and Review of Literature

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Abstract

Background: Cystic meningioma is a rare variety of meningioma. It represents 4% to 7% of all meningiomas. The authors report a case of intracranial cystic meningioma with a review of literature. **Case Report:** A 59-year-old female presented with a history of headache followed by left side hemiplegia. CT scan and MRI of the brain showed a right parietal tumor with double solid and cystic components thought to be pilocytic astrocytoma or metastasis preoperatively. At surgery, the extraaxial solid and cystic lesion had a well defined capsule that could be easily separated from the perilesional cortical surface. The tumor was totally removed and the cyst was punctured. The histological study showed a cystic meningioma WHO Grade I. A follow-up at 10 months after surgery, the patient was going well and recovered from the hemiplegia. **Conclusion:** Cystic meningioma is an uncommon tumor that should be considered in the differential diagnosis of brain tumors with a cystic component. The preoperative diagnosis and management could be in some cases challenging.

Keywords

Meningiomas, Cyst, Differential Diagnosis, Case Report

1. Background

Meningiomas are the most common extra-axial tumours, accounting for 15% of all intracranial tumours. Although imaging is typical for these lesions, there are

many atypical forms, such as cystic meningioma, lipoblastic meningioma and meningioma in atypical positions [1] [2]. Cystic meningioma is a relatively rare condition that is more frequently found in males particularly in the frontoparietal areas men [3]. The clinical manifestations of cystic meningioma include, but are not limited to headaches, seizures, dizziness, personality changes and motor disturbance [4] [5] [6]. Preoperatively, the diagnosis of cystic meningioma may pose a dilemma especially in cases based exclusively on CT imaging. Although there are less dilemmas with MRI, cystic meningioma can easily be misdiagnosed (in about 20% of cases) particularly as glial tumour, metastasis, neuroblastoma or haemangioblastoma [7]. Surgical removal of the entire tumor and its cyst remains the predominant treatment for cystic meningioma [5] [6]. We report here a rare case of intracranial cystic meningioma, and review the importance of preoperative diagnosis as well as the management and perprocedure challenges.

2. Case Report

A 59-year-old female presented to our Department with a 5-months history of headaches followed by left side hemiplegia over the previous 3 months preceding her admission. Other than hypertension, the patient did not present a significant medical or surgical history.

3. Investigations

First, a CT scan was performed. On unenhanced images, a large, complex, peripheral mass located in the right frontoparietal region was found (**Figure 1**). Hypodense cystic components were depicted in an otherwise isodense mass. After iodinated contrast injection, an intense enhancement of the solid component as well as a perilesional oedema was noted. Glioma, metastasis and meningioma were retained in the differential diagnosis. Brain MRI showed a right frontoparietal extraaxial tumor with double solid and cystic components thought to be pilocytic astrocytoma or metastasis preoperatively (**Figure 2(a)**



Figure 1. Sagittal and coronal view CT scan with contrast showing solid mass and peripheral large cyst.



Figure 2. MRI axial and coronal view, showing fronto-parietal solid mass with peripheral large cyst extra-axial, according to the ELFiki Classification Type I.

and **Figure 2(b)**).

4. Management

The patient underwent general anaesthesia. A large right fronto-parietal craniotomy was performed and the dural plane was opened around the implantation of the lesion. The solid and cystic lesion had a well defined capsule that could be easily separated from the perilesional cortical surface. The tumor was totally reduced using an aspirator and then dissected near the cerebral parenchyma respecting its pial plane after the dirty yellow cyst was carefully punctured (**Figure 3(a)**). A complete excision of the lesion was carried out (**Figure 3(b)**) after which a dural plasty was performed to cover the meningeal defect of the tumour implantation. The histopathological study showed a cystic meningioma (**Figure 5(a)** and **Figure 5(b)**).

5. Outcome and Follow-Up

The postoperative outcome was favourable with less recovery of neurological deficit. The control CT scan excluded surgical complication such as haemorrhage and confirm our SIMPSON I resection (**Figure 4**). The patient was discharged 10 days after surgery without neurological impairment and physiotherapy was prescribed. Ten months after the surgery, the patient was going well and recovered from the hemiplegia.

6. Discussion

Cystic meningiomas are rare, accounting for 4% - 7% of all meningiomas [8] [9]. The most common site for the appearance of cystic meningiomas is the cerebral convexity, particularly the frontal and parietal lobes, while the cerebral falx is the second most frequent location [10]. In addition, cystic meningiomas can also be identified in the cerebellopontine angle, olfactory groove, suprasellar, falx and ventricle, trigeminal nerve or optic nerve [8] [11] [12] [13] [14].

