

## Anatomical Variations of Gall Bladder & Its Association With Post operative Outcome

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### Abstract

**Introduction:** The purpose of this study is to evaluate the frequency of Anatomical variations and congenital anomalies of the Extra Hepatic Biliary System encountered during Laparoscopic Cholecystectomy.

**Material and Method:** This study was conducted on diagnosed 100 patients of cholelithiasis at the Department of surgery ,Kasturba Medical College, Mangalore for a period of 1 year.

**Results and Conclusion:** Congenital anomalies and anatomical variations of extra- hepatic biliary tree though are not common but can be of clinical importance and surprise if present. So every surgeon should assess for these anomalies during laparoscopic cholecystectomy

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### I. Introduction

Variations in the anatomy of gallbladder, bile ducts and the arteries that supply them and liver are important to the surgeon because failure to recognize them may lead to inadvertent ductal ligation, biliary leaks and strictures after laparoscopic cholecystectomy . Congenital anomalies of extra hepatic biliary tree have long been recognized but are rare and may be of clinical importance because they may provide surgeons with an unusual surprise during laparoscopic cholecystectomy. These anomalies include aberrant or accessory biliary ducts, aberrant cystic duct, bile duct cysts, alteration of biliary tract associated with situs invertus and anomalous junction of bile duct to pancreatic duct along with vascular anomalies. Several less common and more complicated anatomic variations can also be found.

Biliary tree develops from hepatic diverticulum which gives rise to gallbladder, extra-hepatic ductal system with hepatic parenchyma whereas intrahepatic ducts are derived from endoderm at the tip of diverticulum. The accessory anomalies or aberrant bile ducts may result when interconnecting ducts persists. The extra hepatic bile duct system is divided into four topographic portions. Cystic duct and gall bladder, right and left hepatic ducts, common hepatic and bile duct including its supra and retro-duodenal parts and the pancreatic and intraduodenal portions. Recent advances in MRI, MRCP and Multi-Detector (MD) or Helical CT Scan have improved image quality greatly and have contributed to increased recognition of these entities. The purpose of this study is to evaluate the frequency of Anatomical variations and congenital anomalies of the Extra Hepatic Biliary System encountered during Laparoscopic Cholecystectomy.

### II. Materials & Methodology

This study was conducted on diagnosed 100 patients of cholelithiasis at the Department of surgery ,Kasturba Medical College, Mangalore for a period of 1 year. Inclusion criteria included all patients of cholelithiasis admitted for laparoscopic cholecystectomy. The patients with acute cholecystitis, empyema, gall bladder, pancreatitis, obstructive jaundice and carcinoma of gall bladder were excluded from study because in these cases it would have been difficult to identify the anomalies due to obscured biliary anatomy. Base line investigations along with ultrasound abdomen were carried out in all cases.

All cases undergoing routine laparoscopic cholecystectomy were assessed for different extra hepatic biliary ductal and vascular anomalies accessible during the procedure. Structures mainly assessed were gall bladder, cystic duct, supraduodenal part of CBD, cystic artery and hepatic artery which are easily handled during laparoscopic cholecystectomy. However, assessment of hepatic ducts, portal vein and retroduodenal and pancreatic parts of CBD was not done due to the possibility of iatrogenic injuries.

The data were evaluated using SPSS 20. Mean  $\pm$  standard deviation were presented for numerical parameters and categorical variables were expressed as n (%) on 95% confidence interval. No other statistical test was applied.

### III. Results

Out of 100 cases of cholelithiasis 75% were females and 25% males with female to male ratio of 3:1. Age ranged from 10-80 years with highest incidence during 3rd, 4th and 5th decade having mean age of 39.85 ± 18.82 years and median age of 41 years. Most of the patients presented with upper abdominal pain in form of right hypochondrial pain (71.0%), epigastric and right hypochondrial pain (19.0%) and epigastric pain (10%) as main symptoms. Multiple stones were present in 79% and 20% had single stone. Operative findings revealed variations in 22 cases (22%) mainly involving cystic artery, cystic duct, right hepatic artery, gall bladder and common hepatic artery.

No anomaly of CBD was seen and no operative difficulty was encountered during surgery due to receiving anomalies in majority of cases as all precautions were taken during surgery when these anomalies were identified. Postoperatively patients developed complications in form of sepsis, right shoulder pain, bleeding and biliary leak as main complications.

#### Anomalies Of Gall Bladder

Anomaly Of Gall Bladder	No. Of Patients	Percentage
Buried Gall Bladder	2	2%
Floating Gall Bladder	1	1%
Phrygian Cap	1	1%
Parallel To Cbd	1	1%
Short Cystic Duct	3	3%
Long Cystic Duct	1	1%
Accessory Cholecystohepatic Duct	1	1%

#### Vascular Anomalies

Vascular Anomaly	No. Of Patients	Percentage
Moynihans Lump	2	2%
Long And Tortuous Artery	1	1%
Artery Above Calots Triangle	2	2%
Artery Anterior To Cystic Duct	3	3%
Artery Posterior To Cystic Duct	1	1%
Artery Right To Cystic Duct	1	1%
Double Cystic Artery	2	2%
Aberrant Cystic Artery	0	0%
Short Cystic Artery	0	0%

