Case Report

Low Grade and High Grade Gliomas
INTRODUCTION

Gliomas are the most common primary cerebral neoplasms. The grading of gliomas is of utmost clinical importance as it determines the correct therapy.

More aggressive treatment planning is required for the management of high grade tumors. The purpose of this case report is to illustrate the possible predictors, which might discriminate, between low and high grade gliomas using dynamic contrast-enhanced (DCE) perfusion in the follow-up of treated low grade gliomas.

CASE REPORT

A 54-year-old woman presented to the emergency room with a motor deficit of the left upper extremity. A brain MRI revealed a FLAIR hyperintense lesion in the right frontal lobe.

The patient underwent a craniotomy with frameless stereotactic guidance for resection of the lesion. The histopathologic examination of the tumor was consistent with a low grade glioma.

POST-TREATMENT AND ANALYSIS

PWI images were processed with OLEA SPHERE® (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 graphs were assessed.

CONCLUSION

The PWI curves analysis, together with the 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 hypervasculatized tumors with significantly increased CBV.

Moreover, lymphoma's curve shows a typical profile with values under 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.

Follow-up: MRI-PERF (2010)

No increase of the CBV in the adjacent white matter of the postoperative cavity.

FLAIR, T1, T1 Gadolinium - No residual tumor.

No enhancement in the postoperative cavity and in the adjacent white matter.

Follow-up: MRI-PERF (2010)

Contrast agent concentration curves

Blue curve: ROI within the lesion
Red curve: reference ROI (normal tissue)
No increase of the CBV in the adjacent white matter of the postoperative cavity.
DIAGNOSIS

The lesion was progressing from a low grade glioma to high-grade.

TREATMENT

The patient has benefited from an early treatment with chemotherapy, and there is still today no malignant transformation.

DISCUSSION

Neoangiogenesis is believed to be a key factor in the process of neoplastic transformation, which is essential for the rapidly growing tissue. CBV corresponds to the degree of vascularization and could discriminate tumor grade.

The property of migrating into neighboring cells and tissues is a key feature of gliomas, which increases, as it progresses from a low grade to high grade. K2 has been widely used to quantify the extent of BBB disruption and was found to differentiate low grade tumors and high grade tumors.

Increases in rCBV and K2 precede the development of contrast enhancement in transforming low grade gliomas; rCBV and K2 increases are therefore likely to provide an earlier noninvasive indicator of malignant progression. This has important implications for clinical management, by helping to identify patients most likely to benefit from early treatment. We therefore recommend that MR perfusion imaging be used routinely in the initial assessment and subsequent evaluation of patients with low grade gliomas.