

ANATOMICAL VARIATIONS IN CYSTIC DUCT OBSERVED IN PATIENTS DURING OPEN CHOLECYSTECTOMY AT HAYATABAD MEDICAL COMPLEX, PESHAWAR

Shazia Iftikhar¹, Falak Naz¹, Zainab Rehman¹, Nazish Waheed², Maryam Ijaz³, Sarah Rehman⁴

¹Department of Anatomy, Khyber Medical College, KhyberPakhtunkhwa, Peshawar, Pakistan

²Department of Anatomy, Northwest Medical College, Khyber Pakhtunkhwa, Peshawar, Pakistan

³4th Year BDS Student, Rehman College of Dentistry, Peshawar, Pakistan

⁴Fauji Foundation Hospital, Pakistan

ABSTRACT

Objectives: To determine the type of morphology of the cystic duct and to file the occurrence of anatomical variations in the people of Khyber Pakhtunkhwa.

Materials and Methods: This was a descriptive study having a total number of 220 patients were selected for the study undergoing open cholecystectomy. This included both female and male cases. All patients were operated by open cholecystectomy procedure. During the surgical procedure Calot's triangle was identified and the junction of cystic duct with the common hepatic duct was carefully observed and any variation in the morphology of cystic duct was observed and were noted on a proforma.

Results: Out of 220 patients, Normal anatomy was observed in 164 patients (74.54%). Anomalies were observed in 56 patients (25.45%). Small cystic duct was the most common anomaly observed in 21 (9.54%) patients. 19 (8.63%) cases were observed to have long cystic ducts. The cystic duct entering the right hepatic duct was observed in 10 (4.54%) cases. Apparent common bile ducts (ACBD) were found in 6 (1.36%) patients.

Conclusion: The extrahepatic biliary tree is the region mostly prone to anatomical variations. Cystic duct has been observed to be having a diversity of anatomical variations affecting the biliary tree. Hence it is mandatory for the surgeons to have an accurate acquaintance to standard anatomy and anatomical variations of the cystic duct to avoid any complications during and after cholecystectomy.

Key words: Cholecystectomy, Extrahepatic biliary tree, CHD, CD, CBD

INTRODUCTION

Anatomically, the classical extra hepatic biliary tree is only present in 50% to 60% of population or 60% to 80% of population^{1,2}. Ideally the foremost biliary union called the common hepatic duct is formed external to the liver parenchyma. The right and left hepatic ducts drain the bile from right and left hemiliver respectively, while both the ducts also drain the caudate lobe of the liver. The left hepatic

duct is comparatively longer than the right hepatic duct^{3,4}. Both the ducts along with hepatic artery and portal vein exit from the liver at the point of porta hepatis⁵. Both the ducts unite to form the common hepatic duct (CHD) and is 4cm long. The cystic duct (CD) joins CHD on the right side to form the common bile duct^{3,6,7}. The average length of CD is 2–4 cm while the diameter ranges from 1-5 mm and the mucosa is thrown into concentric folds called the spiral valves of Heister⁸. The hepatic artery lies to the left and portal vein lies posterior to the CHD⁹. The common bile duct is formed by the union of CD to the CHD¹⁰. The entire course of common bile duct (CBD) is divided into four parts i.e., supraduodenal,

Correspondence:

Zainab Rehman

Assistant Professor,
Department of Anatomy, Khyber Medical College, Peshawar
25000, Khyber Pakhtunkhwa, Pakistan
Email: zainabiftikhar78@gmail.com

retroduodenal, retropancreatic and intraduodenal. The CBD courses downwards into the hepatoduodenal ligament along with portal vein on posterior side and hepatic artery on its medial side. Initially this duct courses postero-inferiorly to the first part of duodenum. Then lie posterior to pancreas in a groove and ultimately enters the second part of duodenum. While entering the duodenum, it may either join the pancreatic duct and both opens into the sphincter of Oddi or in some cases it may enter the sphincter individually. The average length ranges between 7 cm and 11 cm¹¹.

