# Correlation of Ultrasonography with Magnetic Resonance Cholangiopancreatography in the Evaluation of Pancreatobiliary Pathologies: A Prospective Study

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## ABSTRACT

Background: Ultrasonography (USG) is commonly employed as the initial imaging technique in patients with suspected pancreatobiliary disorders. However, its diagnostic capability is limited in assessing distal common bile duct and pancreatic duct pathologies. Magnetic Resonance Cholangiopancreatography (MRCP) enables detailed, noninvasive visualization of the biliary and pancreatic ductal systems. This study prospectively evaluates and compares the diagnostic performance of USG and MRCP.

Methods: A total of 90 patients presenting with clinical or biochemical indicators of pancreatobiliary disease underwent transabdominal ultrasonography followed by MRCP. Imaging findings were assessed independently. The final diagnosis was established using ERCP, operative findings, or clinical follow-up

as reference standards. Sensitivity, specificity, diagnostic accuracy, and Wilson 95% confidence intervals were determined. Paired comparisons were performed using the McNemar test.

Results: MRCP demonstrated superior sensitivity compared with USG for the detection of choledocholithiasis, pancreatitis, and biliary strictures. In cases of cholelithiasis, ultrasonography showed high sensitivity, although MRCP achieved higher overall diagnostic accuracy.

Conclusions: MRCP significantly enhances diagnostic evaluation in ductal and pancreatic disorders and should be considered when ultrasonography yields inconclusive findings.

Keywords (MeSH terms)

Magnetic Resonance Cholangiopancreatography

Ultrasonography

Choledocholithiasis

Pancreatitis

Biliary Stricture

## INTRODUCTION

Pancreatobiliary diseases often present with nonspecific or overlapping clinical features, necessitating accurate imaging for definitive diagnosis and management planning.[1]

Transabdominal ultrasonography remains the most frequently utilized initial imaging modality owing to its accessibility, cost-effectiveness, and lack of ionizing radiation exposure.[2]

Nevertheless, its performance may be limited in evaluating distal common bile duct segments and pancreatic ductal abnormalities.[1]

Magnetic Resonance Cholangiopancreatography provides high-contrast, multiplanar imaging of the biliary and pancreatic ductal systems without the invasive risks associated with ERCP.[3]

MRCP has emerged as an important noninvasive tool in the comprehensive evaluation of pancreatobiliary disease.[4]

The present study was designed to prospectively compare the diagnostic accuracy of ultrasonography and MRCP in patients with suspected pancreatobiliary pathology.

## MATERIALS AND METHODS

This prospective observational study was conducted between March 2024 and December 2025 at a tertiary care center in North India. Ninety consecutive patients with clinical suspicion of pancreatobiliary pathology were included. The sample size was calculated assuming an expected diagnostic sensitivity of 90% for MRCP in pancreatobiliary pathologies, with a 95% confidence interval and 10% precision, resulting in a minimum required sample of 86 patients; therefore, 90 patients were included.

Inclusion Criteria

- Clinical suspicion of pancreatobiliary disease
- Abnormal liver function tests
- Elevated pancreatic enzymes
- Prior imaging suggestive of biliary or pancreatic pathology

Exclusion Criteria

- Contraindications to MRI
- Refusal to participate

All patients underwent transabdominal ultrasonography followed by MRCP using high resolution T2-weighted sequences optimized for biliary and pancreatic duct evaluation. Imaging studies were interpreted independently. Final diagnosis was confirmed by ERCP, surgical findings, or clinical follow-up. Sensitivity, specificity, positive predictive value, negative predictive value, diagnostic accuracy, and Wilson 95% confidence intervals were calculated. Statistical significance was set at $P < 0.05$.

## RESULTS

The mean age was 44.37 ± 15.97 years (range 4–80 years) with slight female predominance (51.11%). The most common presenting symptom was abdominal pain (63.33%). Choledocholithiasis was present in 17.78% of patients, biliary strictures in 38.89%, and pancreatitis in 18.89%. MRCP demonstrated significantly higher sensitivity than USG for choledocholithiasis (100% vs 80.95%), pancreatitis (100% vs 66.67%), and biliary strictures (100% vs 6.67%). For cholelithiasis, both modalities performed well; however, MRCP demonstrated superior overall diagnostic accuracy (97.78% vs 92.22%)

**Table 1. Clinical Profile**

| Parameter | Number of Patients (%) |
| --- | --- |
| Age (Mean ± SD) | 44.37 ± 15.97 |
| Age range | 4–80 years |
| Male | 44 (48.89%) |
| Female | 46 (51.11%) |
| Presenting symptom – Pain abdomen | 57 (63.33%) |
| Jaundice | 18 (20%) |
| Elevated pancreatic enzymes | 17 (18.89%) |

