Cystic Cranial Meningioma; Unusual Imaging Features

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Abstract

Meningioma has been described as mostly benign solid lesions with particular features in MRI imaging that make its diagnosis relatively easy. Cystic meningioma was considered as rare tumors and can be confused with other cystic lesions of the brain.

In this report three patients with verified cystic meningioma were discussed. The three patients presented with varying neurologic symptoms. MRI images were not typical for meningioma. Histological examination showed two cases, Nauta type 3 and 4 as WHO grade I meningioma and one case Nauta type 2 as WHO grade II.

Introduction

Cystic meningioma is uncommon, and accounts 2 to 4% of all meningioma , they are found to affect young children and infants (Zhang et al. 792-800). and common in males than females,(Fortuna et al. 23-

30). Radiologically they mimic hemangioblastomas, pilocystic astrocytoma and cystic schwannoma. Pathological examination seems to be the appropriate tool to reach the final diagnosis. (Carvalho et al. 284-89).

In this study, we report three cases of cystic meningioma operated upon in the National Center for Neurological Sciences. Brain MRI features in all patients were suggestive of non meningial tumors. Histological and immunohistchemical diagnosis of cystic meningioma was made.

Case 1

A 70- years -Sudanese male, known hypertensive, with history of generalize convulsions for three years, has been treated as epilepsy. One and halve year before his presentation, he developed headache and slowly progressing hearing loss in the right ear, few months before his admission, he developed unsteady gait with inability to walk.

Neurological examination revealed, conscious patient, there was sensori-neural hearing loss right ear and right hemiparesis (power grade 4).

MRI brain showed solid and cystic lesion in the right CPA (case 1).

Patient under went surgery, through sub occipital retro- mastoid crainectomy. Multiple cystic lesions containing oily like fluid were found. Total resection of the cysts was achieved.

Microscopically the tumor showed cysts lined by cuboidal cells with underlying nets of meningiothelial cells, the tumor is positive for EMA and progesterone, Ki67.and P53 immunostaining was performed. The diagnosis of cystic meningioma WHO grade 1 was made (Fig 1).

Case 2

This is otherwise healthy 40- years-Sudanese female, presented to Neurosurgery referral clinic, with history of chronic headache, 4 months before her presentation she developed nausea and attacks of dizziness.

Neurological examination revealed no abnormality.

MRI brain showed midline extra axial cystic lesion with solid mural component arising from the planum sphenoidale. (Case 2)

Through right sub frontal craniotomy, a small basal anterior fossa cyst that contained milky like fluid and compressing the olfactory nerve was found. The cyst and the mural nodule were totally removed.

Microscopically there was a cyst lined by cuboidal cells with meningiothelial cells. The tumor was positive for EMA and progesterone, Ki67 immunostaining was done. Accordingly, the final diagnosis was cystic meningioma WHO grade 1.

Case 3

A 10 years- old child, presented to Neurosurgery clinic with history of rapidly progressing headache, generalize convulsions and failing vision that ended in total blindness. Clinical examination showed depressed child, with bilateral optic atrophy.

MRI brain showed large left fronto-parietal cystic mass (Case 3).

The patient underwent surgical resection through left fronto- parietal craniotomy, a cyst containing oily like fluid with mural nodule was found and excised totally.

Microscopically, sections showed, a tumor composed of spindle shaped and polygonal cells with dark nuclei. The polygonal cells showed cytoplasm vacuoles. The nuclei showed variation in size with some large hyperchromatic bizarre nuclei. There was a small focus of necrosis and scattered mitosis, with cystic change. The underlying brain tissue showing gliosis.The tumor was positive for EMA and progesterone and negative for G-FAP. The brain tissue was positive for G-FAP.The diagnosis of cystic WHO grade 11 meningioma was made. Figs. (2, 3, 4 and 5).

