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Assessment of the cystic duct anomalies in patients undergoing laparoscopic cholecystectomy in Bihar population

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Abstract
The cystic duct is an important player in the digestive process. The system needs bile to help break down food and the cystic duct transfers bile between the gallbladder and common and hepatic bile duct. This transfer helps the important fluid flow freely, thus allowing lipids to be processed in the small intestine. The present study was planned to assess the cystic duct anomalies in the patients undergoing the laparoscopic cholecystectomy for Cholelithiasis in the north Indian population.
The current study was planned in the Department of the Surgery in V.I.M.S, Pawapuri, Bihar from Jan 2017 to Dec 2017. Total 250 patients undergoing the laparoscopic cholecystectomy for Cholelithiasis were enrolled in the present study. All patients underwent cholecystectomy under general anaesthesia and received standard pre, per and post-operative care under a single team of surgeons following the same management protocol.
The data generated from the present study and already reported findings concludes that Cystic duct may demonstrate a variety of anatomical variations which can cause technical difficulties during surgery especially laparoscopic cholecystectomy. The only way to identify these anomalies and to reduce subsequent morbidity.

Keywords: cystic duct anomalies, laparoscopic cholecystectomy, cholelithiasis

Introduction
A gallstone is a stone formed within the gallbladder out of bile components. The term cholelithiasis may refer to the presence of gallstones or to the diseases caused by gallstones. Most people with gallstones (about 80%) never have symptoms. When a gallstone blocks the bile duct, a cramp-like pain in the right upper part of the abdomen, known as biliary colic (gallbladder attack) can result. This happens in 1–4% of those with gallstones each year. Complications of gallstones may include inflammation of the gallbladder (cholecystitis), inflammation of the pancreas (pancreatitis), jaundice, and infection of a bile duct (cholangitis). Symptoms of these complications may include pain of more than five hours duration, fever, yellowish skin, vomiting, dark urine, and pale stools. Risk factors for gallstones include birth control pills, pregnancy, and a family history of gallstones, obesity, diabetes, liver disease, or rapid weight loss. The bile components that form gallstones include cholesterol, bile salts, and bilirubin. Gallstones formed mainly from cholesterol are termed cholesterol stones, and those mainly from bilirubin are termed pigment stones. Gallstones may be suspected based on symptoms. Diagnosis is then typically confirmed by ultrasound. Complications may be detected on blood tests [1]. The risk of gallstones may be decreased by maintaining a healthy weight with exercise and a healthy diet. If there are no symptoms, treatment is usually not needed. In those who are having gallbladder attacks, surgery to remove the gallbladder is typically recommended. This can be carried out either through several small incisions or through a single larger incision, usually under general anesthesia. In rare cases when surgery is not possible, medication can be used to dissolve the stones or lithotripsy to break them down [2].
In developed countries, 10–15% of adults have gallstones. Rates in many parts of Africa, however, are as low as 3%. Gallbladder and biliary related diseases occurred in about 104 million people (1.6%) in 2013 and they resulted in 106,000 deaths. Women more commonly have stones than men and they occur more commonly after the age of 40. Certain ethnic groups have gallstones more often than others. For example, 48% of Native Americans have gallstones. Once the gallbladder is removed, outcomes are generally good [2].
The cystic duct is between two and four centimeters long. It lies between the gallbladder and the common bile duct. It transmits bile between ducts that are important for the digestion process and the gallbladder. Usually it's found next to the cystic artery that sends oxygenated blood to the gallbladder and cystic duct.
The cystic duct is an important player in the digestive process. The system needs bile to help break down food and the cystic duct transfers bile between the gallbladder and common and hepatic bile duct. This transfer helps the important fluid flow freely, thus allowing lipids to be processed in the small intestine.
It has a spiral valve, which is a curved mucosal lining that is lined with deep folds. This valve doesn't offer much resistance to the flow of bile, which means that bile can flow pretty freely between the bile duct and the gallbladder. The gallbladder can therefore store bile between mealtimes, which

is then released upon consumption of fatty foods, such as those containing high amounts of cholesterol. Unfortunately, this easy flow also means that gallstones can be released into the cystic duct and can block the bile flow. This blockage can lead to painful swelling of the gallbladder and sometimes requires surgery [3].

The bile ducts within the liver are called intrahepatic bile ducts. These small ducts join together into larger ducts, ending in the left and right hepatic ducts. The right and left lobes of the liver are drained by these ducts. Information on intrahepatic bile duct cancer can be found in the liver cancer chapter. The extrahepatic bile ducts are outside the liver. The extrahepatic ducts include the part of the right and left hepatic ducts that are outside the liver, the common hepatic duct and the common bile duct. (The cystic duct is also outside the liver, but cancers of the cystic duct are grouped with gallbladder cancers.)The extrahepatic bile ducts may be further divided based on their location:

The hilum or hilar area is the area where the right and left hepatic ducts leave the liver and join to form the common hepatic duct. It also includes the point where the cystic duct joins the common hepatic duct. Because these ducts are close to the liver, they may be referred to as the proximal extrahepatic bile ducts [4].

