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# A MINI-REVIEW ON THE MULTIMODALITY IMAGING IN THE EVALUATION OF OBSTRUCTIVE JAUNDICE

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**ABSTRACT**

The results of MRCP are crucial in the overall assessment of biliary and pancreatic duct lesions. They are expected to help determine the type of disease (infection, tumor, calculus, etc.), the location and degree of involvement, the type of pathology, the direction of biopsy and drainage procedures, the method of therapy (medical or surgical), the surgical approach, and postoperative evaluation. Here, we highlight how recent advances in coil design, gradient hardware, and pulse sequences have speed up data collecting times while enhancing the quality and diagnostic capabilities.



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## 1. INTRODUCTION

The normal gross and radiological anatomy of the biliary and pancreatic system is needed to understand the broad spectrum of disorders that affect the biliary & pancreatic system. The biliary tract has the following components: Intrahepatic bile ducts (IHBD), Common hepatic duct (CHD), Gall bladder (GB), Cystic duct, Common bile duct (CBD), and Pancreatic duct (MPD).

### 1.1. Intrahepatic bile ducts

Normal IHBD measure < 3 mm in diameter, are fewer in number, and are haphazardly scattered throughout the liver [1]. They are linear T1 hypo/T2 hyperintensity structures seen on one side of PV. In the direction of the hilum, they unite to form right and left hepatic ducts, which have a continuous location just anterior to the main portal vein bifurcation [2].

### 1.2. Common hepatic duct

The common hepatic duct is formed by the union of the right and left hepatic ducts, which arise from the liver and unite near porta hepatis. This is usually imaged as a round or elliptical structure sitting anterior and often slightly lateral to the main portal vein. The CHD wall is normally visualized, measures less than 1.5 mm, and enhances more brightly than the adjacent pancreas. The CHD passes downward and is merged on its right side by the CD. The union of the CHD & cystic duct forms the CBD. CECT helps tell the CHD's water density from the enhanced portal vein and hepatic artery system [2].

### 1.3. Gall bladder

A pear-shaped sac called the gall bladder is partially housed in a fossa on the inferior surface of the right hepatic lobe. Its dimensions are 7 to 10 cm long, 3 cm wide at its broadest point, and 30 to 50 ml in volume. The mucous membrane that lines the neck extends into its lumen as oblique ridges, resembling a spiral heister valve. After administering IV contrast, the regular GB wall may seem enhanced. Gall bladder lumen has a density comparable to that of water (0 to 20 HU). In post-contrast pictures, an increase in lumen density is seen. Gall bladder content shows a hyper signal on T2W images and variable signal on T1W images [2, 3].

### 1.4. Cystic duct

The cystic duct is 4 cm in length tubular structure and has a serpiginous passage and shows S-shaped bends, passes backward, downwards from the neck of the GB, and intersects with the CHD to form the common bile duct; it runs parallelly to the CHD for a distance and then joins it. The intersection is positioned closely below the porta hepatis. Usually, the cystic duct is seen as a tube-like fluid comprising a structure flanked by GB and the bile duct [3].

### 1.5. Common bile duct

The cystic duct and common hepatic ducts join to form CBD. It is about 7.5cm in length and 6mm in diameter. In post-cholecystectomy cases, CBD diameter can be up to/ more than 10mm. It runs at first downwards, backward, and slightly to the left & then it passes behind the superior part of the duodenum and then runs along the upper and lateral portion of the posterior surface of the pancreas head. At the left side of the descending part of the duodenum, the bile duct meets the pancreatic duct and accompanies it into the wall of 2nd part of the duodenum, and here, the ducts generally unite to form hepatopancreatic ampulla [3].

### 1.6. Pancreatic duct

The main pancreatic duct courses cephalad take 45-90 degrees bend in the neck and continue in the tail & body of the pancreas. The standard diameter is considered to be ~ 2 - 3mm. The pancreatic duct usually unites with CBD to form a hepatopancreatic ampulla [3]. The basic principle of MRCP is a visualization of static fluid structures like GB, CD, hepatic duct, bile duct, and pancreatic duct using heavily T2 weighted spin echo images and gradient echo images with fat saturation technique. Because of its extended T2 duration, fluid looks hyper-intense in these sequences. As a result, the pancreatic duct and hepatobiliary tree will stand out against the liver and other structures' low signal intensity.