Discussion

Meningioma is a common primary intracranial neoplasm and accounts for 20 % (Pitkethly et al. 539-44). The use of the MRI has improved the anatomical

localization and can predict the histological subtypes. The images may show variable signals, the most common are iso to hyper intense on T1-weight image and hyper intense on T2- weight images and they show various enhancement after giving Gadolinium contrast that ranges from well to heterogeneous,(Atlas et al. 243-47). However with this improvement technology the identification between the cystic meningioma and other brain neoplasms is uncertain, (Chen et al. 10-19). The exact mechanism of cyst formation is unknown, however, some have been proposed, these include cyst degeneration of the tumors, fluid secretion from the meningioma or entrapment of the cerebrospinal fluid adjacent to the tumor. (Buetow, Buetow, and Smirniotopoulos 1087-106),

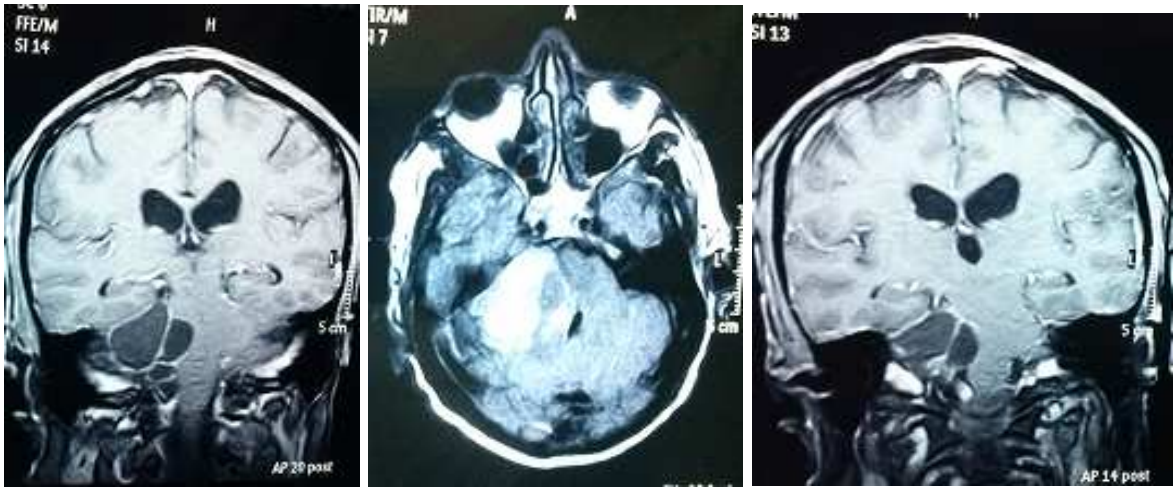
MRI diagnostic criteria of cystic meningioma include extra axial mass, with dural tail and enhancement of nodular part, Fortum A, Ferrorte L. Nauta et al classified cystic meningioma into four types according to the site of the cyst as follows: I/ centrally located intra mural cyst with the meningioma, II/ peripherally located intra mural cyst with the meningioma, III/ cyst located with the adjacent brain parenchyma and IV/ the cyst located between the meningioma and the adjacent brain. According to Nauta types, the three cases of cystic meningioma reported in this study were types 111 and 1V.

In one of our cases the presence of nodular part within the cyst made the diagnosis of hemangioblastoma a possible option as in case 3, yet the anatomical site is unfavorable since hemangioblastoma is more in the cerebellum in up to 86% of cases (Ho et al. 1343-52).

The pathology of intracranial cystic lesions, may include cysts that are lined by epithelial , ependymal or meningiothelial cells, or may be due to cysts that contain keratin like dermoid and epidermoid cysts , hence the radiological diagnosis of dermoid cyst was made in case 2.Moreover,the formation of cyst in Nauta type IV may be

due to entrapment of cerebrospinal fluid (CSF), as seen in case 1, where the clinical course of the disease in this patient made the diagnosis of cystic schwannoma most likely. The small peripherally located cyst is more common in cystic meningioma, and the true cystic one is rare as seen in our cases**.**

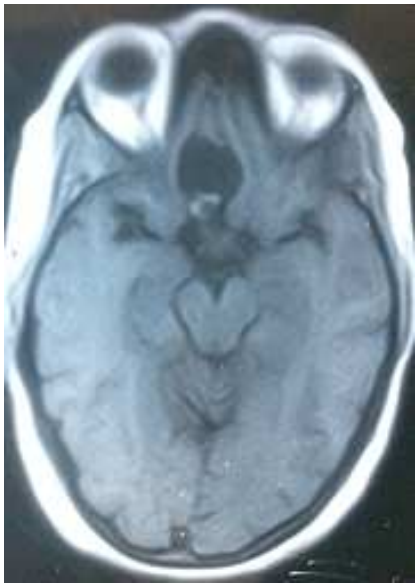
In conclusion, cystic meningioma though rare, is to be considered in patients with cystic brain lesions. The MRI features are not always characteristic for meningioma. Attempt for total resection and removal of the cyst wall are to be considered to lessen the incidence of tumor recurrence.