Laparoscopic cholecystectomy uses several (usually 4) small incisions in the abdomen to allow the insertion of operating ports, small cylindrical tubes approximately 5 to 10 mm in diameter, through which surgical instruments are placed into the abdominal cavity. The laparoscope, an instrument with a video camera and light source at the end, illuminates the abdominal cavity and sends a magnified image from inside the abdomen to a video screen, giving the surgeon a clear view of the organs and tissues. The cystic duct and cystic artery are identified and dissected, then ligated with clips and cut in order to remove the gallbladder. The gallbladder is then removed through one of the ports [5].

As of 2008, 90% of cholecystectomies in the United States were done laparoscopically. Laparoscopic surgery is thought to have fewer complications, shorter hospital stay, and quicker recovery than open cholecystectomy [6].

The present study was planned to assess the cystic duct anomalies in the patients undergoing the laparoscopic cholecystectomy for Cholelithiasis in the north Indian population.

Methodology

The current study was planned in the Department of the Surgery in V.I.M.S, Pawapuri, and Bihar from Jan 2017 to Dec 2017. Total 250 patients undergoing the laparoscopic cholecystectomy for Cholelithiasis were enrolled in the present study. All patients underwent cholecystectomy under general anaesthesia and received standard pre, per and post-operative care under a single team of surgeons following the same management protocol. All the patients were informed consents the aim and objective of the present study was conveyed to them. Approval of the institutional ethical committee was taken prior to conduct of this study.

Following was the inclusion and exclusion criteria for the present study.

Inclusion Criteria: patients undergoing the laparoscopic cholecystectomy for cholelithiasis

Exclusion Criteria: Patients suffered from the carcinoma gallbladder or stones in common bile duct

Results & Discussion

The cystic duct is an important structure to be identified and ligated individually during cholecystectomy. The added benefit of laparoscopic procedure is the magnified view with high resolution that greatly helps in the identification of the cystic duct and its anomalies if present.

The data from the 250 cases were collected and presented as below. Out of this total 250 cases 21 cases were observed with the cystic duct anomalies.

Table 1: Symptoms of Cases

Symptoms	No. of Cases
Pain in right hypochondrium	83
Pain in right hypochondrium and epigastrium	55
Pain in epigastrium	42
Dyspepsia	32
Fullness in epigastrium	27
Nausea and vomiting	11
Total	250

Table 2: Cystic Duct Anomalies

Cystic Duct Anomalies	No. of Cases
Short cystic duct	6
Long cystic duct	4
Double cystic duct	3
Low sited confluence	2
Cystic duct parallel to CBD with low insertion	2
Posterior spiral insertion	2
Absence of cystic duct	1
Anterior spiral insertion	1
Accessory cholecystohepatic duct	0
Insertion in right hepatic duct	0
Total	21

In some cases, an accessory cystic artery arises from the main hepatic artery or from the right hepatic artery. During open cholecystectomy or laparoscopic cholecystectomy, incomplete visualization before dissection of the cystic artery can inadvertently lead to damage of these other major vessels.10 The course and location relative to other structures of the cystic artery can be highly variable. The cystic artery can be seen in the hepatic ducts or even behind the common hepatic duct.

The variation in the length of cystic duct was most frequently found anomaly in our series. Which has also been reported in the past. The variation in the site of confluence is quite well reported in the literature, where a number of varieties have been found and reported as case reports and small series. The anomalies include low insertion, insertion into left or right hepatic ducts, anterior or posterior spiral type insertion, insertion into left or right hepatic duct, anterior or posterior spiral type insertion or pre-hepatic insertion [2].

A study from China analyzed 1100, including analyzed confluence of cystic and common bile ducts16 reported 5.9% (n=65) abnormal insertions and low insertion was most commonly seen i.e.: 54 cases out of 6516. Another study from China focused on low insertion of the cystic duct and found that 5.4% (n=191 out of 3546) patients found to have low

insertion of cystic duct [7]. Anterior and posterior spiral insertions have also been reported in the literature but as case reports or part of the biliary tree anomalies encountered during cholecystectomy [8].

Carl Langenbuch performed the first open cholecystectomy in 1882 [9]. As surgeons gained more experience and open biliary operations became standardized, the incidence of bile duct injuries reduced to approximately 0.125% [10-11]. Open cholecystectomy remained the gold standard for treatment of cholelithiasis until the late 1980s when LC was introduced [12]. It gained widespread acceptance and became the new gold standard for the management of gall stone diseases. During the surgical learning curve for this new technique there was an initial rise in the reports of bile duct injuries [13], resulting mainly from the surgeons' inexperience and misinterpretation of anatomy. Though the reported figures of operative bile duct injuries are much lower than the actual incidence, a recent audit of 1522 LCs performed in Thailand revealed a bileduct injury rate of 0.59%, [14] i.e., about four times the incidence reported for open cholecystectomy.

