MRI Findings Of An Atypical Cystic Meningioma – A Rare Case

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Abstract

The MRI findings of supratentorial cystic meningioma with a mural nodule are highlighted. These lesions, by virtue of their peripheral location and large cystic component, occasionally mimic gliomas or other intra-axial lesions. Recognition of this entity and keeping it as a differential is important to guide surgical decisions. Leaving behind cystic components at surgery can lead to recurrence of a potentially curable tumor.

INTRODUCTION

We present a case report of a supratentorial cystic meningioma mimicking the peripheral intra-axial location and morphology of a Pleomorphic xanthoastrocytoma. However, gross and histopathological examination revealed an angiomatous cystic meningioma with a mural nodule.

CLINICAL CASE

A 40-year-old male presented with seizures of 3 months duration, and headache and giddiness of 10 days duration.

IMAGING FINDINGS

Figure 1

Fig 1a,b. Axial and sagittal T1 weighted image, showing a right frontoparietal hypointense lesion with an eccentric isointense mural nodule.

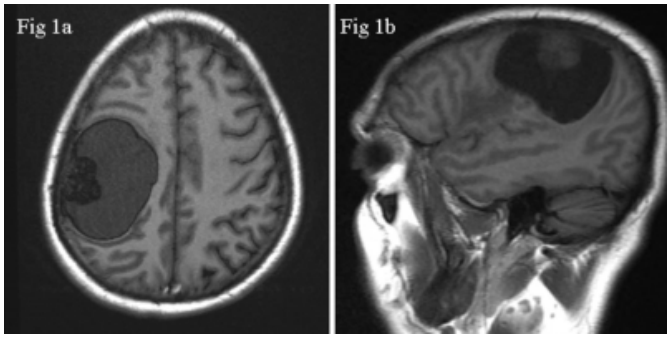


Figure 2

Fig 2a,b,c. Axial T2 FLAIR (Fig 2a) and axial T2 (Fig 2b,c) images show a T2 hyperintense cystic lesion with incomplete suppression on T2 FLAIR. The mural nodule shows mild hyperintensity. Perilesional edema is noted around the lesion.

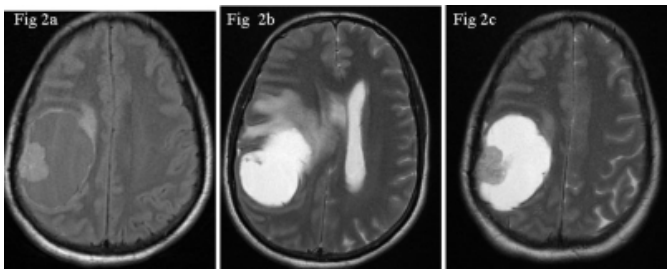


Figure 3

Fig 3a,b. Diffusion and ADC map reveal no restricted DWI, with an ADC value of 1201mm/sec in the nodule.

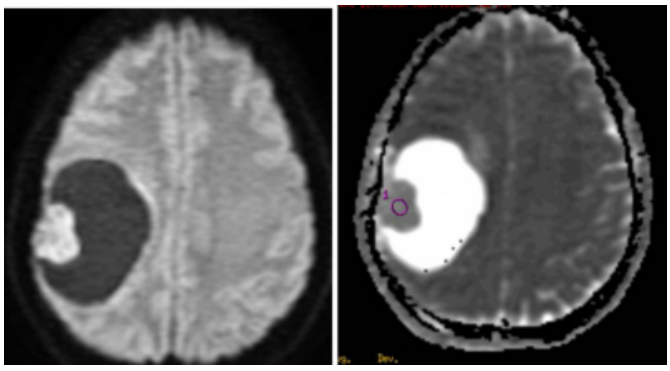


Figure 4

Fig 4a,b,c. Post-contrast axial, sagittal and coronal images reveal intense enhancement of the mural nodule and the cyst wall. Coronal image (Fig 4c) reveals adjacent enhancing of the dural tail.