## 2. PATHOPHYSIOLOGY

Imaging plays a crucial role in detecting the cause and site of pathology. For optimal disease management, it becomes important to characterize & do staging of the malignant tumor. US tailed by CECT is usually done in the above set of individuals. When complete MR imaging is done, which usually encompasses T1 and T2W sequences and Gadolinium-enhanced MR, it can deliver extremely well in evaluating the alleged lesions causing obstruction, precluding the necessity for any other investigation.

### 2.1. Aberrant Bile Ducts

It is said to be an aberrant duct when only a single bile duct drains a specific hepatic segment. It frequently occurs across a biliary system variation and constitutes an important risk factor for injury [4].

### 2.2. Choledochal Cyst

It is the cystic dilatation of the extrahepatic bile duct, with or without dilation of the IHBD. It is uncommon and is 3 to 4 times more common in female than male patients. The precise origin of this abnormality is unknown. CECT appearances of choledochal cysts depend upon the extent of ductal involvement and degree of dilatation. Direct communication of the cystic duct with the dilated duct is necessary for diagnosing choledochal cysts, which is often difficult on CT unless the cyst is large enough.MR imaging shows it as a markedly dilated extrahepatic bile duct saccular in configuration with no or mild IHBR dilatation, with a long common channel being its hallmark of it [5-7].

### 2.3. Caroli's Disease

Caroli's disease is segmental, saccular dilatation of the IHBD. It is associated with a high incidence of bile duct stones, ascending cholangitis, liver abscesses, and cystic renal disease. Imaging gives the impression of saccular cystic distension of the IHBDs. The cystic areas are often shown to be communicating with the bile

ducts 'CENTRAL DOT SIGN' suggested as the pathognomonic of Carolis disease. This sign contains cystic dilatation of IHBDs with a tiny focus on augmented density in the dilated duct. The 'DOT' denotes portal radicle, enhancing contrast [2, 3]. On CT, cholesterol stones are hypodense, and calcified stones appear hyperdense. Stones that are isodense to bile are unnoticeable by CT.

### 2.4. Mirizzi's Syndrome

It is an unusual disease entity in which obstruction is seen as a result of compression of the CHD from a stone in the cystic duct or GB neck. Simple and fistulous forms are the two main types that are described. Dilated bile ducts are usually noted on USG and computed tomography. The diameter of CHD decreases brusquely. On MRCP, the fistulous type, there will be no smooth lateral compression & the simple type shows smooth focal laterally crenated narrowing of CHD produced by stone in GB neck or CD [8, 9].

### 2.5. Extrahepatic biliary atresia

It is an erratic disease associated with atresia of the common bile duct & patent intrahepatic bile ducts. The frequency of biliary atresia is less than 10 in 1 lakh live births. There is no role of CT, and it is used to detect associated anomalies.

### 2.6. Chronic Pancreatitis

It is a permanent inflammatory disease of the pancreas and is seen as a result of several conditions. The pancreas size is inconstant; whole gland atrophy is commonly noted. Calcification of the duct and gland is usually noted along with dilatation of the duct yonder its standard confines. The duct also shows multifocal stenosis, intraductal filling defects representing protein plugs & narrowing of an intrapancreatic segment of CBD. Loss of normal high signal on T1weighted MR images and decreased enhancement on contrast-enhanced ones. Helical CT shows pancreatic atrophy, dilatation of the pancreatic duct, calcifications within the pancreas, and focal enlargement [2, 3].

### 2.7. Choledocholithiasis

10 to 15% of cases with cholelithiasis show gallstone passage into CBD. Most bile duct stones are cholesterol or mixed stones molded in GB. Calculi that arise primarily de novo in the ducts are pigment stones & usually develop in cases with, Chronic hemolytic disease, Hepatobiliary parasitism, Congenital anomalies of the bile ducts, and Dilated sclerosed or strictured ducts. CT shows a radio-opaque filling defect, and 'TARGET SIGN' can be usually noted. Hypo-intense structure encircled by hyper-intense bile can be seen on MRCP [2, 3, 6, 7].

### 2.8. Cholangiocarcinoma:

Based on anatomic location, cholangiocarcinomas are of three types: 1) peripheral, originating from peripheral bile ducts in the liver. 2) hilar type, arising in the confluence of left & right hepatic ducts. 3) extrahepatic type, arising from MHD, CHD, or Common bile duct. It may appear as a unifocal, large mass, multifocal, or diffuse infiltratively. Most are adenocarcinomas, i.e., about 95%. Usually, come across in the sixth and seventh decades. More common in men. CECT has been more helpful for tumor depiction in the case of cholangiocarcinoma [10, 11].

