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Patterns of Pancreatico-Biliary Pathologies Diagnosed by Magnetic Resonance Cholangio Pancreatography at a Tertiary Care Hospital

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ABSTRUCT

INTRODUCTION: Disorders of pancreatico-billiary system are common all over the world. Commonly occurring disorders of pancreaticobiliary systems are cholelithiasis, choledocholithiasis, cholecystitis, pancreatitis, cholangitis, gall bladder carcinoma, cholangiocarcinoma, carcinoma pancreas, peri ampullary growth etc. Variety of imaging modalities are available including ultrasonography (US), computed tomography (CT) and invasive cholangiography for the evaluation of those above mentioned conditions. All these techniques have their own limitations. MRCP overcomes these limitations. MRCP is an excellent, non-invasive, radiation free and highly sensitive diagnostic procedure for patients with suspected bile duct or pancreatic duct abnormalities.

MATERIAL & METHOD: This single-center, hospital based prospective cross-sectional study was conducted at the Department of Radiodiagnosis at AGMC and GB Pant Hospital, Agartala, Tripura over a period of 7 months. All the patients, who were referred for MRCP, from various department of this institution to Department of Radiodiagnosis and in whom the study was done, were included in this study. A total of 100 patients were included.

RESULT: The mean age of the study sample was 45.87 years with a range of 0 to 90 years. Among them, 51 were male and 49 were females. Most of pathologies observed were benign – in 81 cases (81%). Most common benign disorder observed was Cholelithiasis (43%) followed by choledocholithiasis (26%). Rest 19 cases (19%) were malignant.

CONCLUSION: MRCP is noninvasive, non-ionizing imaging modality for evaluation of the pancreaticobiliary anatomy and pathology, having highest resolution of the pancreaticobiliary tree. It is becoming a non-invasive alternative to Endoscopic Retrograde Cholangio pancreatography (ERCP).

KEYWORDS: MRCP, Pancreatico-biliary, Strictures, Cholangiocarcinoma, Cholelithiasis, Choledocholithiasis

INTRODUCTION

Disorders of pancreatico-billiary system are common all over the world. Commonly occurring disorders of pancreaticobiliary systems are cholelithiasis, choledocholithiasis, cholecystitis, pancreatitis, cholangitis, gall bladder carcinoma, cholangiocarcinoma, carcinoma pancreas, peri ampullary growth etc.

Compression of common bile duct (CBD) by enlarged lymph nodes and congenital conditions like biliary atresia, choledochal cyst or Caroli's disease are also not infrequent.

Variety of imaging modalities are available including ultrasonography (US), computed tomography (CT) and invasive cholangiography for the evaluation of those above mentioned conditions. All these techniques have their own limitations.

Ultrasonography cannot effectively visualize the distal CBD, where bowel gas can interfere. CT scan also has its own limitations, especially in biliary stones and biliary strictures. Pure cholesterol calculi are hypo to iso attenuating relative to bile, making them difficult to detect in CT scan.

Although endoscopic cholangio pancreatography (ERCP) has been the mainstay for diagnosing and treating pancreatico-biliary disease, complications such as pancreatitis, cholangitis, haemorrhage and duodenal perforation have limited its use as a routine diagnostic test.

Due to these limitations of US & CT and invasiveness of ERCP, there is need for such an imaging modality which is noninvasive and provides high resolution projection images of the pancreaticobiliary tree. MRCP serves these purpose.

First time MRCP (Magnetic Resonance Cholangio pancreatography) was described by Walner in clinical practice in 1991. [1] It uses heavily T2 weighted sequences with long TE, causing only fluid filled compartments to be visible. It causes near complete suppression of the background [**2]**, which results in a cholangiographic or pancreaticographic effect without need for contrast medium administration as in other invasive procedures.

In initial attempts to visualize biliary tree, steady-state free precession imaging was used with high contrast over several breath holds. [3, 4] However, steady-state free-precession sequences proved too sensitive to signal loss from magnetic susceptibility, fluid motion and pulsation. So now-a-days preferred imaging is Rapid Acquisition with Relaxation Enhancement (RARE) [5] and Fast Spin-Echo (FSE). [6, 7, 8]

MRCP is an excellent, non-invasive, radiation free and highly sensitive diagnostic procedure for patients with suspected bile duct or pancreatic duct abnormalities. [2]

Currently the diagnostic accuracy of MRCP is nearly equivalent to ERCP for a broad spectrum of benign and malignant pancreatic and biliary diseases. [2]

Present study was aimed to study the pattern of pancreatico-billiary pathologies diagnosed at a tertiary care hospital by magnetic resonance cholangio pancreatography.