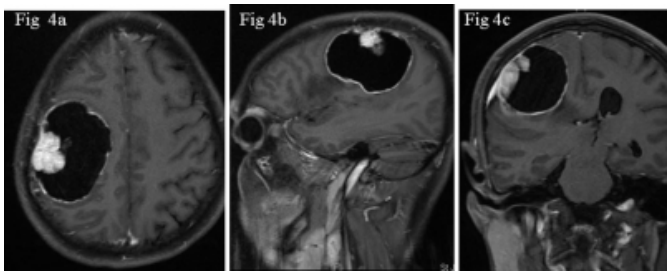
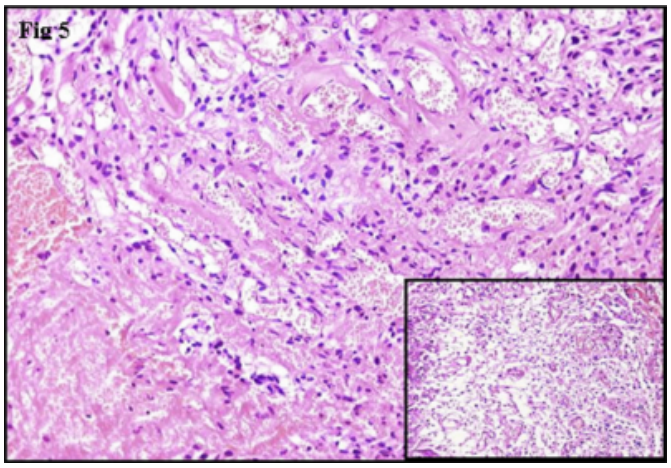


Figure 5

Fig 5. Angiomatous meningioma (200x). The neoplastic meningiothelial cells showing angiomatous pattern. Inset shows microcystic areas.



An MRI scan of the brain showed a peripheral intra-axial predominantly cystic lesion in the right frontoparietal lobe. The lesion demonstrated an eccentric T1 isointense, T2 mildy hyperintense, intensely enhancing solid nodule [Fig 1,2,4]. Diffusion weighted imaging revealed no restriction and an ADC value of 1201.1 mm^2/ s in the nodule. There was enhancement of the cyst wall as well [Fig 4], with mild adjacent dural enhancement [Fig 4c]. There was moderate perilesional edema with mass effect and effacement of the right lateral ventricle [Fig 2]. Midline shift of 13 mm to the left was noted, with mild ipsilateral uncal herniation. A diagnosis of a peripheral intra-axial lesion with possibility of a pleomorphic xanthoastrocytoma was put forth, with a second possibility of an atypical meningioma.

Preoperative findings revealed a vascular extra-axial lesion which was adherent to the underlying brain parenchyma on its posterior aspect.

Histopathology of the tissue disclosed an angiomatous meningioma with foci of microcystic components.

DISCUSSION

Meningiomas are usually solid tumors: cystic components are found in only about 3-7 % of cases in adults. Cystic meningiomas are more common in paediatric patients than in adults. The incidence of cyst formation in meningiomas is higher in infants than in childhood, adolescence, or adulthood.[1]

Benign meningiomas with heterogenous enhancement that contain small nonenhancing areas of cystic change or necrosis occur much more frequently (up to 8-23% of cases).[2] A large cystic meningioma may have an atypical clinical presentation, in that they are more common in male and pediatric patients.[2] Such meningiomas are usually difficult to differentiate from gliomas, intracranial abscesses, hemangioblastomas and metastatic lesions.[3]

The pathophysiological mechanisms involved in the formation of intratumoral cysts within meningiomas have been discussed by various authors. According to Fortuna et al., intratumoral cysts are the outcome of cystic degeneration, ischemic necrosis, or hemorrhage within the tumor.[4] A peripheral cyst, on the other hand, may represent either peripheral degeneration or an arachnoid cyst.[2]

Nauta et al. reported three cases of large xanthochromic cysts associated with meningiomas, and on the basis of this, described four configurations: (I) a centrally located intratumoral cyst that is surrounded by macroscopic tumor throughout, (II) a peripherally situated intratumoral cyst, (III) a peritumoral cyst that actually lies within the adjacent brain, and (IV) peritumoral cyst at the interface of tumor and brain. Regardless of the configuration, MRI appearance of such cystic meningiomas may mimic that of a glial tumour with cystic or necrotic change, leading to an incorrect presumptive diagnosis.[5]

Our case was a Nauta type II intratumoural cyst.

Pathologically, intratumoural cysts are more common in the angiomatous and meningiothelial types. Peritumoural cysts are more common in the meningothelial type.[1]

Typically angiomatous meningiomas are dural-based masses characterized by lobulated margins with high signal intensity on T2-weighted imaging (T2WI), low signal intensity on diffusion-weighted imaging (DWI), prominent intratumoral signal voids, intratumoral cystic changes, and marked

enhancement after intravenous contrast administration.[4] Angiomatous meningiomas have a lower cellularity than typical meningiomas because they have numerous vessels and intratumoral cystic changes.[4]

The most frequent location of cystic meningioma is overlying the cerebral convexity, particularly in the frontoparietal regions. The cerebral falx is the second most frequent location. The occurrence of a cystic tumour in a typical location for a meningioma may be helpful in the diagnosis.[1]