### 2.9. Carcinoma head of the pancreas

Carcinoma of the head of the pancreas can cause partial or complete impediments of the biliary tree. Major Risk factors include alcohol consumption & smoking. It occurs in the sixth to an eighth decade. It is hypointense on T1W images, iso to hypointense on T2W sequences.

### 2.10. Ampullary Carcinoma

Adenocarcinoma arises from the intestinal type of mucosa lining the ampulla. They account for 4% of periampullary tumors. More common in men. Usually seen in the sixties and seventies. Patients with Gardner syndrome are at risk of ampullary carcinoma. Chronic Ascaris infestation can also predispose to the development of ampullary carcinoma.

## 3. CARCINOMA OF GALL BLADDER

It is the most common malignant neoplasm of the biliary tract. The peak incidence is in the sixth and seventh decades. MR shows a mass replacing the GB. Mass appears T1 hypo & T2 hypointense. It shows Focal/

asymmetric diffuse wall thickening and can show variable contrast enhancement. Cesar S. et al. [12], in their study of Obstructive Jaundice with 67 patients, analyzed the value of CT in sleuthing obstruction level. The cases were classified into four groups depending on the anatomical segments, according to the number of pictured hypo dense ring-like structures produced by the enlarged bile duct as seen in axial sections, GB size, IHBR dilation, and the dilatation of pancreatic duct. The overall accuracy of CT has been detected and has an excellent correlation with the result of direct cholangiography. Gibson N. Robert et al. [13], in a study on patients with bile duct obstruction using different available diagnostic modalities, were compared with one another aimed at the ability to show the level and cause of obstruction. The study concluded that ultrasound is the single most convenient modality in the assessment of obstruction in comparison to CT & cholangiography, and PTC. Reiman H. Threasa et al. [14] studied 92 patients with biliary obstruction proximal to the pancreatic segment with CT. The study suggested that computed tomography is most valued.

Wallner et al. [15] introduced MR cholangiography. The authors used rapid sequence gradient echo acquisition with a three-dimensional post-processing technique to assess the biliary system. Comparison with other imaging modalities (ultrasound, CT, and conventional x-rays obtained during ERCP or PTC) was made. The study concluded that the study has a limitation in spatial resolution and needs improvement and a better technique. MRCP is an important noninvasive technique in evaluating cases of obstructive Jaundice. 3D MR cholangiography using contrast-enhanced Fourier acquired steady-state technique (CE-FAST) was evaluated by Morimoto et al (1992) in 12 patients with malignancy-associated causes of obstructive Jaundice and the results were correlated with PTBD executed 0-21 days later. The Noninvasive MR Cholangiography procedure is less traumatic for the patient [16]. Guidbaud et al. [17] retrospectively evaluated the value of MR cholangiography using T2-weighted fast spin echo sequences in 10. CBD stone was perceived in all patients. The study concluded with a note that MRCP based on T2W fast spin echo can be a vital imaging modality in cases with supposed bile duct obstruction and ambiguous sonography and CT outcomes. Barish et al [18], in their study of 30 patients with suspected pancreaticobiliary diseases, compared the efficacy of MRCP with ERCP. They concluded that MRCP is a sensitive and specific invasive technique and should be the technique of choice when invasive methods are incomplete or unsuccessful. In their analysis of patients with suspected pancreaticobiliary disorders, Soto et al. [19] concluded that the projectional pictures produced by MRCP are just as excellent as those produced by PTC or ERCP. They demonstrated how highly accurate MRCP is. In their work, Reinhold et al. [20] showed that MRCP might offer critical diagnostic information independently and can unquestionably do so when ERCP is ineffective or erroneous.

Miyazaki et al [21] in their study on 40 volunteers and 56 patients with various pancreaticobiliary diseases compared the findings of MRCP using HASTE sequence with PTC & ERCP. It was concluded that the HASTE-MRCP technique could show the pancreatic & biliary duct in hale and hearty volunteers and patients with constructive Jaundice causes. Findings such as dilatation & duct narrowing were easier to recognize with HASTE-MRCP compared to PTC / ERCP. They also determined that breath-hold HASTE-MRCP with phased array coil provides swift and high-quality imaging of the pancreaticobiliary system. Regan et al. [22], in their study of 23 patients with HASTE MRCP, proved that HASTE had high sensitivity for detecting stones in CBD and can be performed rapidly and non-invasively without the risks of radiation or contrast and resolved that HASTE MRCP should be considered alternative to ERCP in patients with clinical episodes of bile duct calculi and in whom ERCP was contraindicated. Keifer et al. [23], in their study of 200 patients with pancreaticobiliary ductal disease, proved that single-shot MRCP was highly sensitive (70 to 80%) and specific in detecting lesions in the bile duct and pancreatic duct.