#### Post Operative Complications Due To Anatomical Anomalies

Complication	No. Of Patients	Percentage
Bleeding From Drain	4	4%
Biliary Leakage	5	5%
Port Site Sepsis	1	1%
Shoulder Pain	3	3%
Re Exploration	3	3%

The complications possibly seen due to failure of recognition of aberrant anatomy were bleeding and biliary leak as identified by amount and duration of contents coming from drain. Majority of the cases were controlled by conservative treatment but only 3 cases were re-explored. The patient with bleeding revealed accessory cystic artery as a source of haemorrhage which was ligated and the other two cases of biliary leak were found to have damaged right sectorial duct in one case which was managed by Roux-en-Y hepatico-jejunostomy and slippage of clip in other case due to short cystic duct which was dealt with by ligature application.

### IV. Discussion

The use of laparoscopy for gallstone disease with high resolution and magnification reveals clear anatomy of biliary tree as compared to open cholecystectomy. Therefore extra-hepatic biliary system can easily be assessed for its anatomical variations and congenital anomalies during laparoscopic cholecystectomy. It is important to emphasize that it is difficult to obtain the diagnosis of these malformations pre-operatively by investigations utilized for diagnosis of gallbladder disease, however, they can be seen by special radiological evaluation. The overall incidence of these anomalies found in this study was 22%.

The arterial anomalies should be recognized during laparoscopic cholecystectomy to prevent arterial bleeding and hence iatrogenic injuries. The most dangerous anomaly is tortuous course of common hepatic artery or right hepatic artery on the front of the origin of cystic duct known as "Caterpillar turn or Moynihan's

hump." The vascular anomalies assessed in our study were 12%. The most important thing is the short cystic artery arising from the looped right hepatic artery and most vulnerable to trauma during cholecystectomy. Due to these anatomical variations complications seen were bleeding and biliary leak from drain in. Three patients were re-explored one for bleeding and other two for biliary leak giving rise to morbidity of 3%. No mortality was seen in this series. However morbidity assessed by Leghari AA et al. in their study of laparoscopic cholecystectomy in complicated gallstone disease was 1.67% which is lower than the present study. Minor biliary leaks in other cases could be due to accessory cholecystohepatic ducts passing directly into the liver bed which are unusual and not recognized during laparoscopic procedure.

## V. Conclusion

Congenital anomalies and anatomical variations of extra- hepatic biliary tree though are not common but can be of clinical importance and surprise if present. So every surgeon should assess for these anomalies during laparoscopic cholecystectomy in order to prevent inadvertent ductal clipping, ductal injuries, strictures and bleeding problems. Awareness of these anomalies will decrease morbidity, conversion and re-exploration in these patients.

## References

- [1]. Nahrwold DL. The biliary system. In: Sabiston DC Text Book of Surgery. 13th ed. W.B. Saunders company Igaku - Shoin/Saunders 1986; 1128-36.
- [2]. Suhocki PV, Meyers WC. Injury to aberrant bile ducts during cholecystectomy: a common cause of diagnosed error and treatment delay. *Am J Roentgenol* 1999; 172: 955-59.
- [3]. Marcos A. Right lobe living donor liver transplantation, a review. *Liver Transpl* 2000; 6:3-20.
- [4]. Lamah M, Karanjia ND, Dickson GH. Anatomical variations of extrahepatic biliary tree: review of the world literature. *Clin Anat* 2001; 14: 167-72. Bayraktar Y, Balaban HY, Asalam S, Balkanci F. Agenesis of gallbladder and multiple anomalies of biliary tree in a patients with portal thrombosis: a case report. *Turk J Gastroenterol* 2006; 17: 212-15.
- [5]. Yu J, Turner MA, Fulcher AS, Halvorsen RA. Congenital anomalies and normal variants of the pancreaticobiliary tract and the pancreas in adults: part-1, Biliary tract. *Am J Roentgenol* 2006; 187: 1536-43.
- [6]. Carbajo MA, Martin del Orono JC, Balanco JI, CuestaC, Martin F, Toledano M, et al. Congenital malformations of gallbladder and cystic duct diagnosed by laparoscopy: high surgical risk. *JSL* 1999; 3: 319-21.
- [7]. Hirao K, Miyazaki A, Fujimoto T, Isomoto I, Hayashi K. Evaluation of aberrant bile ducts before laparoscopic cholecystectomy: helical CT cholangiography versus MR cholangiography. *Am J Roentgenol* 2000; 175: 713-20.
- [8]. Morteale KJ, Rocha TC, Streeter JL, Taylor AJ. Multimodality imaging of pancreatic and biliary congenital anomalies. *Radiographics* 2006; 26: 715-31.
- [9]. Schulte SJ. Embryology, normal variation and congenital anomalies of pancreas. In: Margulis and Burhenne's alimentary tract radiology. 5th ed. St Louis: Mo Mosby, 1994; 1039-51.
- [10]. Chen WJ, Ying DJ, Liu ZJ, He ZP. Analysis of the arterial supply of the extrahepatic bile ducts and its clinical significance. *Clin Anat* 1999; 12: 245-9.