Brain Tumor: Meningioma & Primary Malignant Lymphoma



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Introduction

This is an interesting case report demonstrating the usefulness of perfusion-weighted MRI maps for the characterization of multiple intracranial masses in a patient presenting with cerebral lymphoma.

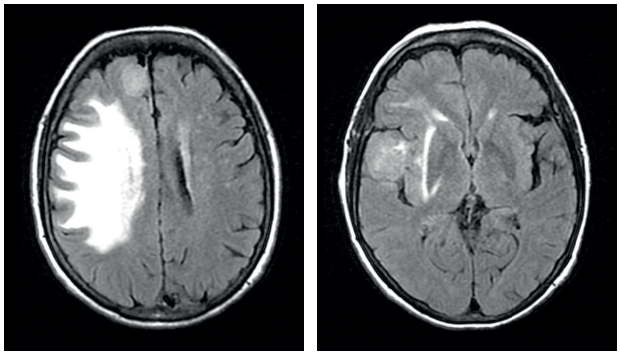
Case Report

76-year-old woman with a medical history of general epilepsy.

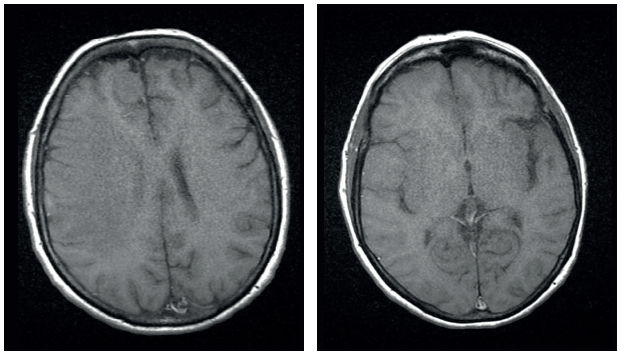
The first CT exam shows multiple cerebral lesions with contrast enhancement after iodated contrast agent injection. These findings suggest multiple cerebral metastases but the patient has no history of primary cancer. Moreover, both the clinical exam and the thoraco-abdominal CT-scan are normal. Therefore an MRI is recommended for a more accurate characterization of the cerebral lesions.

Upon admission, a cerebral MRI is performed including perfusion-weighted (DSC MR imaging) sequences.

MR imaging allowed the characterization of two different lesions, with different perfusion features, i.e. a meningioma and a primary malignant lymphoma. Those diagnosis were further confirmed by neurosurgical stereotactic biopsy.



FLAIR: Two lesions with increased signal intensity. round-shaped right fronto-polar parafalcorial lesion and right fronto-opercular lesion. A difference can be noted between the extent of the peri-lesional oedema that is much higher



T1: Both lesions appear isointense with regard to grey matter (GM) on T1-weighted images

Post-Treatment and Analysis

DSC MR images were processed with Olea Sphere® suite (Olea Medical®, La Ciotat, France) to display the CBV (Cerebral Blood Volume) and K2 (permeability) maps. Regions of interest (ROI) were identified and the corresponding perfusion maps were assessed.

Final Diagnosis Histological Proof

The parafalcorial lesion is a meningioma and the fronto-opercular lesion is a primary malignant lymphoma.

Therapeutic Management

Corticotherapy resulted in a significant decrease of lymphoma and peri-lesion oedema.

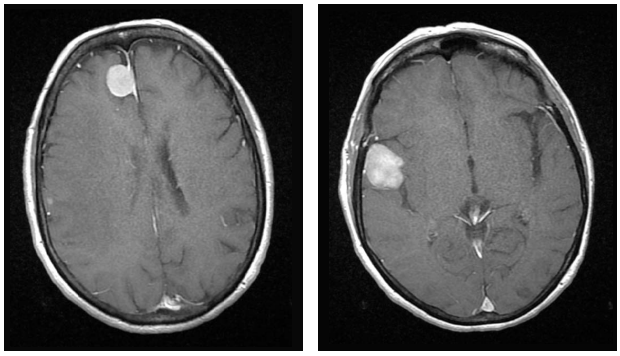
Conclusion

DSC MR imaging analysis, with CBV and K2 maps assessment, allowed us to differentiate a meningioma and a primary malignant lymphoma in this patient. Indeed, such tumors have different hemodynamic behaviors.