Soto et al. [24] Authors reported that MR Cholangiography correctly identified normal caliber of CBD and common hepatic and intrahepatic bile ducts in 17 of 18 patients (specificity 94.1%). MRCP fittingly showed bile duct distension and site of obstruction in 96.3% of cases, shown to have dilated CBD and IHBD on direct cholangiography. The authors concluded that MRCP delivers a comprehensive noninvasive examination for suspected biliary diseases. It can cut the total cost of diagnostic workup by removing the need for multiple successive invasive & noninvasive modalities permitting direct visualization of both extra ductal & intraductal grazes. Liberpoulos et al. [25], in their study of 166 patients with various proven biliary diseases, compared the efficacy of MRCP findings with ERCP findings. They concluded that MRCP shows a comparable sensitivity and specificity to ERCP in assessing biliary system diseases. Robinson et al. [26], in their study of 24 patients with obstructive Jaundice using MRCP, concluded that there is a role for MRCP as a second-line investigation following ultrasound scanning in patients with obstructive Jaundice. Tomoaki Ichikawa et al. [27], in a study on ductal adenocarcinoma of the pancreas, preoperative evaluation with dynamic MR imaging versus CT, determined that dynamic MR imaging scores over CT in the preoperative evaluation and assessment of local tumor extent. Guibaud et al. [28], in their study of 7 neonate and infant patients with suspected bile duct disorders, have proved that MRCP is highly accurate in diagnosing the presence, level, and cause of bile duct obstruction. They also proved that MRCP is the examination of choice for early diagnosis of biliary atresia. It is a noninvasive alternative in selected patients with contraindicated ERCP or hepatic biopsy.

Miyazaki et al [29] in their study of 45 children compared the efficacy of the HASTE sequence. They concluded that the level of dilatation determined on the MRCP images corresponded with the surgery results. He also proved that compared with surgical or ERCP findings, MRCP showed high accuracy in detecting anomalies of the pancreaticobiliary tree. MRCP had diagnostic precision of 100% in diagnosing congenital biliary atresia & choledochal cyst and 69% in the abnormal connections between the pancreatic & bile ducts. Hoa et al. [30], in their study, compared the efficiency of MRCP in evaluating the geomorphology and contractility of the normal ampulla of Vater. They concluded that the distal portion of PD can be visualized by meticulously obtaining serial breath-hold images using single-shot techniques. Schwartz et al. [31], in their study of 32 patients with pathologically established neoplastic obstruction of the biliary tract or pancreatic duct, compared the efficacy of breath hold single-shot fast spin echo (SSFSE) sequence. They concluded that MRCP using breath-hold SSFSE sequence accurately identifies the level of obstruction and presence of a causal tumor. Hiroykirie et al. [32] compared the efficacy of MRCP and ERCP in 16 patients with choledochal cysts. They proved that MRCP offered diagnostic evidence which was equivalent to that of ERCP. They also showed that MRCP defined the proximal biliary tree better than ERCP; however, ERCP was superior in pediatric patients. They concluded that MRCP should be considered the first choice of choledochal cyst imaging technique. Fulcher Tuner, Capps, et al. [33] Breath-hold, heavily T2. Weighted half-Fourier RARE MRCP was conducted in 265 patients with alleged pancreaticobiliary pathology, and 35 patients were used as control. MRCP yielded 100% accuracy in determining the occurrence of pancreaticobiliary pathology.

