



Utility of MRCP in 3T MRI For Diagnosis of Pancreatic Duct Injury and Assessment of Pancreatic Leak

Dr.K.Geetha

Associate professor, Barnard Institute of radiology, Madras Medical College, Chennai-3

Dr.S.BabuPeter

Professor, Barnard Institute of radiology, Madras Medical College, Chennai-3

ABSTRACT

AIM: The aim of this study was to determine the utility of MRCP in the evaluation of pancreatic duct injury and its complications.

MATERIALS AND METHODS: Methods: Nine hemodynamically stable patients with clinically suspected pancreatic injury underwent MRCP and findings are studied for the presence or absence of pancreatic duct trauma and pancreas-specific complications such as pseudo cysts. MRCP findings were correlated with ERCP, surgical findings, computed tomography , and with clinical, biochemical or imaging follow-up.

Results: 3D SPACE MRCPs were obtained in each of the 9 patients. Pancreatic duct injuries were detected in five patients; pseudocysts were detected in four of these patients. In one patient, disruption of the distal pancreatic duct diagnosed with MRCP was not detected with ERCP but confirmed surgically. The information derived from the MRCPs was used to guide clinical decision-making in all patients.

KEYWORDS

MRCP, pancreas, trauma, duct injury

INTRODUCTION

Though Pancreatic injuries are uncommon, early diagnosis is important, as delayed complications like fistula, abscess, sepsis, and hemorrhage may lead to significant mortality, up to 20% of cases (2). CT is routinely used as first-line imaging in the acute trauma patient and can be helpful in defining injuries to the pancreas and associated complications. The integrity of the pancreatic duct is the main factor determining outcome following pancreatic injury and is used to guide therapy, evaluation of the duct is essential. In the past, ERCP was the only method available for evaluating pancreatic duct integrity. Recently, MR pancreatography has emerged as an attractive alternative for direct imaging of the pancreatic duct (5). MR pancreatography has the advantage of being noninvasive, faster, and more readily available than ERCP. MR pancreatography may also demonstrate abnormalities not visible at ERCP, such as fluid collections upstream of the site of duct transection, and is helpful in assessing parenchymal injury (6).

MATERIALS AND METHODS

This prospective study done in a period of one year from march 2015 to march 2016 was approved by our institutional review board. Nine hemodynamically stable patients with clinically suspected pancreatic injury related to blunt abdominal trauma (n = 6), penetrating trauma (n = 2), or iatrogenic trauma (n = 1) underwent MRCP. All our patients were imaged on a 3-T clinical scanner (SKYRA-SQ Engine; Siemens, Erlangen, Germany). MR pancreatograms are acquired by using heavily T2-weighted breath-hold or non-breath-hold sequences coronal thick slice, Thin slice, Haste T2W Axial & coronal. Fast spin-echo (two-dimensional or three-dimensional) and rapid acquisition with relaxation enhancement (RARE) sequences performed in the coronal and axial planes. 3D GATED SPACE MRCP sequences, T1W Turbo Spin Echo TSE and diffusion weighted images were also obtained in all patients. The parenchymal images were studied for laceration, or changes in signal intensity changes. The peripancreatic fluid collection or free fluid, Duct size, continuity, and relationship to collections or free fluid were noted. A duct diameter of greater than 3 mm was considered abnormal.

RESULTS

MRCP findings are studied for the presence or absence of

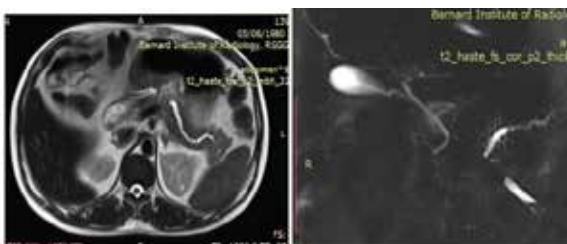
pancreatic duct trauma and pancreas-specific complications such as pseudo cysts by two senior radiologists. The MRCP findings were correlated with endoscopic retrograde cholangiopancreatograms (n = 2), surgical findings (n = 2), computed tomographic scans (n = 12), and with clinical, biochemical or imaging follow-up (n = 12). Sensitivity and specificity of MRCP to diagnose main pancreatic duct injury are 84% and 100% respectively. Also compared to routine thick slab and thin slice, 3D MRCP alone is sufficient for main pancreatic duct evaluation with 3TMRI.

1 shows MRCP findings and Follow up in nine patients

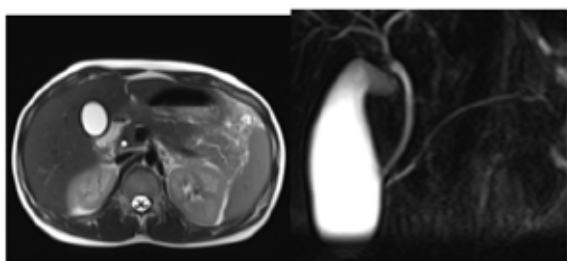
AGE (years) SEX (M/F)	PAREN-CHYMAL FINDINGS	DUCT ANATOMY	FOLLOW UP
12 /M	Bulky, hyperintense Body and tail of the Pancreas	Complete transection of main pancreatic duct at the level of distal body .	Distal pancreatectomy, Well at 3 months
23 /M	3cm collection in lesser sac communicating with main pancreatic duct	Main pancreatic duct at the level of body communicating with collection	External drainage, well at 9 months
16/M	10cm Collection in and around pancreatic head and neck	Duct communicating with collection	Pancreatic stent insertion Imaging changes resolve; well at 8 month