**Table 2. Diagnostic Performance – Cholelithiasis**

| Modality | Sensitivity (95% CI) | Specificity (95% CI) | Accuracy (95% CI) |
| --- | --- | --- | --- |
| USG | 88.89 (73.94–96.89) | 94.44 (84.61–98.82) | 92.22 (84.57–96.82) |
| MRCP | 97.22 (85.47–99.93) | 98.15 (90.11–99.95) | 97.78 (92.19–99.73) |

**Table 3. Diagnostic Performance – Choledocholithiasis & Pancreatitis**

| Modality | Sensitivity (95% CI) | Specificity (95% CI) | Accuracy (95% CI) |
| --- | --- | --- | --- |
| Choledocholithiasis – USG | 80.95 (58.09–94.55) | 98.55 (92.21–99.96) | 94.44 (87.51–98.17) |
| Choledocholithiasis – MRCP | 100 (79.41–100) | 98.55 (92.21–99.96) | 98.89 (94.00–99.97) |

| | | | |
|---|---|---|---|
| Pancreatitis – USG | 66.67 (41.03–86.66) | 94.67 (86.87–98.53) | 88.89 (80.49–94.52) |
| Pancreatitis – MRCP | 100 (80.49–100) | 97.33 (90.70–99.67) | 97.78 (92.19–99.73) |

**Table 4. Diagnostic Performance – Biliary Strictures**

| Modality | Sensitivity (95% CI) | Specificity (95% CI) | Accuracy (95% CI) |
|---|---|---|---|
| USG | 6.67 (0.82–22.13) | 97.33 (90.70–99.67) | 60.00 (49.23–69.98) |
| MRCP | 100 (90.00–100) | 96.00 (86.29–99.51) | 96.67 (90.63–99.30) |

## DISCUSSION

The findings of this prospective study demonstrate that MRCP provides superior diagnostic performance compared with ultrasonography in the evaluation of pancreatobiliary disorders.[5]

In comparison with previously reported diagnostic performance metrics, the sensitivity values observed in our cohort fall within the higher range of those documented in systematic reviews evaluating MRCP for choledocholithiasis.[6]

Notably, the substantial disparity between ultrasonography and MRCP in the detection of biliary strictures in our study underscores the known limitations of sonographic assessment in distal ductal and periampullary regions[7]

The consistently high specificity observed for MRCP across all evaluated conditions further supports its reliability as a noninvasive alternative to diagnostic ERCP in appropriately selected patients.[5]

These findings strengthen the growing body of evidence favoring MRCP as a comprehensive modality capable of evaluating both biliary and pancreatic ductal systems within a single examination.[8,9]

Meta-analyses have demonstrated high diagnostic accuracy of MRCP in detecting common bile duct stones, often comparable to endoscopic modalities.[6]

Ultrasonography, although highly effective in detecting cholelithiasis, shows reduced sensitivity in distal CBD calculi due to bowel gas interference and operator dependency.[2]

MRCP has also demonstrated excellent diagnostic accuracy in identifying benign and malignant biliary strictures owing to its superior ductal delineation capability.[7]

Additionally, MRCP provides detailed visualization of the pancreatic ductal system, aiding in the assessment of obstructive and inflammatory pancreatic disorders.[8]

Cross-sectional imaging plays a crucial role in the evaluation of pancreatitis and related complications, further supporting the utility of MRCP in comprehensive assessment.[9]

## CONCLUSION

MRCP significantly outperforms ultrasonography in detecting choledocholithiasis, biliary strictures, and pancreatic duct abnormalities.