Larena et al. [34] showed that MRCP was a promising alternative to ERCP in evaluating the pancreatic duct, especially in ill patients, patients with complete occlusion of the pancreatic duct, overweight debilitated and overweight debilitated and noncooperative patients. Lam et al [35], in a study of 14 patients proved that MRCP was more sensitive than CT cholangiography for detecting choledochal cysts and related pathologies. J.C. Varghese et al [36] in their study of 191 patients compared MRCP and sonography with ERCP. They proved MRCP was highly accurate (87%), like ERCP's, in diagnosing choledocholithiasis and is far superior to sonography. They concluded that MRCP has the potential to replace ERCP. Norton et al. [37] conducted the MRCP technique in 22 young patients with suspected biliary disease. They concluded that unlike ERCP and PTC, which cannot be performed in children without general anesthesia, MRCP rarely required anesthesia. MRCP enables visualization of the entire liver and biliary system, whereas ERCP cannot image proximal to biliary obstruction, and PTC cannot use opacity ducts distal to an obstruction. ERCP cannot be performed in the postoperative setting of biliary enteric anastomosis. Dokhe et al. [38], in their study of anomalies and anatomic variants of the biliary tree using MRCP HASTE and RARE sequences, concluded that anatomical variants of the cystic duct and hepatic ducts are usually difficult to diagnose on CT and Sonography, are easily detected by MRCP. They found that MRCP can easily show anomalies and Choledochocele on HASTE coronal source images.

Varghese et al. [39] compared MRCP and ERCP in 100 patients with biliary tract disease. They concluded that MRCP, compared with direct cholangiography in the finding of bile duct pathologies, has higher diagnostic accuracy. They also showed that MRCP accurately identified the level & presence of strictures in all cases. 97%, 98%, and 97% were the total sensitivity, specificity, and accuracy of MR-CP, respectively. They showed that MRCP diagnosed choledocholithiasis with sensitivity and specificity of 93% and 97%, respectively, with an accuracy of 97%. They also noted that MRCP showed bile duct lesions in all postoperative patients, whereas ERCP could not show either due to altered gastrointestinal anatomy or technical factors. Kelly Van Epps et al. [40] concluded that HASTE offers a noninvasive rapid imaging technique to evaluate GB, biliary tree, and pancreatic duct. Its multiplanar, fluid-sensitive capability is particularly valuable in detecting acute cholecystitis and choledocholithiasis and diagnosing GB stone and pancreatitis. HASTE MRCP is also beneficial in identifying complications following laparoscopic cholecystectomy. D.R. Brine and R.L. Soulen [41] confirmed the role of MRI & MRCP in a case of pancreaticobiliary carcinoma related to a bulky choledochal cyst. They concluded that MRCP is a cost-effective & safe next step in assessing cases with substantial biliary duct dilatation or congenital abnormalities involving a biliary tree. HO JT et al [42] in their study of 35 patients using Haste MRCP concluded that MRCP using HASTE sequence was fast and accurate for depicting the biliary and pancreatic system.

Kyo et al [43], in their study of 162 patients, evaluated the diagnostic efficacy of non-breath-hold MRCP and concluded that MRCP can dependably portray diseased & normal pancreaticobiliary systems barring non-dilated pancreatic ducts & cystic ducts. Jose C. Varghese et al. [39], in their study of 58 patients with failed or inadequate ERCP, determined that MRCP had a unique and valued role in the investigation of cases in whom ERCP failed or was inadequate, as it exposed pathology with high accuracy and thus circumvented invasive procedures such as PTC in the diagnosis of Bile Duct pathology post an unsuccessful ERCP.

Takyushi Masui et al [44] in their study of 89 cases using SSFSE MRCP concluded that while single thick-slice MRCP only provided data on the biliary tree diseases, Multiprotection Volume Reconstruction

MRCP provided additional information about solid tissue components in and around the pancreas and showed their precise location. Hiroshi Kondo et al [45] in their retrospective study of 43 patients with biliary calculi, compared observer performance for diagnosing CDB stone utilizing the cholangiography with volume-rendered MIP and thick section half Fourier RARE sequences. They determined that observer performance with volume-rendered MR cholangiography was better than that with MIP and thick-section MR cholangiography for diagnosing choledocholithiasis. Volume rendering is an effective/ efficient method for the reconstruction of MRCP. Jorge E. Lopera [46] concluded the high accurateness of MR cholangiopancreatography for defining the range of ductal engrossment in cases with malignant perihilar & hilar obstruction, allowing adequate development or percutaneous intervention in a mainstream of cases.