MATERIALS AND METHODS

This single-center, hospital based prospective cross-sectional study was conducted at the Department of Radiodiagnosis at Agartala Government Medical College and GB Pant Hospital, Agartala, Tripura over a period of 7 months from Feb'24 to Aug'24.

All the patients having clinical features of pancreaticobiliary disease, who were referred for MRCP, from various department of this institution to Department of Radiodiagnosis and in whom the study was done, were included in this study.

A total of 100 consecutive patients were included in the study after obtaining a consent.

MRCP images were acquired using 3 tesla MRI machine with appropriate commercially available software.

The data collected were tabulated. The tabulated data were analyzed using descriptive statistics, i.e. by using percentages. Statistical for the social sciences (SPSS) software (version- 15) was used for data analysis.

RESULTS

In present study, 100 patients were included from all age group (refer table-1).
The mean age of the study sample was 45.87 years with a range of 0 to 90 years.
Majority (23) were from 6th decade of their lives years age (23 %) followed by 5th decade (20). Of these, the number of males were 51 and the number of females were 49. (Ref. table 1)

	Age group		Number	Percent
1	Upto 10		4	4%
2	11-20		5	5%
3	21-30		11	11%
4	31-40		19	19%
5	**41-50**		**20**	**20%**
6	**51-60**		**23**	**23%**
7	61-70		10	10%
8	71-80		6	6%
9	81-90		2	2%
	Total		100	
	Gender wise	Male	51	51%
		Female	49	49%

Table 1 showing age & gender wise distribution of study population of this article.

Most of pathologies observed were benign – in 81 cases (81%). Most common benign disorder observed was Cholelithiasis (43%) followed by choledocholithiasis (26%). Rest 19 cases (19%) were malignant.
In this study total 43 cases of gall bladder calculus were seen, among them 13 cases has features of gall bladder inflammation; one case was acalculus cholecystitis. Rest 29 cases had no features of GB inflammation.GB sludge were seen in 6 cases. Cholelithiasis with choledocholithiasis was seen in 13 cases 9 (Fig 1A).

	Pathology detected			**No**	**Percent**
1	Cholelithiasis			43	43%
2	Choledocholithiasis			26	26%
3	Cholecystitis			14	14%
4	GB Sludge			6	6%
5	Stricture	9	Benign	4	4%
			Malignant	5	5%
6	Pancreatitis	8	Acute pancreatitis	4	4%
			Chronic pancreatitis	1	1%
			Acute on chronic	3	3%
7	Malignant mass	14	Peri ampullary carcinoma	2	2%
			Cholangio carcinoma	4	4%
			Pancreatic carcinoma	4	4%
			Gall bladder carcinoma	4	4%

8	Cholangitic abscess		1	1%
9	Remnant cystic duct		5	5%
10	Remnant cystic duct cal		2	2%
11	Oriental cholangitis		1	1%
12	Mirrizi syndrome		3	3%
13	Congenital biliary atresia		1	1%
14	Post-operative injury in CBD		1	1%
15	Anatomical variant	Low insertion of cystic duct	1	1%
		Choledochal cysts	2	2%
16	Post cholecystectomy		11	11%

The table 2 is showing the major pathologies seen in this study.

11 number of post cholecystectomy cases were seen in this study. Among them MRCP detected 06 cases of CBD calculus; 05 cases of remnant cystic duct- out of these 05 cases, 02 had remnant cystic duct calculus (Fig 1B). 01 case (1%) had postop injury in CBD (Fig-1C).