45/F	4cm collection and peripancreatic inflammation	Mild focal duct narrowing	External drainage, well at 7 months
34/M	Peripancreatic inflammation	Normal duct anatomy	Conservative. well at 3 months
54/M	Parenchymal atrophy, no peripancreatic collections. Fistulous tract extending from head of pancreas up to left pleural cavity. Left hydropneumothorax	Main pancreatic duct grossly dilated measuring 11mm	External drainage, well at 9 months
17/M	Peripancreatic inflammation	Normal duct anatomy	Conservative. well at 3 months
33/M	4 cm Collection in and around pancreatic head and body.	duct transection at the level of proximal body of pancreas	Pancreatectomy Well at 9 months,
27/M	4cm collection and peripancreatic inflammation	Normal duct anatomy	External drainage, well at 7 months

Case1. 12-year-old boy who sustained blunt trauma to abdomen. T2 axial and MRCP images shows peripancreatic mild collection and transection of main pancreatic duct at the level of proximal body of pancreas.



Case 2. 33-year-old male who sustained blunt trauma to abdomen. T2 axial and MRCP images shows hypertintense distal pancreas and complete transection of main pancreatic duct at the level of distal body.



DISCUSSION

Injury to the pancreas is relatively uncommon, occurring in less than 2% of blunt abdominal trauma patients associated with high morbidity and mortality, particularly if diagnosis is delayed(1). Most pancreatic injuries are minor and can be treated by external drainage. So early diagnosis is critical. Also the prognosis of pancreatic injuries largely depends upon the integrity of the pancreatic duct, evaluation of the duct is essential. In the past, ERCP was the only method available for evaluating pancreatic duct integrity. More recently, MRCP has emerged as an attractive alternative non-invasive diagnostic tool for direct imaging of the pancreatic duct and it is being used more frequently to assess injury to the ductal components. MRCP may compete with ERCP in diagnostic accuracy. MRCP provides information about discontinuity of main pancreatic duct and collections. The advantages of MRCP include it being noninvasive, faster and more readily available than ERCP, and it can illustrate the entire pancreatic parenchymal and ductal anatomy, as well as pathologic fluid collections and ductal disruptions (4). For assessing the parenchyma, fat-suppressed T1, T2-weighted and DWI sequences are performed. Magnetic resonance pancreatograms are acquired by using heavily T2-weighted breath-hold or non-breath-hold sequences. Fast spin-echo (two-dimensional or three-dimensional) and rapid acquisition with relaxation enhancement sequences performed in the coronal and axial planes are usually sufficient. The main pancreatic duct (MPD) can be identified by MRCP within the pancreatic head in up to 97% of cases and within the pancreatic tail in up to 83%(5). In addition, MRCP may demonstrate abnormalities not visible at ERCP, such as fluid collections upstream of the site of duct transection, and is helpful in assessing parenchymal injury (6).

CONCLUSION

Magnetic resonance cholangiopancreatography is excellent non invasive technique to delineate pancreatic duct anatomy. Our study showed excellent correlation with operative findings with specificity, sensitivity of 100% and 84% respectively. MRCP accurately demonstrates pancreatic ductal abnormalities associated with pancreatic trauma such as duct dilatation, disruption, or leakage, communication of pseudocyst with pancreatic duct. MRI was useful in the follow-up studies of parenchymal damage and minor ductal injuries, providing high-quality images of the pancreatic duct and biliary tract.

References;

- Uma Debi, Ravinder Kaur, Kaushal Kishor Prasad, Saroj Kant Sinha, Anindita Sinha, and Kartar Singh **Pancreatic trauma: A concise review** ,World J Gastroenterology. 2013 Dec 21; 19(47): 9003-9011. PMID: PMC3870553 published online 2013 Dec 21. doi: 10.3748/wjg.v19.i47.9003
- Avneesh Gupta, MD, Joshua W. Stuhlfaut, MD, Keith W. Fleming, MD, Brian C. Lucey, MD, and Jorge A. Soto, MD Blunt Trauma of the Pancreas and Biliary Tract: A Multimodality Imaging Approach to Diagnosis
- Bujanda L, Calvo MM, Cabriada JL, et al. MRCP in diagnosis of iatrogenic bile duct injury. NMR Biomed 2003; 16:475-478. CrossRef, Medline
- Diagnosis of Duct Disruption and Assessment of Pancreatic Leak with Dynamic Secretin-Stimulated MR Cholangiopancreatography A. R. Gillams¹, T. Kurzawinski² and W. R. Lees¹ American Journal of Roentgenology. 2006;186: 499-506. 10.2214/AJR.04.1775
- Fulcher A, Turner M, Yelon Jea. MRCP in the assessment of pancreatic trauma. J Trauma 2000; 48:1001-1007 [CrossRef] [Medline]
- Soto JA, Alvarez O, Munera F, Yepes NL, Sepulveda ME, Perez JM. Traumatic disruption of the pancreatic duct: diagnosis with MR pancreatography. AJR 2001; 176:175-178.