Ballantyne S.A. et al. [47], in their study of imaging the pancreatic & biliary system with MR cholangiopancreatography, determined that MRCP is an increasingly valuable and rapidly developing technique in the noninvasive assessment of the biliary tree, and it is used in place of ERCP as a diagnostic technique in the examination of surgical Jaundice. Mi Suk Park et al [48] in their study on the differentiation of bile duct cholangiocarcinoma in the extrahepatic location from a benign stricture in a similar location. The study concluded that the diagnostic accuracy of MR Cholangiopancreatography is analogous to that of ERCP. Irrespective of CT or MRCP being used. Anderson M et al. [49], in their study of MRI with MRCP with 51 patients of obstructive Jaundice, found that MRI is more precise than CT in telling between benign & malignant lesions in cases of thought of periampullary tumors largely due to the evidence on the MRCP images of pancreatic & biliary ductal anatomy. Bhatt C et al. [50], in their study of 50 patients with biliary and pancreatic pathology, determined that USG is the low-priced and easily available modality in patients suspected to have biliary and pancreatic pathology, and MRCP has a very high diagnostic value.

Seung Hong Choi et al [51] conducted a study on differentiating malignant & benign CBD stricture with MDCT, and the study contained 50 subjects. Hyperenhancement in the CBD or other ducts in the portal phase is the main thing that helps differentiate benign from malignant strictures of CBD. Shanmugam V. et al [52] in their study of IS MRCP the new gold standard in biliary imaging, proved that MRCP is highly sensitive and specific for choledocholithiasis and thus diminishes the requirement or need for doing invasive procedures, thus reducing the morbidity in the patients. Anderson N. Stephan et al. [53], in their study of the accuracy of MDCT in the diagnosis of choledocholithiasis, concluded that MDCT is moderately sensitive and specific for showing stones. Young Kon Kim et al. [54], with 148 patients suspected of having biliary stones, who underwent MRCP & FLASH, and an axial HASTE sequence who were registered in the study, resolved that compounding the axial T1W sequence. S Verma et al. [55] Benign cause of obstructive Jaundice was less common than malignant causes. Patients with malignant disease presented with abdominal pain and clay-colored stools more frequently. Carcinoma (Ca) of the head of the pancreas was the commonest etiology, followed by Choledocholithiasis Ca gall bladder, periampullary carcinoma, cholangiocarcinoma, CBD stricture, acute pancreatitis, and choledochal cyst & HCC.

Malignant obstructive causes of Jaundice were seen more in males than in females sex. Malignant causes of obstructive Jaundice are commoner in the older population whereas benign causes are seen in the comparatively younger age group. Carcinoma of the head of the pancreas was the commonest malignant cause & choledocholithiasis was the commonest benign etiology in the above study group. Owen J. O'Connor et al. [56] With the increasing use of MRCP reduces the necessity for diagnostic ERCP and Biliary imaging in cases of surgical Jaundice, thus leading the help in the evaluation of the helping to diagnose the level of blockage and its severity and cause. Choledocholithiasis is the most common cause of surgical Jaundice. Obstruction can also occur due to biliary strictures due to various etiologies, malignancy as described above, iatrogenic disease, and parasitic infestation. Hennedige et al. [57] CT, MRI & MRCP play an imperative role in detecting causes of surgical Jaundice, such as GB carcinoma, which is usually detected in the later stages of the disease. Thus helping the surgeon intervene at an earlier stage, even before the spread of the tumor to the surrounding fat & involvement of liver tissue. Singh A et al. [58] DA of MR cholangiopancreatography (98%) in the analysis of malignant vs. benign diseases was comparatively high (98% and 98%) as compared to computed tomography (91.43% & 82.86% in and 91.43% malignant & benign correspondingly) and ultrasound (88% & 88%). In an analysis of benign conditions, MR cholangiopancreatography Whereas in the analysis of malignant conditions, MR cholangiopancreatography was extra sensitive (95.83%) as likened to computed tomography scan (91.67%), which was more sensitive when compared to USG (79.17%). Ultrasound as a screening modality is a convenient/beneficial modality to confirm or eliminate biliary dilatation and to pick cases for MR cholangiopancreatography checkups.

## 4. FUTURE PROSPECTS

Obstructive Jaundice has been documented as one of the leading causes of increased morbidity. Imaging plays an imperative role in its diagnosis and management. The principal aim of imaging in Jaundice is to diagnose the etiology and site of obstruction. This will also help formulate an outline of the biliary tree to

help the surgeon choose the appropriate management line in every case. Ultrasonography (USG) and Helical Computed Tomography (CT) are preliminary investigation modalities. Off late, MRI is emerging as an exciting tool for the noninvasive evaluation of patients with surgical Jaundice. MRCP is a fairly advanced imaging modality that has reformed the imaging of pancreatic-biliary ducts and has evolved into accurate, noninvasive means of visualization of the biliary tree and pancreatic duct without the requirement for contrast media1.


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