Case 11770
Meningioma (ECR 2014 Case of the Day)

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Section: Neuroradiology
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Patient: 47 year(s), female

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Clinical History

A 47-year-old female patient was referred to the radiology department by her general practitioner because of chronic pancranial headache that exacerbated acutely. Neurological and systemic examination were otherwise unremarkable.

Imaging Findings

Computed tomography (CT) with bone window settings shows multiple broad-based hyperostotic lesions in the left frontal region, the left parietooccipital region, the right temporal region and high parietal region extending bilaterally. The lesions show marked thickening of the tabula externa, sclerosis of the diploe and an irregular delineation of the tabula interna (Fig 1 a, b). The lesion on the right temporal side shows, besides irregular delineation of the tabula interna and sclerosis of the diploë, an aggressive periostal reaction with hair-on-end pattern adjacent at the tabula externa (Fig. 1 a). Additional Magnetic Resonance Imaging (MRI) demonstrates multiple broad-based dural

masses that are hyperintense to brain parenchyma on FLAIR-weighted images (WI) (Fig. 2). T1-WI after gadolinium contrast administration revealed marked enhancement of the dural masses adjacent to the skull masses and confirmed the sclerosis of the diploë and hyperostosis (Fig. 3).

Discussion

Meningioma is the most frequently observed intracranial non-glial tumour in the adult population with a female predominance and arises more frequently in African-Americans. About 10% of the menigiomas are clinically silent. In 1-9% meningiomas are multiple on imaging. The presence of multiple meningiomas is also referred to as meningiomatosis. In neurofibromatosis type 2 (NF-2), the combination of multiple inherited vestibulocochlear schwannomas, meningiomas and ependymomas are pathognomonic [1]. However, multiple meningiomas can also occur in the absence of NF-2, as in our case.

The tumours are slow-growing, sharply demarcated and surrounded by a capsule. The two main typical morphological configurations are a spherical lobulated dural-based mass and a more sheet-like 'en plaque' configuration. Although highly variable in expression, hyperostosis is a well-known imaging feature of most meningiomas and is more frequently seen with the 'en plaque' configuration [2].

CT and MRI are complementary imaging techniques for the diagnosis of meningiomas. CT with bone window settings can easily identify adjacent bony involvement such as erosions, sclerosis and hyperostosis. The degree of hyperostosis is usually disproportionate to the underlying size of the lesion. Tumoural invasion of the overlying bone seems to represent the most appropriate hypothesis of the hyperostosis. Histologically, the affected bone frequently contains tumour cells in the diploë and Haversian canals [3]. Sometimes a subdural plaque of ossification can be seen that is separated from the sclerotic or hyperostotic bone by a translucent line corresponding to dura mater on skull radiographs [4]. On MRI the lesions are iso- to hypo-intense on T1-WI and have a variable appearance on T2-WI. The presence of a cerebrospinal fluid cleft on T2-WI confirms the extra-axial localization of the tumour(s). After contrast administration, more than 95 % of the lesions enhance vividly both on CT and MRI. A dural tail is a typical imaging finding, but not pathognomic for meningioma [5].

The differential diagnosis comprises benign and malignant lesions. In the case of dural-based granulomas, abnormal chest X-rays and laboratory values are the key to the diagnosis such as an increased erythrocyte sedimentation rate (ESR) and serum angiotensin converting enzyme (ACE) (neurosarcoidosis) or infectious parameters (tuberculosis). In fibrous dysplasia, the surface of the hyperostosis is smooth. Extramedullary haematopoiesis, dural and osteoblastic metastases should be considered in the case of a known malignancy. In osteosarcomatosis, multiple hyperostotic lesions with an aggressive periostal reaction can be seen.

Final Diagnosis

Meningioma with reactive hyperostosis without signs of malignancy (Fig. 4).

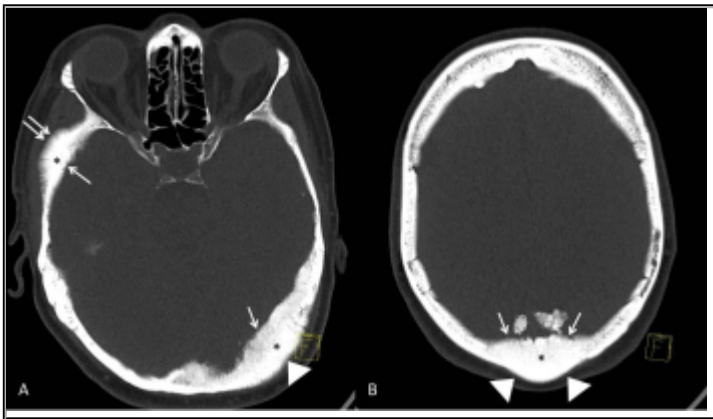
Differential Diagnosis List

Dural/osteoblastic metastases, Extramedullary haematopoiesis, Osteosarcomatosis, Multiple

