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Magnetic Resonance Cholangiopancreatography

Magnetik Rezonans Kolanjiyopankreatografi

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Introduction

Since its first clinical introduction, dated 1911, magnetic resonance (MR) cholangio-pancreatography (MRCP) has proved to be a reliable technique in the evaluation of biliary and pancreatic ducts obstruction[1].

MRCP is used to investigate suspected choledocholithiasis, neoplastic obstruction (tumours), benign and malignant strictures, chronic pancreatitis, primary sclerosing cholangitis, mucinous ductal ectasia, anatomical variants and postcholecystectomy biliary disorders[2]. MRCP is particularly useful where endoscopic retrograde cholangiopancreatography (ERCP) is difficult, hazardous or impossible, such as in patients who have had Billroth II gastrectomy, Roux-en-Y diversions, pancreatic pseudocysts, sclerosing cholangitis and prior serious ERCP complications. MRCP can be used to determine duct calibre, anomalies, strictures, dilatation, filling defects (calculi) and extraductal collections of fluid (cysts, diverticula and fistulae)[3].

The optimal protocol to perform MRCP has not been defined and there continues to be variation across centers. As a general rule, the protocol depends upon the specific MR magnet being used, including its field strength (eg 1.5 versus 3T) and the manufacturer, as well as institutional experience and preferences. However, all acquisition protocols obtain heavily T2-weighted images as thick slabs and the images are reformatted in planes to optimize depiction of the extrahepatic ducts. Volume-rendered images may be used to depict the intra- and extrahepatic bile ducts[4,5].

Contrast agents are not strictly necessary to obtain MRCP images. However, negative oral contrast agents (so called "superparamagnetic" agents) can be usefully employed to reduce the brightness of the gastric and intestinal fluids, in order to enhance the evidence and brightness of the biliary tree and pancreatic ducts[6].

Recent technical issues include the use of half-Fourier T2-weighted pulse sequences and the administration of secretin for MRCP. Secretin improves pancreatic duct and side-branch delineation and the detection of anatomic variants such as pancreas divisum. It allows monitoring of pancreatic flow dynamics and evaluation of pancreatic exocrine function. MR imaging and secretin-enhanced MRCP are useful in advanced inflammatory disease, for planning surgery or therapeutic endoscopy and for follow-up studies after therapy, in identifying pancreatic malignancies and in establishing resectability [7]. A newer technique to minimize signal from the stomach and duodenum, and thus increase the visibility of the biliary tree, has been the administration of a single dose of ranitidine 300 mg two to three hours prior to the

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study. In addition, one report found that intravenous glucagon improved visualization of the common bile duct and ampulla of Vater during MRCP without any documented adverse effects[4,5].

The baseline estimate is that MRCP may both reduce cost and result in improved quality of life outcomes compared with diagnostic ERCP. However, MRCP does not currently allow any intervention to be performed, such as stone extraction, stent insertion, or biopsy[8].

There are several limitations associated with MRCP. The main potential problems with MRCP are image artifacts and difficulty in patient compliance. Image artifacts can be produced by a bright signal arising from stationary fluid within the adjacent duodenum, duodenal diverticulae, and ascitic fluid[9]. The presence of metal leads or fragments precludes any MR imaging study. MRCP has lower resolution than direct cholangiography and can miss small stones (usually stones up to 2–3 mm in size are visible), small ampullary lesions, primary sclerosing cholangitis, and strictures of the ducts. Papilla can only be seen in about 40% of patients who have MRCP. There may also be difficulty in depicting minor narrowing of the cystic and pancreatic ducts. MRCP yields only static images and may fail to depict various anomalies. It is therefore important that both source images and projection images are analysed in order to visualise and evaluate the anatomy of the entire pancreatobiliary tract. MRCPs of diagnostic quality can be obtained in 92–97% of patients[10].

Contraindications to MRCP, as in all MRI, include cardiac pacemakers, cochlear implants, retinal metal fragments and, in some cases, subarachnoid aneurysm ferromagnetic surgical clips. Other patients unsuitable for MRCP include those with obesity, massive ascites or haemodynamic instability. Claustrophobia and emotional distress prevent completion of the MRI procedure in up to 5% of patients[11].

As a result: the recent introduction of 3 Tesla magnets will likely provide an increased spatial resolution, although data are not still conclusive. In the next years the role of MRCP will further expand, due to the availability of faster sequences, 3D imaging, specific contrast agents and functional studies. MRI examination of the biliary and pancreatic system will provide an excellent anatomical display in both normal and pathologic conditions. Functional imaging will further progress allowing information on both biliary and pancreatic functions.

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