Anatomical variations in extrahepatic biliary apparatus have been observed by the anatomists and are always exigent to the surgeons too especially during surgical procedures like laparoscopic and open cholecystectomy, segmentectomy, lobectomy, liver transplant etc. However increased frequency of biliary tract injuries has been observed during cholecystectomy which may result in many post op complications. These variations can lead to iatrogenic injuries to surrounding structures and can lead to increase in morbidity and mortality of the patients or can increase the outlay of healing. Hence extensive knowledge and successful identification of these variations is mandatory for the health of the patient undergoing surgical procedures like laparoscopic cholecystectomy and other hepatobiliary surgeries¹².

During cholecystectomy, the CD is needed to be ligated, therefore any variation in its anatomy may lead to pre or post operative complications. The most common variations encountered by the surgeons are differences in the length of cystic duct. There are many different ways by which the CD joins the CHD. It may join CHD on the right side, or may cross the CHD from the front or behind to join CHD on its left side. It is very important for the surgeons performing cholecystectomy to know about the inconsistent union of CD with the CHD to prevent injuries to the CHD or CBD. In some cases, CD is found to run parallel to CBD for a small distance and may also course parallel to the CHD for an erratically extended expanse upto the ampulla of Vater. In such cases the distal parts of CD and CHD are enclosed in a common sheath inside which both these ducts run parallel and are called Apparent common bile duct (ACBD) seeming to have a double lumen. A surgeon who is not well aware of this anatomical variant can get puzzled while performing cholecystectomy¹. Oc-

asionally the CD may be seen entering the the right hepatic duct and hence the right hepatic duct may be mistakenly ligated and severed by the surgeon, considering it to be a CD. The patient may come up with biliary peritonitis or fistula, or liver cirrhosis afterwards^{2,13}. Therefore the surgeons should have an extensive awareness of the anatomy of extra-hepatic biliary ducts and their variations to avoid disasters during surgery. Ideally the right and left hepatic ducts course for a very short expanse outside the liver and later meet to form the CHD. However infrequently, both these ducts may join intrahepatically or may run parallel to a variable distance and may join quite distally in hepatoduodenal ligament. An anomalous duct has also been described uniting the right lobe of liver with the gallbladder. The length of CHD and CD and subsistence of anatomic variations in the biliary tree are directly associated to the position and expansion of the cysto hepatic triangle also called Calot's Triangle. This triangle has profound importance in common surgical procedures like cholecystectomy which involves ligation of cystic artery and cystic duct for the consequent removal of the gallbladder. It has been observed that in 56% of cases the cystic artery is bounded by the Calot's triangle, hence identification of this triangle facilitates further identification of structures involved in resection of gallbladder and prevent complications like hemorrhage, bile leakage in peritoneal cavity etc. Keeping in view the probability of aforementioned variations in extrahepatic biliary tree, the surgeons need to be highly cautious while operating in the particular area².

The intend of this study is to study the morphology of common bile duct and cystic duct and to file the occurrence of anatomical variations in common bile duct and cystic duct in our population of Khyber Pakhtunkhwa.

MATERIALS AND METHODS

This is a descriptive study that was allowed to be carried out in surgery department of Hayatabad Medical Complex Peshawar from July 2016 to February 2017. A total of 220 adult patients including both the genders were studied and an expedient sampling method was adopted for compilation of sample. A pre arranged proforma was used for data collection which included a comprehensive history, entire clinical assessment and baseline investigations

including abdominal ultrasound. Inclusion criteria was diagnosed cases of cholelithiasis (gallstones) who were later operated by open cholecystectomy. Exclusion criteria was all patients with jaundice, acute cholecystitis, carcinoma gallbladder or were having stones in common bile duct and those patients not fit for general anesthesia. Informed consent was taken and all the patients were admitted one day before surgery. All patients were operated by open cholecystectomy procedure. During the surgical procedure Calot's triangle was identified and the junction of cystic duct with the common hepatic duct was carefully observed and any variation in the morphology of both CD was observed. All the patients were given a standard post operative care and follow up of these patients was done to look for any complication. All the findings were documented on proforma and presented on frequency table.

