Diffusion Weighted Imaging in Differentiating Malignant from Benign Intraductal Papillary-Mucinous Neoplasm of the Pancreas

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Purpose

To evaluate the diagnostic performance of diffusion-weighted imaging (DWI) and apparent diffusion coefficient (ADC) value for differentiating malignant intraductal papillary-mucinous neoplasm (IPMN) of the pancreas from benign IPMN.

Materials and methods

This retrospective study included 21 patients (14 men, 7 women; mean age 69.7 years) with histopathologically proven IPMN (12 malignant and 9 benign IPMNs). All patients had undergone MR examination with a 3-T unit (Signa EXCITE HD 3.0T, GE Healthcare; n = 6) or a 1.5-T unit (Signa EXCITE HD, GE Healthcare; n = 15) before surgery. Axial diffusion-weighted images were obtained using the single-shot echo planar imaging technique at two b values (0 and 800 s/mm^2) using the tetrahedral gradient technique in addition to the standard MR imaging protocol for pancreas including axial fat-suppressed T1-weighted image, axial and coronal T2-weighted image, 3D-MR cholangiopancreatography and Gd-enhanced T1 weighted image. As a quantitative analysis, region of interest (ROI) was drown on the cystic lesion (branch duct type) or on the dilated main pancreatic duct (main pancreatic duct type), and minimum ADC value (ADCmin) was calculated by using a computer workstation (Advantage Workstation 4.2, GE Healthcare). The Student's t-test was used to compare the ADCmin between malignant and benign IPMNs. As a qualitative analysis, two experienced abdominal radiologists independently evaluated MR images without DWI first, and assigned their confidence level regarding the presence of malignancy using a five-point rating system (1. definitely benign, 2. probably benign, 3. equivocal, 4. probably malignant, 5. definitely malignant). Then, they also evaluated MR images together with DWI, and assigned their confidence level in the same fashion. Receiver operating characteristic (ROC) curve analysis was performed to compare the diagnostic performance between MR imaging with and without DWI. Sensitivity, specificity and accuracy were also calculated using a confidence level of 4 or 5 as positive finding.

Results

Figure shows the ADCmin of the malignant and benign IPMNs. The mean ADCmin of malignant IPMN (1.88×10^{-3} mm^2/s) was significantly lower than that of benign IPMN (2.89×10^{-3} mm^2/s) ($P < 0.001$). Mean Az value, sensitivity, specificity and accuracy of MR imaging with DWI were higher than those of MR imaging without DWI (table), although differences were not significant.

Conclusion

DWI and measurement of ADCmin would be helpful for differentiating malignant IPMN form benign IPMN.

Figure: ADCmin (mm^2/s) of malignant and benign IPMNs

	DWI (-)	DWI (+)
Az	0.86	0.95
Sensitivity	0.75	0.83
Specificity	0.89	0.94
Accuracy	0.81	0.88

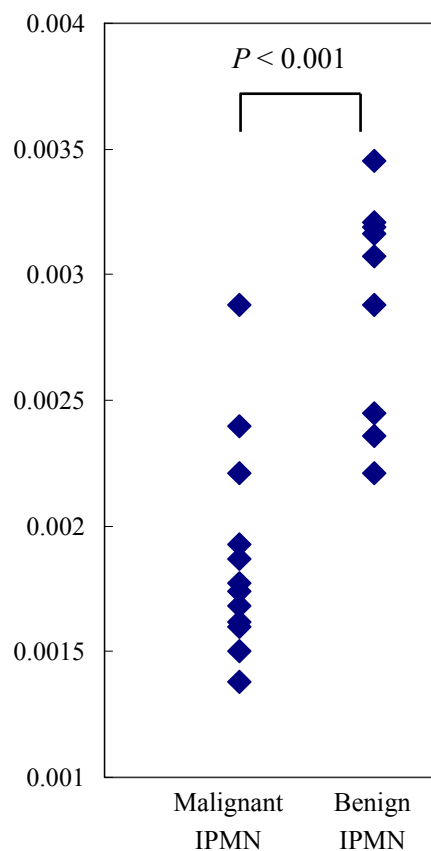**Table**: Mean Az value, sensitivity, specificity and accuracy of MR imaging without and with DWI for differentiating malignant IPMN from benign IPMN.