



The Role of Advanced MR Imaging in the Differential Diagnosis of Dural-Based Intracranial Space-Occupying Lesions

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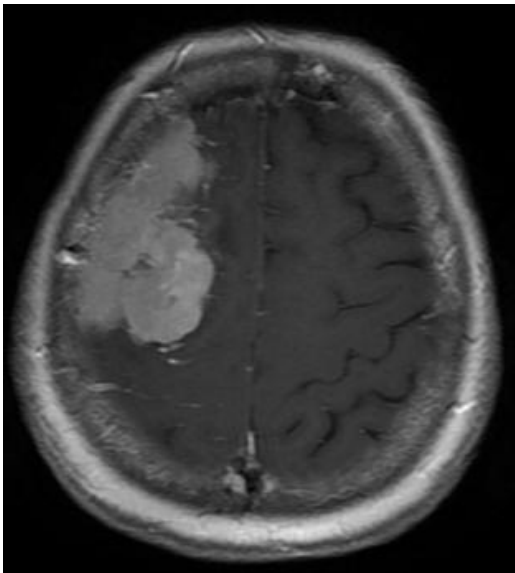
Introduction

Intracranial meningiomas constitute the most common extra-axial, dural based lesions. However, other dural based tumors may mimic meningiomas. Additionally, meningiomas may infrequently be atypical lesions. It has been postulated, that the presence of peritumoral edema is related to the presence of atypia. The purpose of our prospective clinical study was to evaluate the role of advanced MR imaging, diffusion tensor imaging (DTI) and proton magnetic resonance spectroscopy (1HMRS), in the differentiation of dural based intracranial lesions, and to examine the association of peritumoral edema with meningioma atypia.

Methods

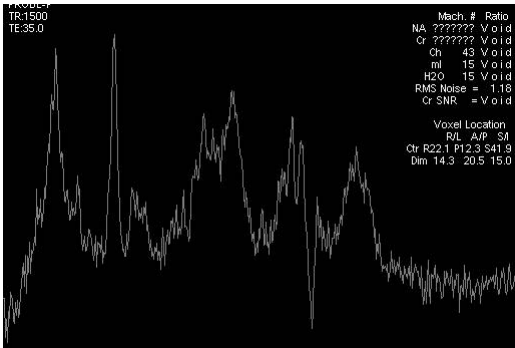
Our study included 22 patients (7M and 15F), aged 44 to 80 years (mean: 63 years) with extraaxial dural based lesions. All patients underwent preoperatively MRI of the brain as well as DTI and 1HMRS studies. The dimensions and the relative volume of the peritumoral edema were calculated. Absolute metabolite concentrations and metabolic ratios were calculated on the obtained 1HMRS studies. All patients underwent surgical extirpation of their lesions. Advanced MRI reports were compared with the results of the histopathological examination.

Fig. 1



Preoperative T1 MRI image, showing a large extraaxial lesion in the right frontal lobe

Fig. 2

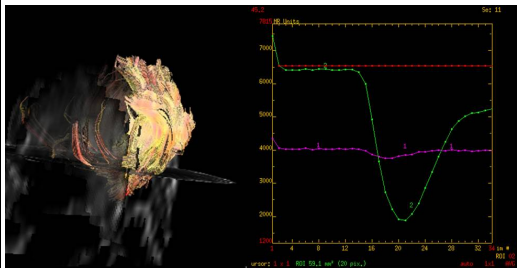


Proton MRS shows elevated Cho at 3.2ppm, reduced NAA and the presence of an unidentified peak at 3.8ppm, which is characteristic of meningiomas.

Results

Fifteen lesions were diagnosed as meningiomas and only three were atypical. From the remaining 7 lesions, 4 were metastatic tumors, 2 were plasmocytomas, and one was glioblastoma. The presence of peritumoral edema was present in 50% of typical and 50% of atypical meningiomas. White matter tracts disruption although more common in non-meningiomas dural based tumors, occurred also in meningiomas. Interestingly, 1HMRS identified a specific peak at 3.8ppm, which was present in 12 of our 15 meningiomas, regardless of the meningioma type, and it was not detected in any other tumors.

Fig. 3 a and b



a. DTI showing displacement, without infiltration of the fibers around the lesion b. PWI shows the characteristic curve of meningiomas

Conclusions

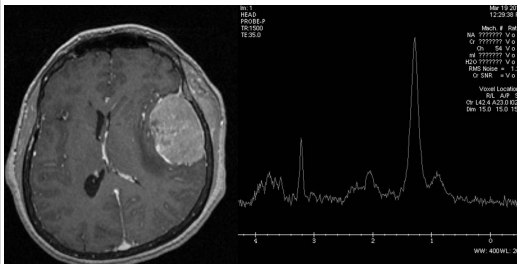
The presence of edema was not suggestive of meningioma atypia in our cohort. Advanced MR imaging modalities were helpful in distinguishing meningiomas from other tumors. 1HMRS identified a specific peak at 3.8ppm, which was characteristic of meningiomas.

Learning Objectives

By the conclusion of this session, participants should be able to:

- Identify the diagnostic dilemma of intracranial dural based lesions
- Recognize the role of advanced MR imaging in the differential diagnosis and the preoperative evaluation of these tumors
- Identify the proton MR spectral characteristics of meningiomas
- Understand the association of peritumoral edema and meningioma atypia.

Fig. 4a-b



a. T1 image with contrast shows an extraaxial lesion in the left frontal lobe b. Proton MRS shows increased concentration of lipids and Cho. No other peaks are identified. MRS is characteristic of a highly malignat tumor (breast meta)