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# Use of Magnetic Resonance Cholangiopancreatography in Clinical Practice: Not as Good as We Once Thought



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- BACKGROUND:** Magnetic resonance cholangiopancreatography (MRCP) is believed to be a useful tool to evaluate the biliary tree and pancreas for stones, tumors, or injuries to the ductile system. The purpose of this study was to compare the accuracy of MRCP to the gold standard, endoscopic retrograde cholangiopancreatography (ERCP), in our institution.
- STUDY DESIGN:** We performed a retrospective review of all MRCP followed by ERCP (follow-on ERCP) at a single institution over a 6-year period. Exam findings from MRCP were compared with findings on the follow-on ERCP and compared. Studies were grouped into 2 main classifications: tests being performed for patients with suspected choledocholithiasis (stone disease) and tests being performed for concerns of malignant strictures or duct injuries (non-stone disease).
- RESULTS:** A total of 81 patients had MRCPs and follow-on ERCPs in this time period. Thirty-six patients had positive findings on MRCP and ERCP for stones in the common duct system, and 14 patients had positive findings on MRCP and subsequent ERCP for masses and strictures of the common duct. Three patients had positive MRCP and ERCP findings for pancreatic duct abnormalities. The specificity and positive predictive value of MRCP were 94% and 98%, respectively. However, 13 of 28 patients had lesions identified on ERCP after a normal MRCP. The sensitivity and negative predictive value were 80% and 54%, respectively.
- CONCLUSIONS:** Magnetic resonance cholangiopancreatography was not useful in the management algorithm of either stone or non-stone disease of the biliary tree or pancreas. It should be abandoned as a diagnostic tool for work-up of biliary duct pathology. (J Am Coll Surg 2015;221:215–219. © 2015 by the American College of Surgeons)
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Magnetic resonance cholangiopancreatography (MRCP) has now become a commonplace test in many health care systems around the world for evaluating the biliary tree for stone disease, tumors, or other abnormalities. Our institution has experienced an increase in the number of MRCP studies done and the timing of these studies,

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especially as they relate to the work-up and treatment of choledocholithiasis. There were several cases in the past year in which MRCP was read as negative, but subsequent endoscopic retrograde cholangiopancreatography (follow-on ERCP) was actually positive. This prompted us to review the literature on this topic and re-evaluate our process and techniques here. The literature at large supports the notion that MRCP is a very accurate study, with sensitivities and specificities well above 90%,<sup>1-11</sup> while some studies showed sensitivities and specificities in the 80% to 90% range, especially for choledocholithiasis.<sup>7,12-20</sup>

The aim of this study was to evaluate our use of MRCP in the work-up of suspected choledocholithiasis as well as tumors of the pancreas and biliary tree, especially the sensitivity and negative predictive values of the study as compared with the gold standard, ERCP. We specifically wanted to see how it compared with ERCP in discerning anatomic variation, whether it be stones, tumors, or otherwise. Our hypothesis was that MRCP, as compared

**Abbreviations and Acronyms**

ERCP = endoscopic retrograde cholangiopancreatography

IOC = intraoperative cholangiogram

LC = laparoscopic cholecystectomy

MRCP = magnetic resonance cholangiopancreatography

NPV = negative predictive value

PPV = positive predictive value

with ERCP in our institution, is not as sensitive and carries a lower negative predictive value than previously reported in the literature.

**METHODS****Patients**

We queried our procedural database to identify all patients who underwent ERCP in our institution during the past 6 years. We then matched all patients who underwent MRCP within the 48 hours previous to the ERCP by querying our radiologic database for the same time frame. We selected a small time period of 48 hours to decrease the chance of “new” stones passing from the gallbladder and being seen on ERCP. All patients were admitted and treated at our hospital. The electronic medical records as well as all procedural and radiologic reports were reviewed for each patient. Results of MRCP and ERCP were viewed as positive or negative for either stone or non-stone disease of the biliary tree by any confirmatory comments in the overall impression or the body of the reports specific to that disease process. Because our inherent bias was against the use of MRCP, we attempted to overcome it by allowing any abnormal finding, even in the body of the report, to count as a positive result to decrease our chance of falsely rejecting the null hypothesis. In addition, the time frame of this study was, in large part, before our group lost confidence in MRCP. This study was approved by our local Institutional Review Board.

**ERCP and MRCP**

All ERCPs were done by 6 gastroenterologists over the 6-year time frame of the study. All procedures were done with an Olympus V-Scope TJF-160VF side-viewing duodenoscope and a Boston Scientific cannulating sphincterotome using Omnipaque contrast and standard fluoroscopic views to adequately visualize the biliary or pancreatic ductal anatomy. All MRCPs were done using a General Electric 1.5 Tesla HDXe MRI scanner with an LCC bore magnet using software version 15x and a Signa HD 1.5T 12-channel body array coil. All MRCPs were contrasted

images using Magnevist contrast and protocolled to obtain axial 3D echo, axial T2, axial T2 classic fast suppression (C FS), coronal liver acquisition with volume acceleration, fat sequenced (LAVA FS), thick slab MRCP (Fast spin echo 2D), thin slab coronal single shot fast spin echo (SSFSE), thin slab axial SSFSE, and 3D fast recovery fast spin echo (FRFSE) using respiratory comp images.

**Statistical analysis**

Sensitivity, specificity, negative predictive value (NPV), and positive predictive value (PPV) were all calculated using SAS software (SAS Inc, version 9.3).

**RESULTS**

A total of 110 patients underwent ERCP during this time period. Of these, 81 had undergone a preoperative MRCP. Forty-one patients were women and 40 were men. The average age of the patients was 48. Fifty-three studies had at least 1 discrete lesion seen on MRCP and were read as abnormal. Of those, 36 were thought to be stones in the common bile/hepatic duct system; 14 were thought to be masses, strictures, or other abnormalities of the common bile/hepatic duct system; and 3 were thought to be abnormalities of the body or duct system of the pancreas. Only 1 of the MRCPs read as abnormal (common bile duct filling defect) had a subsequently normal ERCP. Specificity and PPV were 94.4% and 98.0%, respectively.

Twenty-eight MRCP studies did not identify a stone, stricture, injury, mass, or filling defect and had a follow-on ERCP. The most common reasons to obtain the ERCP in the face of the normal MRCP study were dilation of the common bile/hepatic duct systems (without an identifiable discrete lesion) on MRCP and/or ultrasound (53%), limited MRCP study (13%), or stones seen on intraoperative cholangiogram (IOC) (10%). Of the 28 studies that did not identify any discrete abnormality, 6 patients had common bile duct, common hepatic duct, or ampullary strictures, 2 patients had transected pancreatic ducts, 1 patient had a cystic duct stump leak, and 4 patients had choledocholithiasis seen on follow-on ERCP. Sensitivity and NPV in this study were 80% and 54%, respectively.

Studies done specifically evaluating for choledocholithiasis showed a sensitivity of 90%, specificity of 88%, PPV of 97%, and NPV of 64%. Studies done for other non-stone biliary pathology, namely, tumors or leaks of the biliary tree or pancreas, showed a sensitivity of 65%, specificity of 100%, PPV of 100%, and NPV of 47% (Table 1).

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