Intratumoural cysts are extremely rare and seldom large, but peritumoural cysts are more common, larger, and tend to be unilocular.[1] Peritumoural cysts are often larger than the main tumour mass and may account for the mass effect produced on the adjacent tissue.[1]

El-Fiki et al. reported meningiomas with intratumoral cysts showed greater degrees of edema than meningiomas with peritumoral cysts. The edema around cystic meningiomas is usually mild.[1]

Although the imaging differentiation between a peripheral (neoplastic) intratumoral cyst and an extratumoral (reactive) arachnoid cyst may be suggested when ring enhancement is seen surrounding the fluid collection, histologic analysis, demonstrating neoplastic cells in the cell wall, may be required for confirmation.[2]

Biopsy of all suspected cerebral neoplasms is important, because an incorrect diagnosis of glioma frequently results in palliative treatment rather than surgical removal of a potentially curable neoplasm.[6]

An important problem that a surgeon needs to face in surgery is how to correctly deal with the cyst wall of cystic meningiomas. In fact, peritumoural cysts are due to surrounding gliosis of the brain tissue and/or loculation of cerebrospinal fluid. In those cases, removal of the cyst wall is usually not necessary. On the contrary, intratumoral cysts with peripheral enhancement probably indicate the presence of tumor infiltration in the cyst wall and therefore the necessity of its total removal.[3] From a surgical viewpoint, Nauta type II cysts are especially important, because neoplastic cells are present in the distal cyst wall, and such cases may not be easy to differentiate from types III and IV, in which the cyst wall usually does not need resection.[3]

In our case the cyst wall was enhancing and was removed at surgery.

The solid component of the cyst shows moderate or marked enhancement. MRI can dramatically increase the accuracy for detection of cystic meningiomas. It may show dural attachment, extra-axial location, and cerebral edema better than CT.[1]

Giuseppe in 1986 reported seven cases of cystic meningiomas. They suggested that the possibility of meningioma should be considered in the diagnosis of any intracranial neoplasm with a large cyst, particularly if the tumor is parasagittal.[6]

In spite of the various MR imaging features, cystic meningioma can present with diagnostic dilemmas. A retrospective study assessed the value of perfusion-weighted MRI in the differentiation of meningiomas with atypical conventional MRI findings from intra-axial tumors. There was a statistically significant difference in rCBV ratios between meningiomas and glioblastomas and metastasis ($p < 0.001$). They concluded that differentiating atypical meningiomas from malignant intra-axial tumors could be difficult on conventional MRI. Calculation of rCBV ratios and construction of signal intensity-time curves may contribute to the differentiation of meningiomas from intra-axial tumors.[8] This is an area of further research.

CONCLUSION

Cystic meningiomas with a mural nodule are rare tumors. Their differentiation from the more common gliomas, abscesses, hemangioblastomas and metastases is sometimes difficult. The typical location at the cerebral convexity and falx should prompt one to seek the differential of a cystic meningioma. It is especially important to diagnose Nauta type II cysts preoperatively as neoplastic cells are present in the distal cyst wall which require complete removal to prevent recurrence.

References

1. Zhang D, Hu LB, Zhen JW, Zou LG, Feng XY, Wang WX et al. MRI findings of intracranial cystic meningiomas. Clin Radiol 2009;64:792-800
2. Buetow MP, Buetow PC, Smirniotopoulos JG. Typical, Atypical, and Misleading features in Meningioma. Radiographics 1991;11:1087-106
3. Zhao X, Sun JL, Wang ZG, Zhang TG, Wang CW, Ji Y. Clinical analysis for an unusual large cystic meningioma: case report and review of the literature. Clin Neurol Neurosurg. 2008;110:605-8.
4. An HY, Yu IK, Kim MS, Kim SM, Kim HK. Angiomatous Meningioma: CT and MR Imaging Features. J Korean Soc Radiol 2011;64:429-34.
5. Nauta HJW, Tucker WS, Horsey WJ, Bilbao JM, Gonsalves C. Xanthochromic cysts associated with meningioma. J Neurol Neurosurg Psychiatry

1979;42:529-35.
6. Parisi G, Tropea R, Giuffrida S, Lombardo M, Giuffre F. Cystic meningiomas. Report of seven cases. J neurosurg 1986;64:35-38
7. Dell S, Ganti SR , Steinberger A, McMurtry J 3rd. Cystic meningiomas: a clinicoradiological study. J Neurosurg 1982;57:8-13
8. Hakyemez B, Yildirim N, Erdogan C, Kocaeli H, Korfali E, Parlak M. Meningiomas with conventional MRI findings resembling intraaxial tumors: can perfusion-weighted MRI be helpful in differentiation ? Neuroradiology 2006;48:695-702.

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