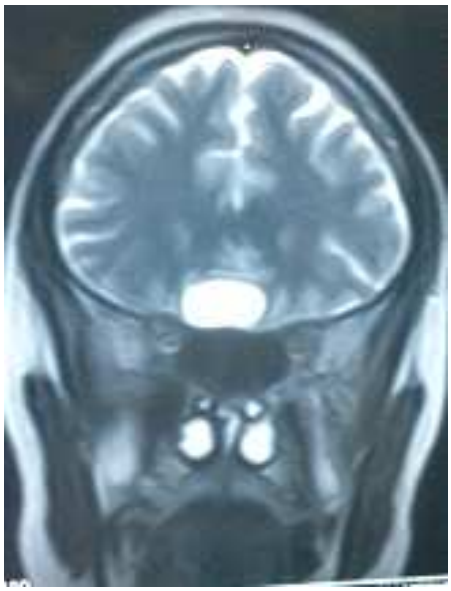


A **B** **C**

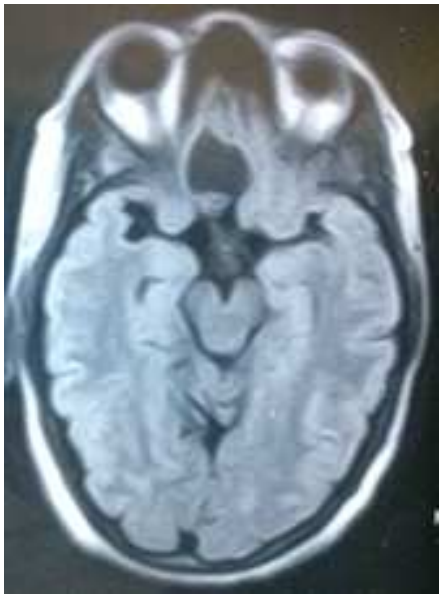
Case 1 A, It showed an extra axial infratentorial right cerebellpontine angle mixed mass lesion of solid and lobulated cystic components, funnel shaped part of the mass is seen projecting into the internal auditory meatus (IAM), associated small per focal edema, there is mass effect with compression of the adjacent brain stem, cerebellar peduncle and right cerebellar hemisphere and partial effacement of the fourth ventricle result in tension hydrocephalus. **B**, (FLAIR), the mass demonstrate high signal while the solid part shows intermediate signal, after IV contrast **.C**, there is ring enhancement of the cyst

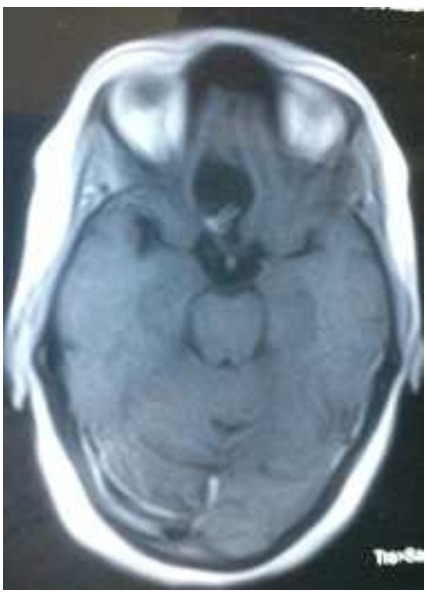
wall and diffuse enhancement of the nodular part.