meningiomas, Granulomas (neurosarcoidosis - tuberculosis), Fibrous dysplasia

Figures

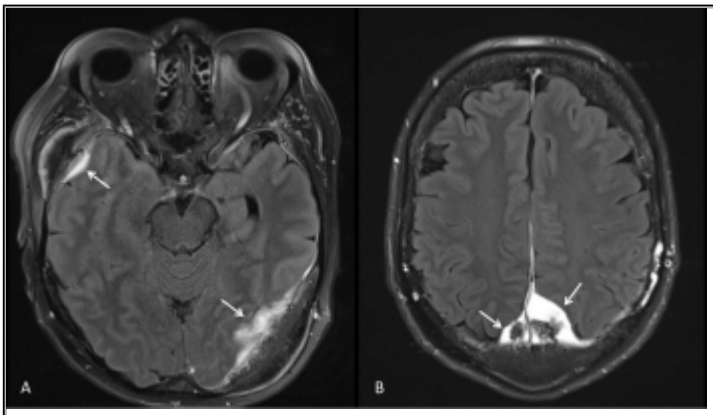
Figure 1 Axial CT with bone window setting



Thickening of the tabula externa (arrowheads), sclerosis of the diploe (asterisk) and irregular delineation of the tabula interna (arrows). Periostal reaction (hair-on-end pattern) adjacent at the tabula externa (double arrow in A).

Area of Interest: Neuroradiology brain;
Imaging Technique: CT;
Procedure: eLearning;
Special Focus: Neoplasia;

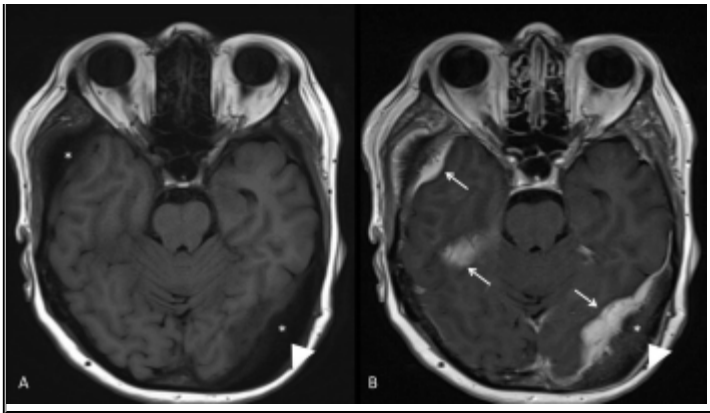
Figure 2 Axial FLAIR-WI



Multiple broad based dural masses that are hyperintense to brain parenchyma (arrows in A and B).

Area of Interest: Neuroradiology brain;
Imaging Technique: MR;
Procedure: eLearning;
Special Focus: Neoplasia;

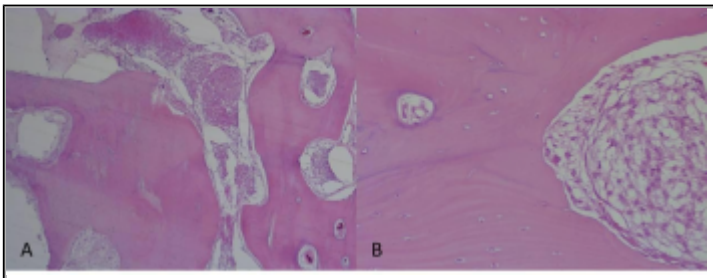
Figure 3 T1-WI without (A) and after gadolinium contrast administration (B)



Marked enhancement of the dural masses (arrows in B) adjacent to the skull masses. Sclerosis of the diploe (asterisk) and hyperostosis (arrowheads).

Area of Interest: Neuroradiology brain;
Imaging Technique: MR;
Procedure: eLearning;
Special Focus: Neoplasia;

Figure 4 Photomicrograph (overview (A) and detailed view (B), HE stain)



Intertrabecular space with tumoral invasion. Immunohistochemistry confirmed the presence of meningotheliomatous meningioma WHO grade 1 (epithelial membrane antigen positive).

Area of Interest: Neuroradiology brain;
Imaging Technique: Experimental;
Procedure: Biopsy;
Special Focus: Neoplasia;

References

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Citation

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