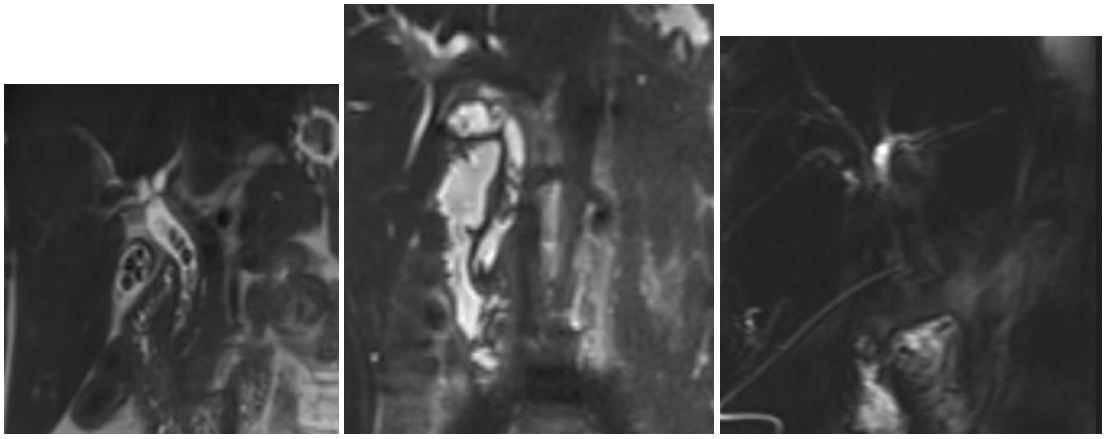
Total 8 cases of pancreatitis were seen; among them 04 cases were acute, 01 cases chronic & 03 cases acute on chronic pancreatitis (Fig 2A).

Total 09 cases of stricture were seen in this study- 04 were benign & rest 05 were malignant in nature. Among these benign stricture 01 case was post cholecystectomy.

14 cases of malignant mass of pancreaticobiliary system were seen- 04 cases of GB mass, 04 Pancreatic mass, 4 cases of cholangiocarcinoma (Fig-2B) & 02 cases of peri ampullary carcinoma. Including 05 cases of malignant stricture, total malignant cases become 19 nos.

Three (03) cases having features of Mirrizi syndrome (Fig-2C) were detected. One case (01) each of congenital biliary atresia & Cholangitic abscess were seen. Two (02) cases of choledochal cyst (Fig-3A) & 01 case of low insertion of cystic duct (CD) (Fig-3B) were noted. 01 case (1%) Oriental cholangitis (Fig-3C) is also seen.

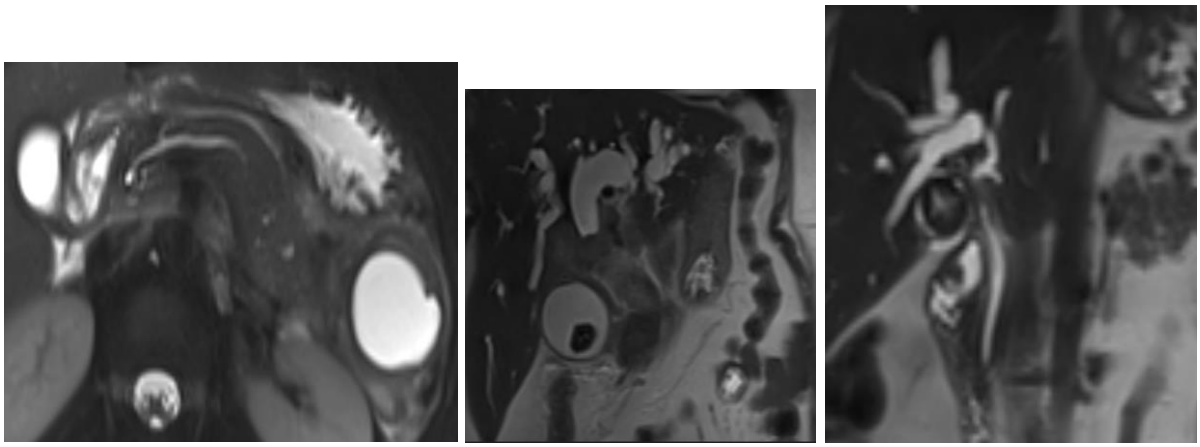
REPRESENTATIVE MRCP IMAGES OF THIS ARTICLE



1A 1B 1C

Fig. 1A. Coronal T2WI image showing multiple signal void foci in GB as well as in CBD. Fig.1B. Coronal T2WI- shows multiple signal void in CBD in a post cholecystectomy case. A small signal void is also seen in remnant cystic duct. Fig. 1C. Coronal T2WI – This is a post cholecystectomy

case. T-tube in situ. The common hepatic duct & proximal CBD not visualized. Multifocal T2 hyper intensities are seen in surrounding area- consistent with injury to CBD & bile leakage.
Mirizzi syndrome- Coronal T2WI image showing large signal void lesion in GB neck, compressing proximal CBD causing obstructive biliopathy