The imaging features of an extra-axial meningioma are a broad dural base

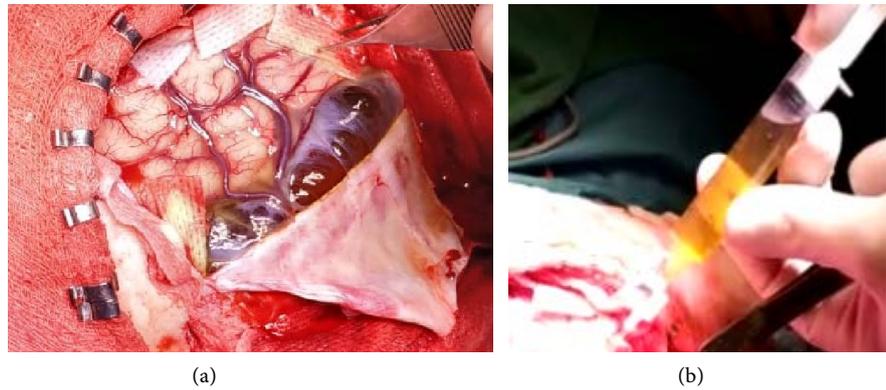


Figure 3. Peroperative view showing the mass lesion and the dirty yellow cyst punctured according with the correlation between EL Fiki classification system with Nauta's (Type 1 corresponds to Type C).

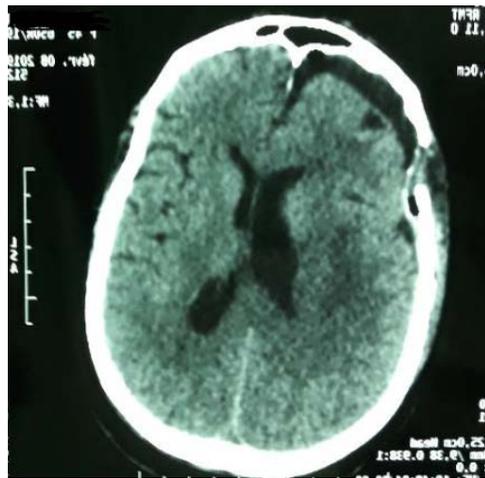


Figure 4. Post-procedure ct scan axial view showing total excision.

with a tail, the presence of cerebrospinal fluid (CSF) or vascular cleft between meningioma and normal parenchyma, white matter buckling and cortical thinning [15]. In a study by Goldsher *et al.* (1990), three criteria were proposed for the definition of the tail: presence on at least two consecutive images, greatest thickness next to the tumour with tapering away from it and enhancement greater than the tumour itself [16]. Although multiplanar reconstruction on CT or MRI may differentiate extra-axial from intra-axial tumours, a meningioma can mimic an intra-axial lesion when invaginating in the brain [17]. MRI remains the optimal diagnostic means for the diagnosis of cystic meningioma, but it is not sufficient to determine the particular tumor type. Only microsurgical inspection and histological examination can lead to the final diagnosis of the type of cystic meningioma [18]. However, combined MRI and diffusion-weighted imaging (DWI) may be efficient in diagnosing the type of cystic meningioma [15] [19]. Contrast-enhanced MRI may assist surgeons in determining whether neoplastic cells are present in the cystic wall; however, the

wall could be enhanced despite the absence of tumor cells [20]. Nauta (1979) classified cystic meningiomas into four types (**Table 1**) [21]. In Type 1, the cystic component is entirely contained within the tumour and centrally located. In Type 2, the cyst is wholly intratumoural but peripherally located and encapsulated by tumour cells. In Type 3, the cyst is peripherally located and lies in the adjacent parenchyma while in Type 4, the cyst is limited to the interface between the tumour and the brain as loculation of the CSF in the subarachnoid space, so it is not located in the tumour nor in the cerebral parenchyma [21]. Jung *et al.* [8] added Type V as a mixed type of meningioma combining Types I and III. In our case, the cystic meningioma was Type 1 (**Figure 2(a)** and **Figure 2(b)**).

In addition, El-Fiki *et al.* (1996) correlated the location of the cyst and its content and also described four types (**Table 2**). In type A, the cyst is extratumoural and contains clear water or CSF-like fluid. It can be subdivided into Type A1 when entrapped CSF is found and the cyst is surrounded by an arachnoid membrane, and into A2 when the content is the result of an excretory process of the tumour cell or an exudation without the presence of arachnoid separation. In type B, the content is a xanthochromic fluid and in B1 the cyst is extratumoural without a definite wall, while in B2 the fluid is surrounded by a

Table 1. Nauta's classification of cystic meningioma.

