

Microcystic meningioma mimicking an arachnoid cyst

Danil Adam^{1*}, Ioana Hornea¹, Cristiana Moiescu¹, Dragos Iftimie¹, Toma Papacocea^{1*}

^{1*}“Carol Davila” University of Medicine and Pharmacy Bucharest

¹“Saint Pantelimon” Emergency Clinical Hospital Bucharest

Abstract: Microcystic meningioma is a particular morphopathological form of benign meningiomas, with different imaging characteristics compared to other forms of meningiomas. It is presented the case of an 80 year old woman with repeated head injuries, initially operated for a right fronto-temporo-parietal pericerebral fluid collection. After four years, the patient returned with headache, confusional status, somnolence, symptoms which appeared after a new head injury. Cerebral CT scan revealed a hypodense lesion in the right sylvian fissure of 5.7/3.5 cm, without perilesional edema, which was interpreted as an arachnoid cyst. Intraoperative, a soft, gelatin-fibrous tumor mass was identified, partially adherent to the dura mater and the underlying cortex, which was completely resected. The morphopathological diagnosis was microcystic meningioma. It is discussed the imaging aspect of the presented case compared to the literature data regarding the microcystic meningiomas and the relationship between head traumas and the occurrence of meningiomas.

Key words: microcystic meningioma, higroma, arachnoid cyst, computed tomography.

Introduction

The meningioma represents 20-34% of the primary cerebral tumors (13, 16). The vast majority are solid benign tumors, more common among women, with classical typical imaging features: extraaxial well-defined mass, hyperdense on CT scan, sometimes with calcifications and adjacent bone hyperostosis, hypointense in T1-MRI and hyperintense in T2-MRI, with homogenous contrast enhancement.

Among the benign meningiomas there is a rare morphological type, with atypical imaging features, with microcysts at the morphopathological examination, called microcystic meningioma.

This constitutes a difficult preoperative diagnostic issue.

We present the case of a patient who has had repeated head traumas and the diagnosis

of this lesion was an intraoperative surprise. Although miming a posttraumatic fluid collection on the preoperative investigation, in reality it was a tumor, a rare type of meningioma.

We discuss the imaging aspects of the presented case in comparison with the literature data regarding the microcystic meningioma, mainly to eliminate the diagnosis confusion between the microcystic meningioma and the posttraumatic fluid collections frequently encountered among the elderly patients.

Case presentation

A 80 year old woman suffered in february 2011 a mild head injury by accidental fall on stairs. At admission she presented with headache and dizziness. The head CT scan did not reveal acute posttraumatic brain injuries,

but a right temporo-parietal meningeal thickening was noted.

After a month, the patient returned accusing headache and diplopia. The cerebral CT scan revealed a right fronto-temporo-parietal hypodense extracerebral area with a maximum thickness of 12 mm at the level of the sylvian fissure, which determined a 5mm midline shift (Figure 1). Through a circular bone flap performed with a trephina, at the opening of the dura mater, a slightly xantocrom liquid was evacuated under pressure (Figure 2). Postoperative, the evolution was uneventful.

After four years, the patient was readmitted after a mild head trauma, presenting headache, cognitive disorders exacerbated in recent months, somnolence.

The cerebral CT scan revealed a right fronto-temporo-insular fluid collection of 5.7/3.5 cm with mass effect on the right ventricle which appeared almost completely collapsed, and which determined midline shift towards the left side. The density of the liquid from the fronto-temporo-insular collection was different (higher) than the liquid in the ventricular system, but there was no perilesional edema (Figure 3).



Figure 1 - Axial head CT scan which reveals a right fronto-temporo-parietal hypodense extracerebral area

with a maximum thickness of 12 mm at the level of the sylvian fissure, with a 5 mm midline shift



Figure 2 - Postoperative skull X-ray which reveals right parietal bone flap

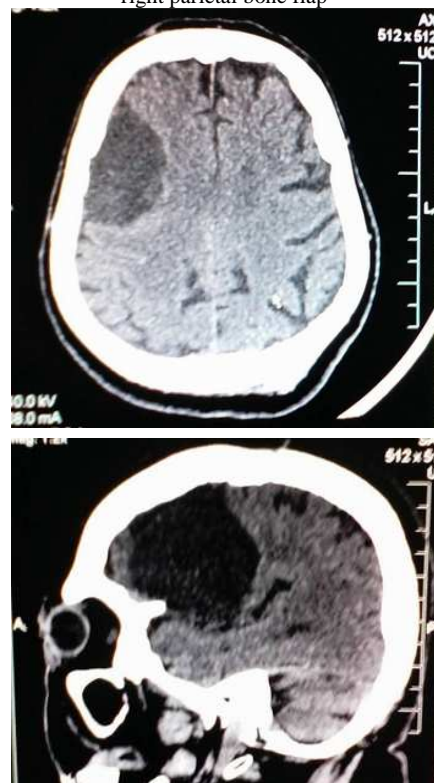




Figure 3 - Head CT scan in axial (A), coronal (B) and sagittal (C) sections which reveals a right fronto-temporo-insular fluid collection of 5.7/ 3.5 cm with mass effect on the right ventricle and midline shift towards the left side

Considering that it was a posttraumatic injury, a new fronto-temporal bone flap centered on the sylvian fissure was performed with the trephina (Figure 4) and, intraoperative, an extraaxial, soft, gelatinous, grey violet, vascularized mass was identified, which was adherent to the dura mater, compressed the subjacent brain and in some places was adherent to the cortex and the sylvian fissure vessels.