In bile duct excision, a portion of the bile duct is lost and simple repair, as may be done in transection and laceration, is not possible. This is the reason why both the cases with major extrahepatic biliary duct injures in this study underwent hepatojejunostomy. The chances of late stricture are greater in bile duct transection than in bile duct laceration, as the axial vascular supply of the CBD is damaged in transection. Biliary reconstruction in the presence of peritonitis, combined vascular and bile duct injuries or injuries at or above the level of the biliary bifurcation were significant independent predictors of poor outcome [15]. In our study, all patients had excellent recovery and were discharged in a good condition within 10 days of surgery; however, long-term follow-up was not available. Strictures may develop early (within days or weeks) or may take years to develop and vary in both diameter and length [16]. Early strictures may develop due to intra-operative procedures such as clamping, ligation or clipping of the duct or thermal injury. Local infection may also result in both early and delayed stricture formation. Thermal injury and occult malignancy are important causes of delayed stricture formation.

A thorough knowledge of the anatomy of the region, including possible anomalies, is important in preventing iatrogenic bile duct injuries. Both open cholecystectomy and LC are based on similar operative principles. Proper exposure and visualization, careful dissection, adequate haemostasis, careful placement of ligatures and clips, and division of structures only after proper identification are essential for safe cholecystectomy. Fundus-first cholecystectomy is well recognized as a safe technique during open cholecystectomy as well as during LC, because it minimizes the risk of injuries to the biliary structures at the Calot's triangle [17].

Conclusion

The data generated from the present study and already reported findings concludes that Cystic duct may demonstrate a variety of anatomical variations which can cause technical difficulties during surgery especially laparoscopic cholecystectomy. The only way to identify these anomalies and to reduce subsequent morbidity.

References

1. "Gallstones". NIDDK. November 2013. Archived from the original on 28 July 2016. Retrieved 27 July 2016.
2. Treatment for Gallstones". National Institute of Diabetes and Digestive and Kidney Diseases, 2016.
3. https://www.innerbody.com/anatomy/digestive/cystic-duct
4. http://www.cancer.ca/en/cancer-information/cancer-type/bile-duct/diagnosis/?region=on
5. Yeo Charles J. Shackelford's surgery of the alimentary tract. Yeo, Charles J. (Eighth ed.). Philadelphia, PA, 2016. ISBN 978-0323402323. OCLC 1003489504.
6. Yamashita Y, Takada T, Kawarada Y, Nimura Y, Hirota M, Miura F, *et al*. "Surgical treatment of patients with acute cholecystitis: Tokyo Guidelines". Journal of Hepato-Biliary-Pancreatic Surgery. 2007; 14(1):91-7.
7. Ta Kao J, MouKuo C, Sin Changchien C, HunagKuo C. Congenital anomaly of low insertion of cystic duct: endoscopic retrograde cholangiopancreaticography finding and clinical significance. J Clin Gastroentrol. 2011; 45(7):626-9.
8. Wu YH, Liu ZS, Mrikhi R, Li Ai Z, Sun Q, Bangoura G, *et al*. Anatomical variation of cystic duct: Two case reports. World J Gastroenterol. 2008; 14(1):155-7.
9. Bhattacharjee P. Bile duct injuries: Mechanism and prevention. Indian J Surg. 2005; 67:73-7.
10. Gharaibeh KI, Ammari F, Al Heiss H, Al Jaberi TM, Qasaimeh GR, Bani Hani K, *et al*. Laparoscopic cholecystectomy for gallstones. Ann Saudi Med. 2001; 21:312-6. [PUBMED]
11. Olsen DO. Bile duct injuries during laparoscopic cholecystectomy: A decade of experience. J Hepatobiliary PancreatSurg. 2000; 7:35-9.
12. Mouret P. From the first laparoscopic cholecystectomy to the frontiers of laparoscopic surgery: The prospective future. Dig Surg. 1991; 8:124.
13. Huang ZQ, Huang XQ. Changing patterns of traumatic bile duct injuries: A review of forty years experience. World J Gastroenterol. 2002; 8:5-12.
14. Sicklick JK, Camp MS, Lillemoe KD, Melton GB, Yeo CJ, Campbell KA, *et al*. Surgical management of bile duct injuries sustained during laparoscopic cholecystectomy. Ann Surg. 2005; 241:786-95.
15. Schmidt SC, Langrehr JM, Hintze RE, Neuhaus P. Long term results and risk factors influencing outcome of major bile duct injuries following cholecystectomy. Br J Surg. 2005; 92:76-82.
16. Strasberg S, Hertt M, Soper N. An analysis of the problems of the biliary injury during laparoscopic cholecystectomy. J Am College Surgeons. 1995; 180:101-25.
17. Tuveri M, Calò PG, Medas F, Tuveri A, Nicolosi A. Limits and advantages of fundus-first laparoscopic cholecystectomy: Lessons learned. J Laparoendosc Adv Surg Tech A. 2008; 18:69-75.