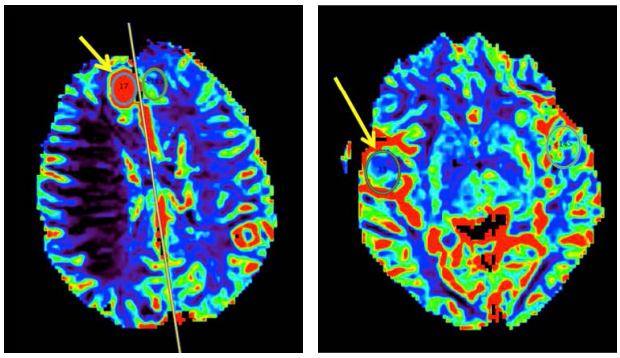
Lymphomas are hypercellular tumors with perivascular tropism and a close-to-normal CBV, whereas the meningiomas are hypervascularized tumors with significantly increased CBV.

Moreover, lymphoma's curve shows a typical profile with values above the baseline, accounting for significant leakage of contrast agent into the interstitial space, as opposed to most other cerebral tumors, such as glial and/or secondary lesions.

Conversely, most meningiomas are characterized by a typical "larger" curve and values under baseline, due to tumor hypervascularization and to BBB (blood brain barrier) breakdown.



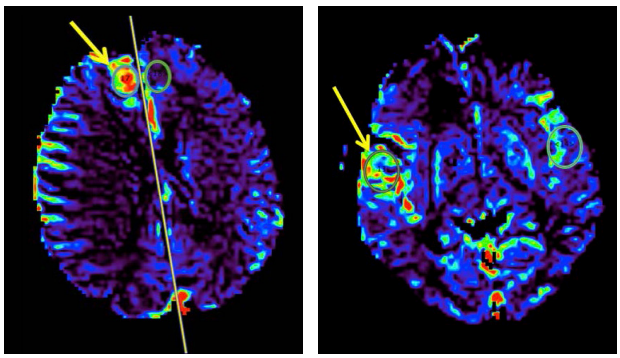
T1 gadolinium: Both lesions show intense and homogeneous enhancement on contrast-enhanced T1-weighted images.
The parafalcorial lesion seems to be linked to the falx cerebri via a dural tail, suggesting an extra-axial lesion.



CBV: CBV is increased in the parafactorial lesion (L) whereas it is normal in the fronto-opercular one (R). Significant increase of the CBV in the parafalcorial lesion due to tumoral hypervascularization. On the contrary, the CBV in the fronto-opercular lesion is equivalent to the normal parenchyma and slightly decreased in the lesion peripheral areas (in green on the map)

ROI (tumor): 4.01
ROI (normal/reference): 1.25
Ratio: 3.21

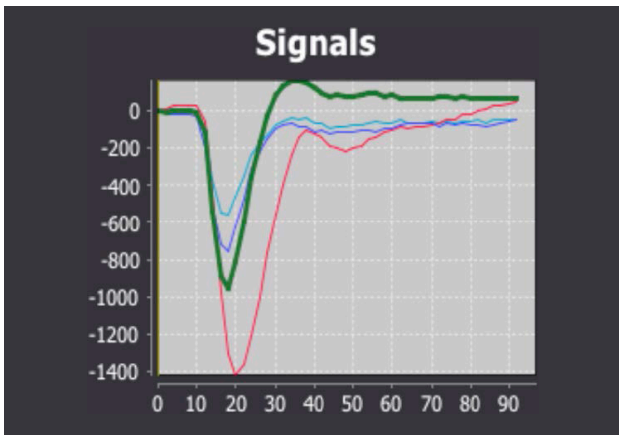
ROI (tumor): 1.29
ROI (normal/reference): 1.47
Ratio: 0.87



K2: Permeability maps show increased K2 in both lesions.
Both lesions have an increased capillary permeability

ROI (tumor): 182.48
ROI (normal/reference): 28.57
Ratio: 6.39

ROI (tumor): 122.98
ROI (normal/reference): 58.97
Ratio: 2.09



Contrast agent concentration curves
Blue curve: (dark and light): reference ROIs (normal tissue)
Red curve: ROI within the parafalcorial lesion.
The increased AUC (Area Under the Curve) accounts for increased CBV. The curve is wider and the values under the baseline are typical for meningioma.
Green curve: ROI within the fronto-opercular lesion.
The AUC is normal but the values above the baseline are typical for primary cerebral malignant lymphoma.

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