Total tumor resection was performed with the coagulation of the adjacent dura mater (Simpson II resection).

Postoperative, the neurological evolution was influenced by the occurrence of lung infections and Clostridium infections that have prolonged hospitalization.

The patient was discharged in conscious state, without neurological deficits.

The histopathological diagnosis was microcystic meningioma (Figure 5).



Figure 4 - Postoperative cerebral CT scan which reveals the two bone flaps: right parietal and fronto-temporal

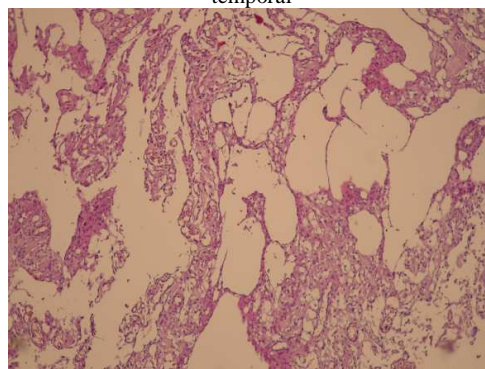


Figure 5 - H-E colored photomicrograph no.111090, original magnification 400x - fragment of the surgically removed tissues showing numerous microcysts containing a pale eosinophilic fluid, surrounded by processes of neoplastic cells

Discussions

Although meningiomas have distinctive imagistic and morphological features, they are histologically heterogeneous. A unique morphopathological type is the microcystic meningioma. After the macroscopic appearance, Masson named this type of meningioma using the term “humid meningioma”. The term “microcystic” was introduced by Kleinmen and col. in 1980. Although in the last century several classifications of meningiomas were made (2,

4, 5, 20), this rare form of meningioma appears for the first time in the 1993 WHO classification (11). The microcystic meningiomas represent 1.6 % of the intracranial meningiomas (11).

Macroscopically, the tumor has a soft, gelatinous, spongy appearance, it is adherent to the dura mater and highly vascularized. Microscopically, the tumor consists of polygonal eosinophilic cells with intracytoplasmic vacuoles and microcysts. In the tumor mass there can be identified extracellular microcystic spaces containing edematous fluid. Even if the histological features of this tumor are well known to experts, the rarity of this type of meningioma generates diagnostic confusion regarding the radiological and imaging data.

Based on the presented case and the literature data, we will discuss the characteristics of microcystic meningiomas in order to avoid incorrect preoperative diagnoses. The skull X-ray may reveal hyperostosis or osteolysis adjacent to the meningiomas, as well as calcifications. Its role in guiding the diagnosis decreased once the CT scan has appeared. On CT scan images, the meningiomas appear as a hyperdense extracerebral mass with contrast enhancement. Calcifications can be identified in over 20% of cases (19). Hyperostosis is encountered more frequently in the skull base meningiomas, in up to 50% of the cases, and osteolysis in about 3% of cases (8).

Regarding the patients with symptoms appeared after head injuries who present at the Emergency Department, the routine investigation is the cerebral CT scan. In elderly patients with a history of mild head traumas, the cerebral CT scan may show a pericerebral fluid collection. At the first cerebral CT examination of the presented patient, two elements which need to be apprehended were described: the thickening of the dura mater in the fronto-temporal region and the highest thickness of the fluid collection

at the level of this dural thickening. The evacuation of the fluid collection was followed by neurological improvement and a new cerebral CT scan was no longer necessary.

At the last admission, the hypodense fluid collection was located at the level of the sylvian fissure. There were no elements to suggest a different diagnosis: perilesional edema, calcifications, requiring other imaging studies: contrast CT scan or brain MRI. The clinical symptoms appeared after a new head trauma, which strengthened the diagnostic suspicion of fluid collection. Peritumoral edema is the prerogative of malignant tumors, but it was observed in more than half of WHO grade I tumors. Peritumoral edema was noted in 40 to 60% of all meningiomas (10). Azizyan and col. found peritumoral edema in up to 66% of the 12 cases of pure micromeningiomas.

The mechanism through which the peritumoral edema occurs is not completely understood. Overexpression and secretion of VEGF by the tumor is the most common theory on peritumoral edema production as VEGF increases the permeability of capillaries and pial vascularization (6, 9, 18). Yoshioka and col. believe that peritumoral edema only occurs when there is a brain-pial tumor vascularization, with VEGF contribution. Other theories relate to the production of fluid by the tumor through a tumor cell secreting activity, or mechanical or ischemic injury to the brain by the tumor (15). The trabecular tumor cells identified in microcystic meningiomas suggested to Lantos and col. that the formation of microcysts was an attempt of tumor cells to restore the subarachnoid space.