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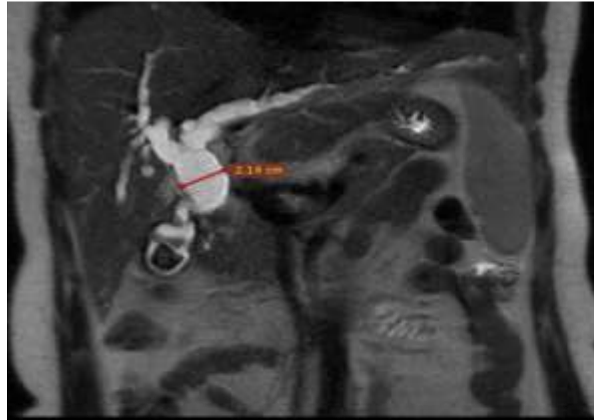
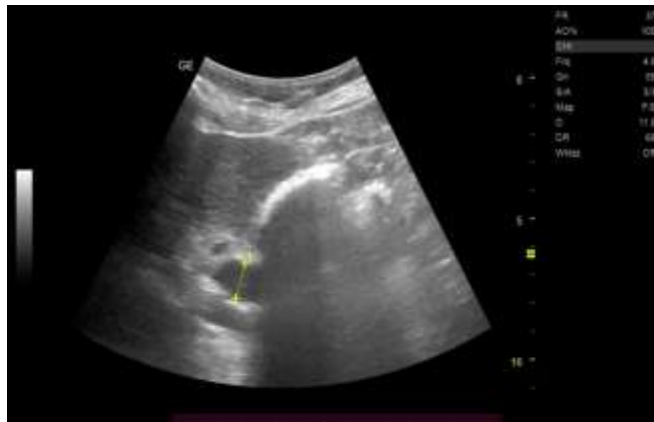
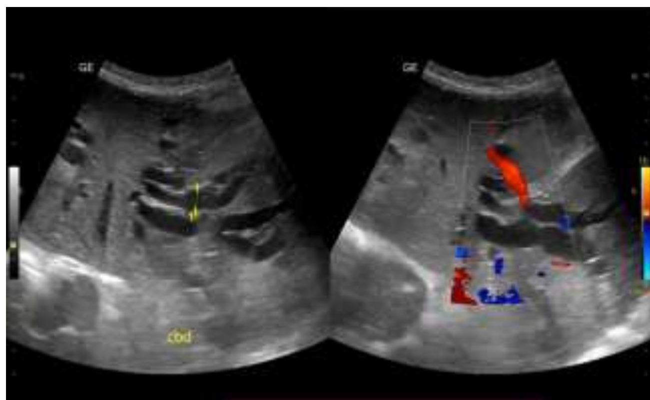


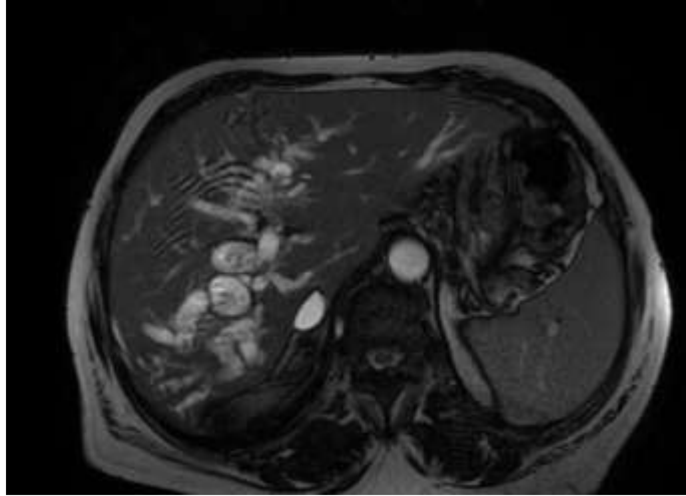
A . MRCP CORONAL 2 D FIESTA image showing dilatation of CBD due to obstructive calculus in CBD.



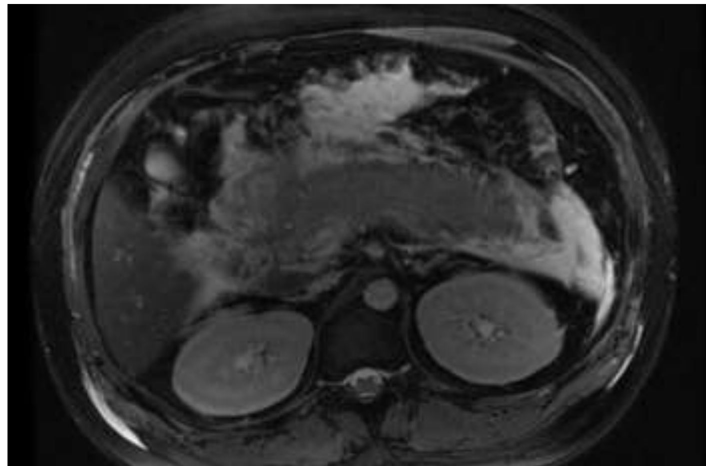
B. USG image showing dilated CBD.



C. USG image showing moderate IHBRD in both lobes of liver with dilated CBD.



D. MRCP AXIAL 2 D FIESTA image showing moderate IHBRD



E. MRCP AXIAL image showing pancreas is diffusely bulky with moderate peripancreatic fat stranding and moderate peripancreatic free fluid. Mild thickening of bilateral anterorenal and left conal renal fascia.