A **B**

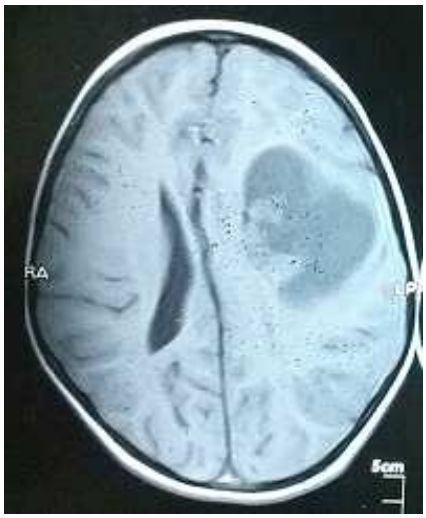




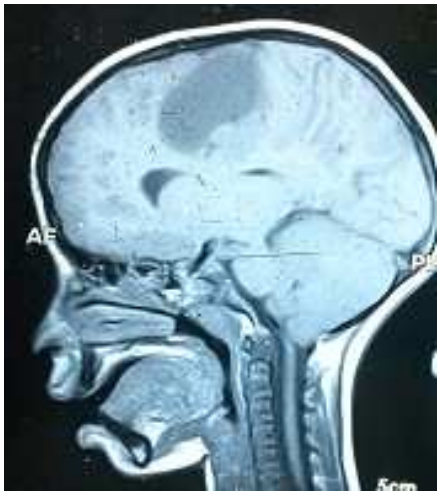
C **D**

Case 2. **A**, showed an extra axial cystic mass lesion with small mural solid component, it arises in the floor of the anterior cranial fossa, at the approximately

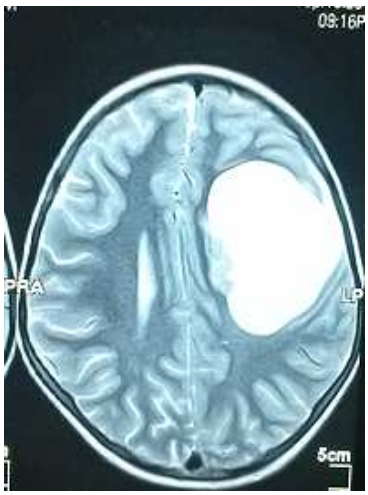
midline, extending from planum sphenoidale to end posterior to crista galli. It measures in AP dimension about 2.5 cm and vertically 1.5 cm. The bulk of the mass is on the right side, but part of it crosses the midline. The rectus gyrus of the right frontal lobe is elevated by the mass.The cyst par demonstrates signals intensity of pure fluid, while the nodule is of grey matter signals on T1 and little higher on FLAIR and T2 .**B** and **C** respectively. It showed faint post contrast enhancement in its solid part while the wall is non-enhancing **D**.



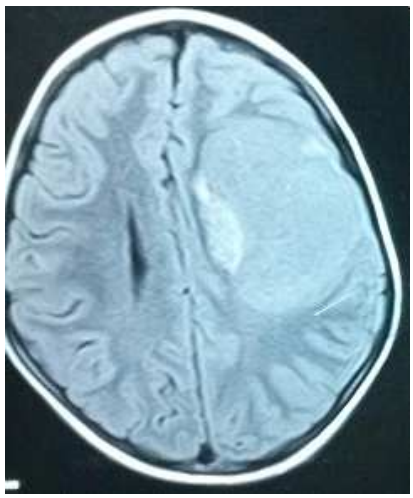
A



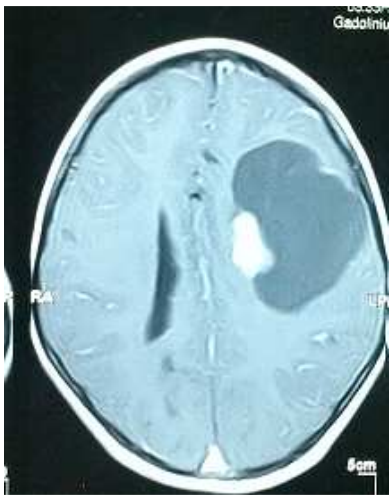
B



C



D



E

Case 3. **A** and **B** showed extra axial cystic mass lesion with small lobulated mural solid component, it measures about 5.5cm vertically, 6.0 cm transversely and 7.0 cm in AP dimension.

The mass exert mass effect on the adjacent brain tissue, shift of the midline to contra lateral side causing compression effect on the infra tentorial structures with the resultant of trans foramina tonsil hernation.It showed low signal on T1in the cystic part and iso-intense to the gray matter in the solid part. In T2 the cystic part shows high signal and heterogeneous high signal in the solid part **C**. On FLAIR **D**, the cystic part showed intermediate high signals, may be due to high cellularity and protein content, while the solid part showed high signal. On post contrast **E** the solid part showed avid and homogenous enhancement, while the cystic part there is ring enhancement.