Some authors have noted that in microcystic meningiomas there is a thickening of the dura mater adjacent to the tumor (3, 7, 12, 16). This aspect was also stated in our case, on the first cerebral CT scan. This suggests the fact that, at the first admission, the tumor was at the debut, small-sized, although the thickness of the hypodense pericerebral lesion was maximal at the level of the sylvian fissure,

where subsequently the tumor resection was performed. If we do not admit the fact that the tumor pre-existed the first head trauma, we can assume that there is a relationship between head traumas and further development of meningioma, causal relationship commented even by Cushing, afterwards admitted or denied by various authors. Since a contrast CT scan or MRI were not performed, otherwise unusual in a patient with head trauma, we cannot give a definite answer to the question whether there is a connection between head traumas and further development of meningiomas.

Conclusions

In elderly patients with head traumas, the cerebral CT scan may reveal images suggestive for a pericerebral fluid collection. In very rare cases, this fluid collection may be associated with a rare type of meningioma, the microcystic one, some lesions appearing hypodense on these images.

References

1. Azizyan A, Eboli P, Drazin D, et al: Differentiation of benign angiomatous and microcystic meningiomas with extensive peritumoral edema from high grade meningiomas with aid of diffusion weighted MRI. *BioMed Research International* 2014, Hindawi Publishing Corporation. <http://dx.doi.org/10.1155/2014/650939>.
2. Bailey P, Bucy PC: The origin and nature of meningeal tumors. *Am J Cancer* 1931, 15:15-54.
3. Cho JH, Yang KH, Zhang HY: Microcystic Meningioma – unusual variant of meningiomas. *J Korean Neurosurg Soc*, 2003, 34: 82-85.
4. Cushing H: The meningiomas (dural endotheliomas): Their source and favored seats of origin. *Brain* 1992, 45:282-316.
5. Cushing H, Eisenhardt L: *Meningiomas: their classification, regional behaviour, life history and surgical end results*. Springfield, Charles C Thomas, 1938.
6. Ding Y-S, Wang H-D, Tang K, et al: Expression of VEGF in human meningiomas and peritumoral brain areas. *Annals of Clinical and Laboratory Science*, 2008, 38: 344-351.
7. Enderf F: Ueber Geshwulste der Dura Mater. *Virchows Arch* 1900, 160:19-32.
8. Gangadhar K, Santosh D, Fatterpekar GH: Imaging of intracranial meningiomas with histopathological correlation: A Relook into old disease. *NJR*, 2013, 3(1): 14-32.
9. Kalkanis SN, Carroll RS, Zhang J et al: Correlation of VEGF messenger RNA expression with peritumoral vasogenic cerebral edema in meningiomas. *J. Neurosurg* 1996; 85: 1095—1101.
10. Kim EY, Kim ST, Kim HJ, Jeon P, Kim KH, Byun HS: Intraventricular meningiomas: radiological findings and clinical features in 12 patients. *PubMed* 2009 May-June; 33(3):175-80.
11. Kleihues P, Burger PC, Scheithauer BW: The new WHO classification of brain tumors. *Brain Pathology* 1993, 3:255-268.
12. Kleinman GM, Liszezak T, Tarlov E, Richardson EP Jr. Microcystic variant of meningioma: a light-microscopic and ultrastructural study. *Am J Surg Pathol*. 1980; 4:383-389.
13. Lantos PL, Vandenberg SR, Kleihues P. Tumors of the nervous system. In: Graham. Lantos editors. *Greenfields, Neuropathology*. Arnold: 1997, 732.
14. Mahmood A, Caccamo DV, TonrecekFJ et al: Atypical and malignant meningiomas: a clinicopathological review, *Neurosurgery*, 1993, 33(6), 955-963.
15. Michael PB, Peter CB, James GS. Typical, atypical and misleading features in meningioma. *RadioGraphics* 1991; 11: 1087-1106.
16. Michand J, Gagne F: Microcystic meningioma. Clinicopathologic report of eight cases. *Arch Pathol Lob Med* 1983, 107:75-80.
17. Perry A, Louis D.N., Scheithauer B.W. et al: *World Health Organization Classification of Tumours of the Central Nervous System*. IARC, Lyon, France, 4th edition, 2007.
18. Provias J, Claffey K, Tang K, et al: Meningiomas: role of VEGF/vascular permeability factor in angiogenesis and peritumoral edema. *Neurosurgery* 1997; 40: 1016-1026.
19. Rohninger M, Sutherland GR, Louw DF Sima AAF. Incidence and clinicopathological features of meningioma. *J Neurosurg* 1989; 71:665-672.
20. Russel DS, Rubinstein LJ: *Pathology of Tumors of the Nervous System*. London, Edward Arnold, 1971, 3rd edition.
21. Yoshioka H, Hama S, Taniguchi S, et al: Peritumoral brain edema associated with meningioma: influence of vascular blood supply. *Cancer* 1999, 85(4): 936-994.