Type of Cystic Meningioma	MRI characteristics
Type I	Cyst entirely contained within the tumour, centrally located
Type II	Cyst entirely contained within the tumour, peripherally located
Type III	Cyst peripherally located relative to the tumour but lying in the adjacent parenchyma
Type IV	Cyst peripherally located but lying between the tumour and the adjacent parenchyma

Table 2. El-Fiki's classification of cystic meningioma per-procedure.

Type	Content	Location
Type A	Clear water or CSF-like fluid	A1 Extratumoural, CSF surrounded by arachnoid membrane A2 Extratumoural, clear water without the presence of arachnoid membrane
Type B	Xanthochromic fluid	B1 Extratumoural, no wall B2 Intratumoural, thin rim of enhancing tumour surrounding the cyst or enhancing nodule
Type C	Dark brown or yellow dirty fluid	Intratumoural
Type D	Contains both clear-water	Extratumoural or peritumoural cysts and dark brown intratumoural small cysts

CSF, cerebrospinal fluid.

thin rim of enhancing tumour or enhancing nodule. An intermediate degree of oedema accompanies the cyst. In type C, dark brown or yellow dirty intratumoural fluid was found accompanied by marked peritumoural oedema. Type D includes meningiomas with the presence of both clear extratumoural or peritumoural cysts and small dark brown intratumoural cyst [22]. The use of this classification showed in our case a Type C cystic meningioma (**Figure 3(a)**). Moreover, El-Fiki correlated his classification system with Nauta's and noted that Type 1 corresponds to Type C, Type 2 to Type B2, Type 3 to B1 or A2 and Type 4 to A1 (**Table 3**). In our case, this correlation was found perprocedural. The differential diagnosis of these lesions depends on the location. For supratentorial masses, high-grade gliomas and metastases have to be included. In infratentorial lesions, schwannomas with cystic degeneration, metastases and hemangioblastoma in adults and pilocytic astrocytomas in children have to be considered [1].

The diagnosis of meningioma have to be confirmed by histopathological examination in all of the cyst types. In our case, the histological analysis revealed a microcystic meningioma World Health Organization (WHO) grade I (**Figure 5(a)** and **Figure 5(b)**). Although there is no significant correlation between cyst formation and any particular histological type [23], Weber *et al.* (2003) found a correlation between peritumoural cystic meningiomas and atypical histological types [24].

7. Conclusion

Cystic meningiomas are rare forms of meningiomas that do not show

Table 3. Correlation of Nauta's and El-Fiki's classification.

Author	Classifications			
Nauta's	I	II	III	IV
M EL-Fiki's	C	B2	B1 or A2	A1
Necessitating surgical excision of the cystic component	Yes	Yes	No	No

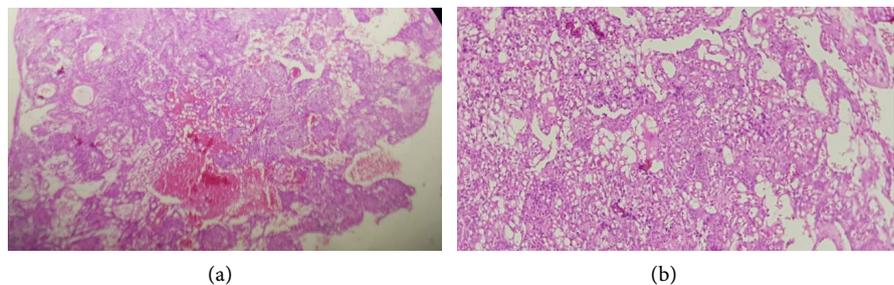


Figure 5. (a) and (b): Tumor proliferation of moderate and homogeneous cellularity composed of endothelial cells which are arranged in microcystic structures. Foci of classic meningotheelial meningioma without cerebral parenchyma observed on the periphery. Histological appearance of a microcystic meningioma grade I WHO.

pathognomonic radiological findings. The presence of cystic components within and/or around the mass usually suggests a diagnosis other than meningioma. These tumours can be easily misdiagnosed as metastases, gliomas and hemangioblastomas macroscopically in CT or MRI. Histopathological diagnosis is always required to confirm the diagnosis of meningioma. The outcome and follow up is generally favorable and good.

Conflicts of Interest

The authors have not any conflict interest in this case report and any financial resources.

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