2A 2B 2C

Fig. 2A. Axial T2WI showing dilated MPD & few fluid intensity pockets in pancreatic tail and also a pseudocyst near tail - a case of acute on chronic pancreatitis. Fig. 2B. Coronal T2WI showing features of Hilar cholangiocarcinoma. Fig.2C- Mirizzi syndrome- Coronal T2WI image showing large signal void lesion in GB neck, compressing proximal CBD causing obstructive biliopathy

3A 3B 3C

Fig.3A. Axial T2WI- shows features of Caroli's disease (Todani –V Choledochal cyst).
Fig. 3B. Coronal T2WI showing Low insertion of cystic duct. Fig. 3C. Axial T2WI- shows multiple signal void foci involving both hepatic ducts in a post cholecystectomy patient- consistent with Oriental cholangitis.

DISCUSSION

Out of 50 patients evaluated, 51 (51%) patients were male and 49 (49%) patients were female. The mean age of study population was 45.9 (Range 0-90 years). Various referred literature shows that gender distribution in such type of study ranges from 46-66 % male and 34-54 % female. [9-12]

In this study total 43 cases (43%) of cholelithiasis were seen. Isolated cholelithiasis seen in 30% cases. Cholelithiasis with choledocholithiasis was seen in 13% cases. Melkundi et al [9] reported isolated cholelithiasis in 8% and cholelithiasis with choledocholithiasis in 20% cases. Asymmetry in this regard may be due to larger sample size in this study.

In this study 26 cases (26%) of choledocholithiasis seen. Upadhaya et al [10] reported choledocholithiasis

in 32% cases. Macaulay et al [15] reported choledocholithiasis in 14.2% cases.
Isolated choledocholithiasis was seen in 13 cases (13%), which is comparable to the study by Melkundi et al [9] where they reported isolated choledocholithiasis in 10% cases.
In this study total 14 cases (14%) of cholecystitis were seen (13 calcular & 01 acalcular); Shenoy et al [2] & Nandan et al [14] reported cholecystitis in 10% & 7.7% respectively. Slightly larger number in this study could be due to larger sample size.
In this study, three cases (03%) having features of Mirrizi syndrome were detected. This is very well correlating with the existing literature. According to some recent series, these are being encountered in 1% to 2% of patients with symptomatic cholelithiasis. However, in underdeveloped countries, this is a more common condition with a reported incidence ranging from 4.7% to 5.7%. [15]
In a study to retrospectively search in post cholecystectomy cases for residual gallbladder & cystic duct stones, Mageed et al [16] found that cystic duct stump calculus in 44.4% of cases. In the present study, among the 11 post cholecystectomy cases, 02 such case were seen- which in other way can be said to be present in 18.18%. The difference likely to be due to less number of postoperative cases in this study.
Postoperative injury in CBD was seen in one case (1%). Existing literature reveals its incidence to be 0.1-0.2% in open cholecystectomy & 0.4- 0.6% in laparoscopic procedure [17], although Shenoy et al [2] reported it in 4% cases.
Total 8 cases (8%) of pancreatitis were seen; among them 04 cases (4%) were acute, 01 cases (1%) chronic & 03 cases (3%) acute on chronic pancreatitis.
Nandan et al [14] reported comparable finding –both acute & chronic pancreatitis in 4.6% cases. Higher number (acute- 16% & chronic 8%) were reported by Shenoy et al [2]
One case (1%) of Cholangitic abscess was seen, which closely correlates with the study by Nandan el al [14] where it was present in 1.5% cases.
One case (1%) of oriental cholangitis was detected, which is almost similar to the finding of Prabhu et al [18] where 09 cases of oriental cholangitis were found among 950 MRCP studies (0.95%).
Total 09% cases of stricture were seen in this study, among them - 04% were benign & 05% were malignant in nature. Shadan et al [19] reported benign strictures in 4% cases. Hurter et al [20] reported malignant stricture in 5.7% cases. Those finding are similar to this study. Bhatt et al [21] reported benign strictures in 4% cases- same to this study but malignant in 8% cases- which is slightly higher than this study.
One case (1%) of post-operative benign stricture was noted in this study. Shadan et al [19] reported postoperative stricture in 2% cases. Slightly higher frequency were reported by Bhatt et al [21] (4%) and Upadhaya et al [10] (6%).
Total 4 cases (4%) of cholangiocarcinoma were seen in this study. Similar finding (4% cases) was reported by Shadan et al [19]. Lower incidence (2.3%) was reported by Reinhold et al [22], but higher incidence (12%) by Melkundi et al [9].
Among these cholangiocarcinoma, 2% were Hilar (Klatskin's), 1% were in distal CBD and 1% intrahepatic- as noted in this study. In their study by Melkundi et al [9] reported hilar variety in 3% cases, followed by extrahepatic in 2% & intrahepatic in 4% cases, which is comparable to present study.
02 cases (2%) of peri ampullary carcinoma seen in this study. Shadan et al [19] also reported peri ampullary CA in 2% cases- which is exactly similar to this study. Bhatt el al [21] reported peri ampullary carcinoma in 4% cases- higher than this study.

