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Diagnostic Performance of Perfusion MRI in Differentiating Low-Grade and High-Grade Gliomas: Advanced MRI in Glioma, A Siriraj Project

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Abstract

Background: To determine the usefulness of the perfusion MRI technique at Siriraj Hospital for differentiating between high- and low-grade gliomas by using pathological results as the gold standard.

Material and Method: The authors prospectively investigated 64 consecutive patients who were suspected as cerebral glioma from prior conventional imaging. Cerebral perfusion study was achieved during the first pass of a bolus of gadoliniumbased contrast agent. All post-processing MRI images were interpreted by two board-certified neuroradiologists (more than 10-year-experience), one radiology resident and one well-trained technician, who separately performed and blinded from the pathological results.

Results: Forty-four patients diagnosed as glioma were included in this study. There were 26 cases of high-grade and 18 cases of low-grade gliomas. The cerebral blood volume and flow and its ratios had a strong association with the grade of glioma. The areas under the ROC curve for CBV, CBV ratio (rCBV), CBF, and CBF ratio (rCBF) are 0.778, 0.769, 0.769, and 0.772, respectively. On the basis of equal misclassification rates, a cutoff value of 6.15 for CBV (sensitivity, 81.5%; specificity, 64.7%), a cutoff value of 2.38 for the rCBV (sensitivity, 88.9%; specificity, 64.7%), a cutoff value of 0.66 for CBF (sensitivity 81.5%; specificity 70.6%), and a cutoff value of 2.6 for the rCBF (sensitivity, 85.2%; specificity, 70.6%) best discriminated the high and low-grade gliomas.

Conclusion: Preoperative radiologic grading of gliomas based on conventional MR imaging is sometimes unreliable. The cerebral perfusion measurements can significantly improve the sensitivity and predictive values of radiologic glioma grading. The rCBV measurement is the best parameter for tumor grading due to the highest sensitivity.

Keywords: Perfusion MRI, Cerebral blood volume, Cerebral blood flow, Glioma

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