MRI and MRCP in pancreaticobiliary malignancy

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Summary

Ultrasonography and CT scanning have been the standard techniques for demonstrating pancreatic carcinoma, although MR and more recently even endoscopic ultrasound have shown excellent results. MRCP is a specialized MR technique that shows fluid containing structures in a 2D image display similar to direct ERCP findings. Accuracy of MRCP (sensitivity, specificity) equals or exceeds ERCP for both biliary and pancreatic duct morphology. MRCP does not provide information with regard resectability. MRI can be applied to pancreaticobiliary malignancies as conventional MR, as MR angiography/venography or as MR cholangiopancreatography (MRCP). The technique and applications of each method differ. Although all have been well documented in the literature, their clinical role when compared to other evolving technologies such as helical CT and endoscopic ultrasound is still evolving.

Key words: magnetic resonance, pancreatic cancer

Pancreatic cancer - detection

MRI is still not a primary method for detecting carcinoma of the pancreas, but several groups have shown results rivaling helical CT [1-3]. Optimal image quality is obtained with T1 weighted sequences utilizing dynamic gadolinium enhancement. Tumors (as well as foci of pancreatitis) are shown as low signal masses against the bright high signal produced by normal enhancing pancreatic parenchyma (figure 1). Dilatation of the pancreatic duct, areas of necrosis and liver metastases are readily demonstrated. Fat suppression techniques are essential in order to bring out the best image contrast features [2]. Other workers have shown enhancement of normal pancreatic parenchyma following intravenous manganese DpDp (mangafodipir) where foci of tumor maintain darker signal, also achieving improved tumor/parenchyma contrast. This agent is commercially available in the United States, but has not been widely utilized because of the excellent results obtained with other methods.

Pancreatic cancer staging

MR angiography (MRA) and MR venography (MRV) techniques have recently been refined with the routine administration of gadolinium DTPA for dynamic early (arterial) and delayed (venous) large vessel imaging [4]. Computer processed images with maximum intensity projection (MIP) or shaded surface display (SSD) techniques create images revealing the detail of conventional catheter angiograms. Vascular stenosis, occlusion and displacements are readily demonstrated obviating the need for celiac and superior mesenteric angiography for preoperative vascular road mapping.
An important special use for MRCP is the evaluation of suspected mucinous duct ectasis or ductectatic cyst adenocarcinoma of the pancreas where anatomic details are often better shown with MRCP and ERCP because of the better depiction of duct dilatation and associated cyst collections [11-12]. Established current indications for MRCP include incomplete or failed ERCP, but MRCP is increasingly widely employed for a broader range of diagnostic pancreatic and biliary problems. In these cases MRCP will increase diagnostic certainty, allowing ERCP to be reserved mainly for therapeutic interventions such as papillotomy and stent placement.

Figure 1: Small carcinoma of the head of the pancreas shown as a rounded, low signal area in the pancreatic head. The remainder of the normal pancreas is shown as a uniform high signal. The slightly dilated pancreatic duct is clearly visible. Image is obtained with T1 weighting, fat suppression, and intravenous administrations gadolinium.

Figure 2: Magnetic resonance cholangiopancreatography showing localized stricture of the common bile duct due to metastatic periportal lymphadenopathy. Note considerable proximal dilatation of intrahepatic bile ducts, cystic duct and gall bladder.

References