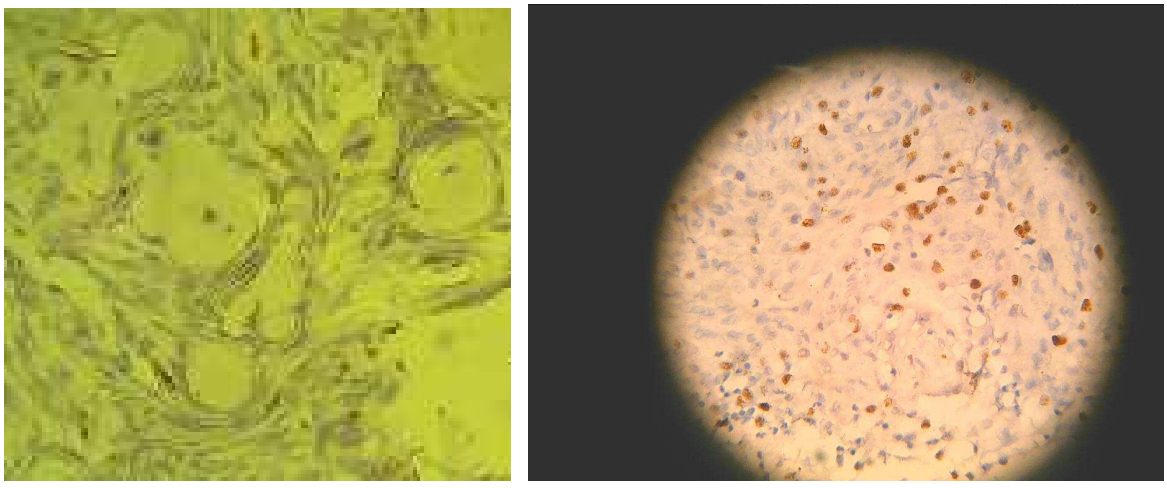


Fig.1, Left side shows Ki 67 labeling index 1-5%, in mixed meningioma, Cases 1 and 2.Right side shows Ki67 labeling index 16-20% in atypical meningioma, case 3.

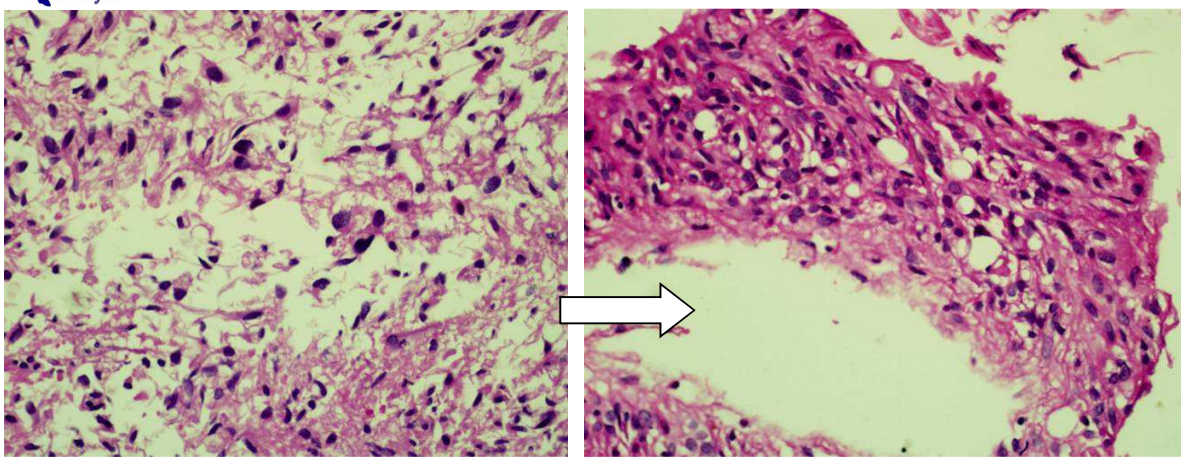


Fig. 2 Left side Shows tumor consisting of spindle shaped cells with dark nuclei, some are large and hyper chromatic, the center of the field shows early cystic change. The right side shows spindle shaped and polygonal cells, the latter with large cytoplasmic vacuoles. Note the cystic change (arrow) (H&E X40)

