Detection of pancreatic fibrosis using magnetic resonance imaging: correlation with histopathology

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Background and Hypothesis: Diagnosis of chronic pancreatitis (CP) is challenging and controversial. Magnetic Resonance Imaging (MRI) offers a noninvasive modality to diagnose CP, but its findings have been rarely correlated with histopathology. We aimed to assess the correlation of T1 signal intensity ratio of pancreas to spleen (T1 SIRp/s) and arterio-venous ratio (AVR) of the parenchyma on MRI and Cambridge score on MRCP with surgical histopathology in patients who underwent pancreatic resection.

Methods: We identified 160 pancreatic resections performed in adults between 2017 and 2019 by searching our institution's surgery database. Seventy-one of them had surgical pathology specimens available and 59 of them had MRI/MRCP within 3 months prior to the surgery. Histologic grading was performed by a gastrointestinal pathologist using Ammann's fibrosis score. Two image analysts blinded to the clinical information and fibrosis score measured T1 SIRp/s from unenhanced T1-weighted fat-saturated gradient-echo images and arterio-venous ratio (AVR) from post-contrast dynamic phase. Cambridge score was also recorded from MRCP. Statistical analysis included Pearson's correlation coefficient of the T1 SIRp/s, AVR, and Cambridge score with the fibrosis score and weighted kappa for interobserver agreement.

Results: Correlations between T1 SIRp/s and AVR with the fibrosis score were (r= -0.30, p=0.02, 95%CI: -0.51 to -0.04 and r= -0.36, p=0.01, 95%CI: -0.58 to -0.09, respectively). In comparison, there is less correlation between the Cambridge grade and the fibrosis (r= 0.17, p=0.15, 95% CI for r= -0.07 to 0.39). Interobserver agreement was good (kappa=0.80).

Conclusion: There is moderate correlation between the T1 signal intensity and enhancement ratio of the pancreas with pancreatic fibrosis. This is higher than the correlation between the Cambridge grade and fibrosis. Multi-institutional, prospective studies are needed to verify T1 SIR and AVR as potential imaging biomarkers of pancreatic fibrosis.