Total 04 cases (4%) of malignant pancreatic mass seen in this study. This is close to the finding by Nandan et al [14] who reported malignant pancreatic mass in 3.1% cases. Shenoy et al [2] reported malignant pancreatic mass in 2% of cases- lower than this study.

Total 04 cases (4%) of GB mass were noted in this study- similar to Shadan et al [19] (4%). Bhatt et al [21] reported Ca GB in 2% cases where as Melkundi et al [9] reported carcinoma of gall bladder in 6% cases.

This study reports only one case (1%) of congenital biliary atresia. In a study by Huang et al, congenital biliary atresia was reported in 25% cases. Though the incidence is very high, that study included only paediatric patients, where 55% & 33% of sample were of below one year & one-five year of age respectively, having a mean age of 02 years. In the present study, total 04 number of such (under-five year of age) cases (mean age in of this group is 1.3 years) was present. Therefore the percentage of congenital biliary atresia of this study may be expressed as 25%, which is exactly same as the Huang et al [23]

Two cases (2%) of choledochal cyst were seen in this study (one Todani type-I & other one- Todani type-5), which is comparable to Nandan et al [14] where they reported it in 3% cases. Upadhaya et al [10] also reported choledochal cyst in 3% of cases in his study. Although Melkundi et al [9] reported 8% cases.

One case (1%) of anomalous arrangement of pancreaticobiliary duct was seen in this study. Reported frequency of this anomaly varies from 1.5 -3.2% [24], which is not far away from this study.

One case (1%) of low insertion of cystic duct was seen in this study. In a study aimed to determine the prevalence of cystic duct variations among Iranian population, Taghavi et al [25] found low insertion of cystic duct in 2.07% cases (6 case out of 290 patients). This is comparable to the present study. Higher value of that study is likely to be due to large sample size as well as due to separate aim of their study.

	Percentage of pathology detected in various referred study									
Pathology detected	This study	Shenoy	Melkundi	Upadhya	Nandan	Beltrán	Prabhu	Shadan	Hurter	Taghavi
Isolated GB cal	30		8							
GB cal + CBD cal	13		20							
CBD cal	26			32						
Isolated CBD cal	13		10							
Cholecystitis	14	10			7.7					
Mirrizi syndrome	3					1-2				
Stricture										
Benign	4							4		
Malignant	5								5.7	
Pancreatitis	8									
Acute	4	16			4.6					
Chronic	1	8			4.6					
Acute on chronic	3									

Cholangitic abscess	1				1.5					
Oriental cholangitis	1						0.95			
Low insertion CD	1									2.07
Choledochal cysts	2		8	3	3					
Malignant mass										
Cholangiocarcinoma	4		12					4		
Peri ampullary Ca	2							2		
Ca Pancreas	4	2			3.1					
Ca GB	4		6					4		

Table-3. Showing comparative percentage of various studies referred in this article-

CONCLUSION

MRCP is noninvasive, non-ionizing imaging modality for evaluation of the pancreaticobiliary anatomy and pathology, having highest resolution of the pancreaticobiliary tree.

It is much superior in the diagnosis and evaluation of various pathologies as compared to the ultrasound and Computed Tomography. Extent of disease & involvement of adjacent structures are very well visualized. It is becoming a non-invasive alternative to Endoscopic Retrograde Cholangio pancreatography (ERCP).

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