RESULT

Out of 220 patients, 172 (78.18%) were females and 48 (21.81%) were males, with female to male ratio of 5:1. Normal anatomy was observed in 164 patients (74.54%). Anomalies were observed in 56 patients (25.45%) of which short cystic duct was the most common anomaly with 21 (9.54%) patients having this variation. 19 (8.63%) cases out of 220 patients were observed to have long cystic ducts. The cystic duct entering the right hepatic duct was observed in 10 (4.54%) cases. As regard the variation observed in common bile duct, apparent common bile ducts (ACBD) were found in 6 (1.36%) patients. All variations observed along with their percentages are shown in Table 1. All the operated patients were regularly followed up for complications and no mortality was recorded in the study.

DISCUSSION

Anatomical variations of the extra-hepatic biliary tree are recurrently encountered by surgeons while operating in the particular region. They may

frequently present as a bolt from the blue to the unacquainted surgeon. Hence understanding of the normal and anomalous anatomy is of supreme importance. The most common and beneficial surgical choices for patients with gall stones are Open and Laparoscopic cholecystectomy. Both have success rate of around 95%¹. For both the procedures to be successfully performed, the basic know how of the normal anatomy of the extra-hepatic biliary apparatus and cystic duct is expected from the surgeons. Many variations have been observed in the region of Calot's triangle. Therefore vigilant examination of this triangle and rest of biliary tree is of prime importance during open cholecystectomy.

This study was performed on 220 patients. Out of these, 172 (78.18%) were females and 48 (21.81%) were males having a female to male ratio of 5:1. This finding revealed that females have greater incidence of cholelithiasis than males. This finding is compatible with the studies done in other regions of Pakistan like Sukkar where the F:M was 4.4:1¹⁴. Normal anatomy was observed in 164 patients (74.54%) while variations were observed in 56 patients (25.45%) of cases. This finding is compatible with the incidence of variations observed in regions like Sindh, Pakistan and Saudi Arabia^{15,16}. Although the normal length of CD is 2-4cm but indeed there are variations in length due to variations in its course and attachment to either right or left hepatic ducts, low or high insertion in CHD or running parallel to BD and ending directly into duodenum⁴. Out of these 56 patients, short cystic duct was found to be the most common anomaly with 21 (9.54%) patients having this variation. Such a finding of high incidence of short cystic duct was also encountered in a study at Liaquat University of Medical & Health Sciences, Jamshoro. In this study, no complication was encountered during surgery regarding this anomaly¹². Long cystic duct was observed in 19 patients (8.63%) of patients. This finding was also seen in the same study aforementioned and also in a study performed in Tehran, Iran^{12,17}. The cystic duct entering the right hepatic duct was observed in 10 (4.54%) cases. This finding is compatible with a case study done in Brazil. The right hepatic duct may be mistakenly ligated and severed being considered as a cystic duct and may lead to severe complications in patient¹⁸. Another variation called apparent common bile duct was observed in 6 (1.36%) patients.

Table 1:

Observed anatomical variations	(n=220)	%
Short cystic duct	21	9.54
Long cystic duct	19	8.63
Cystic duct entering right hepatic duct	10	4.54
Apparent common bile ducts (ACBD)	6	1.36

The cystic ductal ligation in close vicinity to hepatic duct may lead to stricture of hepatic duct. Also cystic duct may be mistaken for a bile duct and the adjacent hepatic duct may be ligated and severed being considered as cystic duct¹⁹. The results of this study suggest that present at birth anomalies present at birth and anatomical variations of extrahepatic biliary tree can be of clinical significance and bombshell if present. So every surgeon should evaluate these anomalies during open cholecystectomy in order to prevent unintended ductal clipping, ductal injuries, strictures and bleeding problems. Understanding of these variations will lessen morbidity, conversion and re-exploration.

CONCLUSION

The extrahepatic biliary tree is the region mostly prone to anatomical variations. Cystic duct has been observed to be having a diversity of anatomical variations affecting the biliary tree. Hence it is mandatory for the surgeons to have an accurate knowledge of normal anatomy and anatomical variations of the cystic duct to avoid any disasters during surgery and also to prevent post operative complications in the patients.

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