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Abstract

Meningioma consistency is one of the most critical factors affecting the difficulty of surgery. Although there have been many reports attempting to predict meningioma consistency via magnetic resonance imaging (MRI) findings, no definitive method has been established, as most have been based on qualitative evaluation. Therefore, the present study examined the potential of T2 relaxation time (T2 value), a tissue-specific quantitative parameter, for assessment of meningioma consistency. Eighteen surgically treated meningiomas in 16 patients were participated. Preoperatively, T2 values of all meningiomas were calculated pixel by pixel, and a T2 value distribution map (T2 map) image was generated. Twenty-seven tumor specimens (multiple specimens if heterogeneous) were taken from these meningiomas, with each localization identified intraoperatively by image guidance. The consistency of the specimens was measured with a durometer, originally a device for measuring the hardness of material such as elastic rubbers, and their water content were subsequently measured by wet/dry measurement. Significant correlation was found between T2 values of matched locations identified by image guidance intraoperatively and the

consistency measured by durometer ($r = -0.722$, $p < 0.01$), as well as the water content ($r = 0.621$, $p = 0.01$). In addition, the water content correlated significantly with the durometer consistency ($r = -0.677$, $p < 0.01$). T2 values could be a reliable quantitative predictor of meningioma consistency, and T2 map, which elucidated the internal structure of the tumor in detail, could provide helpful information for surgical resection.