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Value of Diffusion Tensor Imaging in Differentiating High-Grade from Low-Grade Gliomas

Siriwan Piyapittayanan, Orasa Chawalparit, Siri-on Tritakarn, Theerapol Witthiwej, Tumtip Sangruchi, Sarun Nunta-aree, Sith Sathornsumtee, Paranut Itthimethin, Chulaluk Komoltri

Abstract

Objective: To determine the usefulness of diffusion tensor imaging (DTI) in differentiating high-grade glioma (HGG) from low-grade glioma (LGG).

Material and Method: Patients with cerebral gliomas underwent conventional MRI and DTI before surgery. All proven pathologies were classified into two groups, i.e. LGG and HGG. The authors measured fractional anisotropy (FA) and apparent diffusion coefficient (ADC) values in region of interest (ROI) including solid tumoral region, necrotic region, peritumoral edema, contralateral normal appearing white matter (NAWM) and normal corpus callosum as well as calculated ADC ratios. Pairwise comparisons were performed by using the t-test. The ROC curves of imaging parameters were employed to determine the best parameter for differentiating the two entities.

Results: Forty-three patients with cerebral gliomas, 17 with LGG and 26 with HGG, no statistical significant difference between LGG and HGG using mean FA values in each ROI. The ADC and minimal ADC values of solid tumoral region and peritumoral edema, the ADC and minimal ADC ratios of solid tumoral region are statistical significant to differentiate HGG from LGG, $p < 0.05$. The ratio ADC solid tumoral region to normal corpus callosum had highest predictive accuracy to differentiate the two entities with AUC of 0.74.

Conclusion: The ADC value, minimal ADC value, and ADC ratios of solid tumoral region appeared to be useful for differentiating HGG from LGG.

Keywords: Brain tumor, Glioma, DTI

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The Medical Association of Thailand

Address: 4th Floor, Royal Golden Jubilee Building, 2 Soi Soonvijai, New Petchburi Road, Bangkok 10310, Thailand

Telephone: 0-2716-6102, 0-2716-6962 press 0 Fax: 0-2314-6305

E-mail: jmedassocthai@yahoo.com, math@loxinfo.co.th