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## A correlational study on the diagnostic utility of magnetic resonance cholangiopancreatography (MRCP) in the evaluation of gall stone disease and biliary tract morphology

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**Abstract**

**Introduction:** Gall stone disease is a common condition which is a cause of significant morbidity in the society. It is most of the time asymptomatic but sometimes presents with serious symptoms. It can be diagnosed by investigations like Ultrasonography, Computerized Tomography (CT), Magnetic Resonance Cholangiopancreatography (MRCP) and Endoscopic Retrograde Cholangiopancreatography (ERCP). The definitive treatment for gallstone disease is surgery.

**Objectives of the study**

1. To compare Magnetic Resonance Cholangiopancreatography and laparoscopic findings in gall stone disease.
2. To study the anatomy of intra and extra hepatic biliary radicals and evaluate the anatomical variations.

**Methodology**

**Study design:** Correlational study

**Study population:** Total 100 cases of gall stone disease undergoing laparoscopic cholecystectomy are included in this study.

**Setting:** Department of Radiodiagnosis, S.P. Medical College, Bikaner

**Inclusion Criteria:** All patients of gall stone disease who were admitted for laparoscopic cholecystectomy and undergoing the same after taking an informed consent.

**Exclusion Criteria**

1. Patients with pacemaker or any kind of metallic implants/prosthesis or metallic foreign body.
2. Patients suffering from claustrophobia.
3. Patients refuse to give informed consent.

**Period of Study:** 01 June 2019 to 31 May 2020.

**Results and Conclusion:** The present study attempts to determine the role of magnetic resonance imaging and magnetic resonance Cholangiopancreatography prior to laparoscopic cholecystectomy in gallstone disease. Gallstone disease is a common disease responsible for considerable morbidity in the society. Surgery is the definitive treatment and laparoscopic cholecystectomy has largely replaced conventional surgery. However, laparoscopic cholecystectomy carries a higher risk of injury to biliary tree than conventional surgery. Significant number of these injuries are caused by variations in the biliary tree anatomy.

**Keywords:** Gall stones, imaging, MRCP, liver, biliary

**Introduction**

Gall stone disease is a common condition which is a cause of significant morbidity in the society [1]. It is most of the time asymptomatic but sometimes presents with serious symptoms. It can be diagnosed by investigations like Ultrasonography, Computerized Tomography (CT), Magnetic Resonance Cholangiopancreatography (MRCP) and Endoscopic Retrograde Cholangiopancreatography (ERCP). The definitive treatment for gallstone disease is surgery [2].

Since the advent of laparoscopic cholecystectomy, preliminary evaluation of the biliary tree has assumed great importance [3-5]. Pre-operative evaluation of the biliary tree helps to avoid intraoperative difficulties like damage to the biliary tree and "forced conversion" to open surgery.

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The need for a time consuming and potentially hazardous intraoperative cholangiogram is also eliminated if a confident prior assessment and appropriate pre-operative clearance of the CBD is carried out [5-6].

At present, ERCP is considered the gold standard for the diagnosis of the ductal calculus, but carries potential risk of complications including pancreatitis, bleeding from sphincterotomy sites and duodenal perforation [7].

MRCP is the ideal imaging modality and when used with proper Indications, based on clinical suspicion and predictive scoring, offers a safe and more acceptable alternative to diagnostic ERCP. MRCP carries an additional advantage of diagnosing abnormalities of the biliary tree including duplication, choledochal cyst, pancreas divisum and cholangiocarcinoma [8, 9, 10].

### Materials and Methods

**Source of data:** This study was conducted at Department of Radiodiagnosis and Modern Imaging, S.P. Medical College & A.G. of P.B.M. Hospitals, Bikaner, A multi-disciplinary tertiary care referral hospital.

**Study Area:** Department of Radiodiagnosis and Modern Imaging, S.P. Medical College & A.G. of P.B.M. Hospitals, Bikaner.

**Sample size:** Total 100 cases of gall stone disease undergoing laparoscopic cholecystectomy are included in this study.

**Study design:** Correlational study.

**Study duration:** - 01 June 2019 to 31 May 2020.

**Inclusion criteria:** All patients of gall stone disease who were admitted for laparoscopic cholecystectomy and undergoing the same after taking an informed consent.

### Exclusion criteria

1. Patients with pacemaker or any kind of metallic implants/prosthesis or metallic foreign body.
2. Patients suffering from claustrophobia.
3. Patients refuse to give informed consent.

**Imaging Equipment:** 3.0 Tesla Philips ingenia MRI machine is used for this study.

### Results

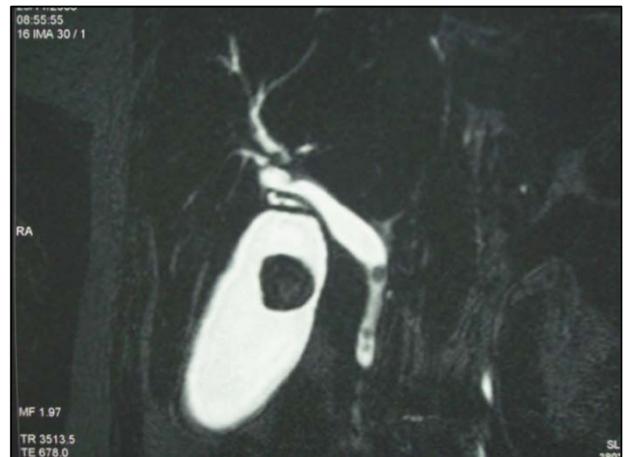
In the present study, 100 patients with gallstone disease, referred for magnetic resonance imaging and magnetic resonance cholangiopancreatography were evaluated.

The most common age group to be involved was 4th and 5th decade.

Females were almost twice commonly affected than males. The following statistical data were obtained:

1. The sensitivity of MRI was 95 -100%, specificity 97 – 100% and accuracy 96 – 98% for detecting gallstones.
2. Similar sensitivity and specificity was found for CBD calculi.
3. The sensitivity and specificity for delineation of biliary tree anatomy was 100% each. Type A IHBR pattern was seen in 42 %, Type B in 22%, Type C in 26%, Type D in 6% and Type E in 2%.
4. The cystic duct anatomy was delineated with 100% sensitivity and specificity. Anomalous cystic duct insertion patterns were seen in 11%.

5. The incidence of CBD calculus was 7%. The mean diameter of CBD was  $5.73 \pm 2.65$  mm.
6. However, the pattern of cystic duct insertion had a statistically significant correlation with difficult surgery with anomalous insertions leading to difficult surgery with a p value of 0.025. It was significant on multivariate analysis too with a p value of 0.034.



**Fig 1:** Coronal MIP MRCP image of biliary tree showing gall stone and CBD calculi.



**Fig 2:** Coronal MIP MRCP image showing a solitary calculus in GB neck and high cystic duct insertion into CHD just distal to the confluence.



**Fig 3:** showing: Coronal MIP MRCP sequence with a long cystic duct.

### Summary and Conclusion

MRI and MRCP are noninvasive, radiation free imaging modalities with multi planar capabilities, excellent post processing and delineation of biliary anatomy. They can

accurately detect gallstones and delineate biliary tree anatomy. They can detect anomalous biliary tree and can predict difficult surgery thus helping the surgeon to be prepared for the eventualities during surgery and to prevent biliary injury. Overall, there is reduction in patient morbidity.

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