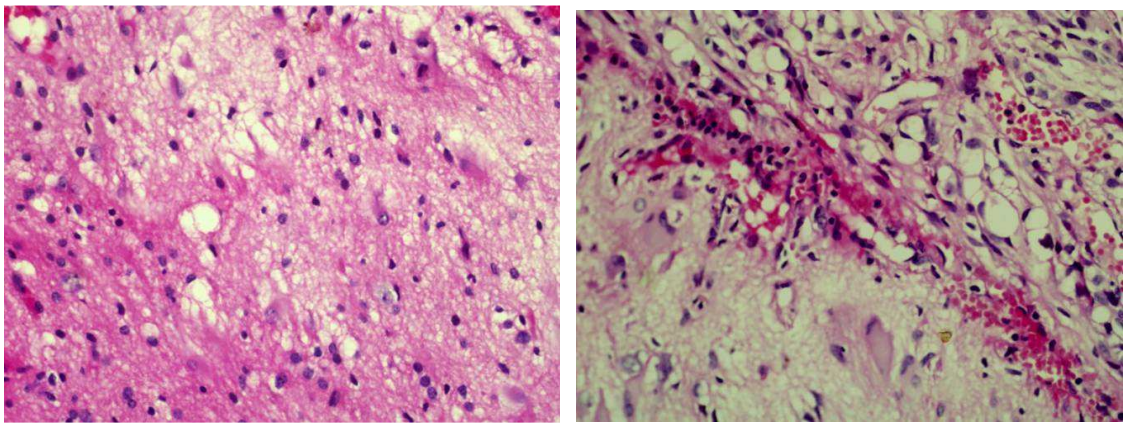


Fig. 3 Left side shows an area of gliosis deep to the meningioma. Note the degenerated neurons and edema. The right side showed junction between the meningioma (Top right) and the gliosis (Bottom left) (H&E X40).

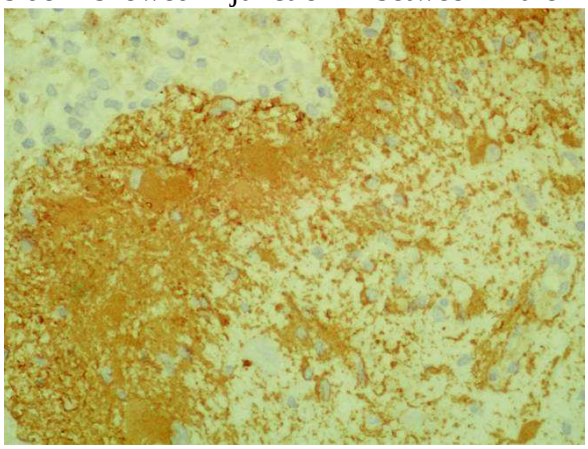


Fig. 4 Showed

- **The major part of the slide shows gliosis positive for G-FAP**
- **In the top left part the meningioma is negative for G-FAP (Immunoperoxidase X40)**

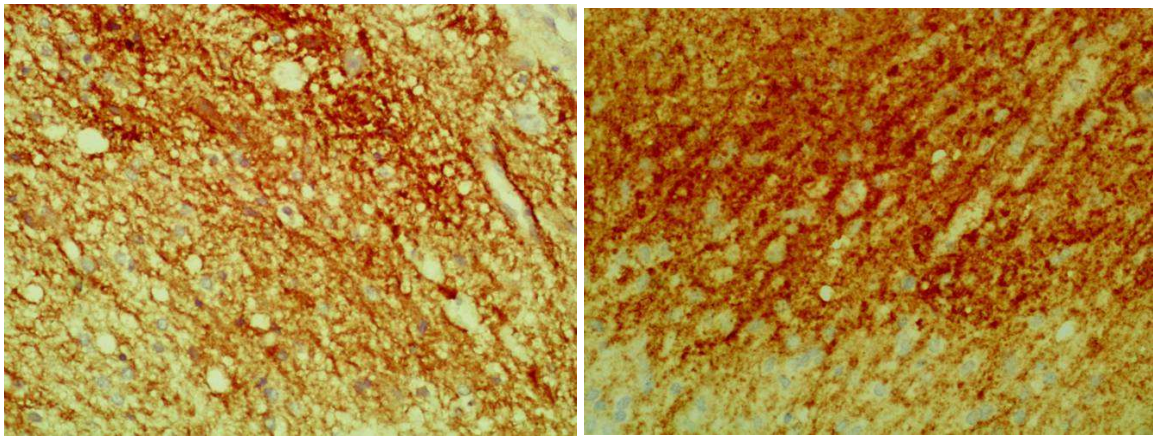


Fig. 5 Showed meningioma section positive for EMA (left) and positive for progesterone (right) Immunoperoxidase X40.

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