Cystic meningioma in an adult
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Section: Neuroradiology
Area of Interest: Neuroradiology brain
Procedure: Diagnostic procedure
 Imaging Technique: MR
Special Focus: Neoplasia Case Type: Clinical Cases
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Patient: 62 years, female

Clinical History:
The patient presented with sudden onset of seizures and loss of conscience.

Imaging Findings:
The patient was submitted to brain MRI with T1WI, FLAIR, SWI, DWI, as well as T1WI post IV Gadolinium (Gad) administration in the axial, sagittal and coronal planes(figures 1-5). The MRI revealed an extra-axial, dural based lesion in the left parietal lobe measuring 3.5x3.4x3.2 cm. The lesion had a solid enhancing central part, with multiple well-circumscribed peripheral cysts (ddx:concomitant CSF clefts). There was no vasogenic edema, or midline shift. There was mild buckling of the white matter. The adjacent dura was thickened and enhanced. On DWI, the lesion showed slight diffusion restriction of the solid component. The cystic areas followed the CSF signal on all sequences. There was no evidence of hemosiderin/calcification on SWI. The findings were compatible with cystic meningioma, type 4. The tumour was surgically resected. Histopathology confirmed the diagnosis of cystic meningioma, grade I WHO.

Discussion:
Meningiomas are the most common extra-axial neoplasms, representing 15% of all intracranial tumours [1]. Most meningiomas are benign, however atypical and malignant meningiomas may also exist. Cystic meningiomas are rare in adults, accounting for only 2-4% of meningiomas and are, on the other hand, more frequent (10-19%) in infants and children [2]. The aetiology of meningioma is unclear. However, known risk factors comprise radiation exposure and type II neurofibromatosis. The majority of meningiomas are located in the frontal, parietal lobes, arising from the falk or the convexity meninges [3].

According to the Nauta classification [4], cystic meningiomas are divided into four types: I-with a central cyst; II-with a peripheral intratumoral cyst; III-cyst wall may comprise a nest of tumor cells; IV-with a peritumoral cyst, located between the meningioma and brain.

Worthington [5] added a supplementary type V, where the cysts enclose the tumour nodule, with neoplastic cells on the cystic wall. Weber [6] subdivided the peritumoral cystic meningioma according to the presence of tumour invasion in the cystic wall.

The exact mechanism of cyst formation is unknown. Types I and II are probably the result of microcystic degeneration, intratumoral haemorrhage or ischemic necrosis. Type III may be due to reactive gliosis or cerebral oedema, type IV may be the result of widened subarachnoid spaces and trapped cerebrospinal fluid around the tumour [3].

Meningiomas may be asymptomatic or present with headaches, seizures or focal neurologic deficit. MRI is the modality of choice for diagnosing cystic meningioma, with higher accuracy than CT, however only
histolopathology can lead to the accurate diagnosis [7]. Combined MRI and DWI may be helpful in the diagnosis of the type of cystic meningioma [8]. The cystic parts are hypointense or mildly hyperintense on DWI, whereas the ADC values are increased.

Typical MR findings include an extra-axial tumour with a broad dural base. The solid part shows intense enhancement, while the associated cysts may illustrate wall enhancement, in spite of the absence of tumour cells [9]. The absence of Gad-enhancement of the cystic component does not exclude the presence of tumour cells [10]. Regarding the dural tail sign, it may also be observed in glioblastoma, parenchymal/dural metastases and schwannomas. Peritumoral oedema, presenting in 60% of meningiomas, may incorrectly suggest an intra-axial lesion, i.e. glioma.

Treatment is surgical if the lesion is symptomatic. If asymptomatic, follow-up is recommended. If malignant cells are found on histopathology, radiation therapy may also be used.

**Differential Diagnosis List:** Cystic meningioma, type IV., dural metastasis, primary intra-axial glial neoplasm

**Final Diagnosis:** Cystic meningioma, type IV.

**References:**


Description: The lesion is slightly hyperintense to brain parenchyma. The cystic part is isointense to CSF. Incidentally, note the presence of micro-ischemic changes. Origin: Aik. Solomou, MRI unit, University Hospital, Patras
Description: The cystic part is more conspicuous. Origin: Aik. Solomou, MRI unit, University Hospital, Patras
Description: The lesion is hyperintense compared to brain parenchyma. Origin: Aik. Solomou, MRI unit, University Hospital, Patras
**Description:** Corresponding ADC map image, where the solid part has mildly heterogeneous signal with iso- and hyperintense component. The cystic part is isointense to CSF. **Origin:** Aik. Solomou, MRI unit, University Hospital, Patras
Description: The lesion is slightly hypointense to brain parenchyma. The cystic part is noted around the lesion, as well as buckling of the white matter. Origin: Aik. Solomou, MRI unit, University Hospital, Patras
Description: No evidence of "blooming" to suggest calcification or hemosiderin. Origin: Aik. Solomou, MRI unit, University Hospital, Patras
Description: There is homogeneous enhancement of the solid part. Origin: Aik. Solomou, MRI unit, University Hospital, Patras
**Description:** The cystic part does not enhance. **Origin:** Aik. Solomou, MRI unit, University Hospital, Patras.

**Description:** There is dural thickening/enhancement. **Origin:** Aik. Solomou, MRI unit, University Hospital, Patras.
Figure 6

Description: The cystic component caudal to the solid part has high signal. Origin: Aik. Solomou, MRI unit, University Hospital, Patras
Description: Contiguous image just above figure a. The cystic component in front and posteromedial to the solid part exhibits high signal. Origin: Aik. Solomou, MRI unit, University Hospital, Patras