EXTRAHEPATIC BILIARYANATOMY VARIATION ENCOUNTERED DURING LAPAROSCOPIC CHOLECYSTECTOMY

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ABSTRACT

Background : Cholelithiasis is one of the common surgical problems worldwide and cholecystectomy offers complete cure for the disease. Though, cholecystectomy is one of the most common major surgical procedures, it comes with the surprise to the surgeon due to high association with congenital anomalies of extra hepatic biliary tree.

Objectives : The primary objective is to assess the variability of the anatomy of the extra-hepatic biliary systems in terms of Extra-hepaticBile ductal anomaly including Gall bladder; Cystic duct and Vascular anomaly seen at Calot's triangle. The secondary objectives are to study demographic profile of gallstone patients and outcome of laparoscopic cholecystectomy.

Methods : The study was conducted at B. P. Koirala Institute of Health Sciences, Dharan for One year (2014-2015). The inclusion criteria were all the patients undergoing laparoscopic cholecystectomy in the Department of General Surgery. The exclusion criteria were CBD Stone, malignancy of Extra hepatic biliary tree,Cholecystectomy as a part of other surgery and Open cholecystectomy.

Results : In our study among 335 patients, anatomical variation was noted in 33 patients (9.85%). There were 5 gallbladder anomaly, 11 cystic duct anomaly, 4 Right hepatic artery anomaly and 13 cystic artery anomaly. Biliary leakage present in 2 case.There was no mortality.

Conclusion : Though Congenital anomalies of extra- hepatic biliary tree 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.

Key words: Extrahepatic biliary, cholecystectomy

INTRODUCTION

Cholelithiasis is one of the common surgical problems worldwide and cholecystectomy offers complete cure for the disease. Though, cholecystectomy is one of the most common major surgical procedures, it comes with the surprise to the surgeon due to high association with congenital anomalies of extra hepatic biliary tree. Different studies shows these anatomical variations to account from 9.6% to as high as 54%[6,15,18].Hence, with this intent we have carried out this study so that it helps lowering the incident of bile duct injury.Although many imaging and pre-operative diagnostic tools are available to assess the hepatobiliary anatomy, but these both are unreliable and too expensive for most of the population of our country. The aim of the study is to assess the frequency of anatomical variations of extra-hepatic biliary system in patients undergoing laparoscopic cholecystectomy.

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METHODS

The study was conducted at B. P. Koirala Institute of Health Sciences, Dharan for One year (June 2014- May 2015).Ethical clearance was ensured from the Institutional ethical review board before the start of the study on 8th June 2014.There was no conflict of interest.

The inclusion criteria were all the patients undergoing laparoscopic cholecystectomy in the Department of General Surgery. The exclusion criteria were CBD Stone, malignancy of Extra hepatic biliary tree,Cholecystectomy as a part of other surgery and Open cholecystectomy.

The patients were assessed for inclusion into the study as per the aboveinclusion criteria. Patients were admitted through OPD after completing full laboratorial and radiological workup for surgical and anaesthetic fitness. All the patients were explained about the procedure in their native language and an informed written consent was obtained. The patient's name, address, contact number, age, sex, smoking

history, prior medical/surgical history (including Chronic Obstructive Pulmonary Disease, Diabetes Mellitus, chronic cardiac diseases or prior history of surgery) and an American Society of Anaesthesiologists (ASA) classification were all noted. All the patients underwent Laparoscopic Cholecystectomy by a consultant surgeon or a senior resident as per the hospital protocol.Standard four ports were made for laparoscopic cholecystectomy.

Structures mainly assessed were gallbladder, cystic duct, supraduodenal part of common bile duct, cystic artery and hepatic artery which were easily handled during laparoscopic cholecystectomy. However the assessment of hepatic ducts, portal vein and retro duodenal and pancreatic parts of common bile ducts were not done routinely due to the possibility of iatrogenic injuries. Operative photographs was taken during laparoscopic cholecystectomy that supplement in documenting the anatomy, after dissection of the cystic duct and the cystic artery.

Post operatively all the patients were assessed for bleeding, biliary leakage, shoulder pain & duration of hospital stay.

STATISTICS

All the data was entered into a computer and analysis was done using SPSS16. Descriptive statistics include mean, median and range for continuous variables and absolute numbers with percentages for categorical variables.

RESULTS

Total of 335 patients were included in the study.The mean age of our study group was 40.22±14.23 years (Mean± SD) and majority patients were in age group 18-35 years comprising 44.5 % followed by age group 36-52 years comprising 34.3 %.In this study, out of 335 patients,255 (76.1 %) patients were female and 80 (23.9 %) patients were male with female: male ratio 2.8:1.

There was comorbity in about 25% patientsas shown in table 1.

Table 1 : Comorbid conditions

Co-morbid conditions	Frequency	Percentage(%)
Hypertension	41	12.23
Prior surgery	30	8.95
Diabetes mellitus	13	3.88
Cardiac disease	10	2.98

Total of 33 patients(9.85%) had biliovascular variation.Cystic artery variation was most common(n=13,3.86%) followed by cystic duct anomaly(n=11,3.09%), gallbladder anomaly(n=5,1.49%) and Right hepatic artery anomaly(n=4,1.19%) as shown in table 2.Among cystic artery variation, aberrant cystic artery was most common(2.38%) followed by artery anterior to cystic duct(1.19%) and cystic artery arising above calot's triangle(0.29%) as illustrated in figure 5,6,7.

Cystic duct anomaly was 2nd most common anomaly.Long cystic duct(1.49%) was most commonamong cystic duct anomaly followed by short cystic duct(1.2%) and aberrant cystic duct(0.6%) as illustrated in figure 2,3.

Gallbladder anomaly was found in 1.49%.Among which hourglass appearance

Table 2 : Extra-hepatobiliary anatomy variation

Extra-hepatobiliary anatomy variation		Frequency	Percentage (%)
1.Gall bladder anomaly	Hourglass appearance	3	0.89
	Gallbladder fundus passing through liver	2	0.6
	Total	5	1.49
2.Cystic duct anomaly	Long cystic duct	5	1.49
	Short cystic duct	4	1.19
	Aberrant cystic duct	2	0.6
	Total	11	3.09
3.Cystic artery anomaly	Aberrant cystic artery	8	2.38
	Artery anterior to cystic duct	4	1.19
	Artery arising above calot's triangle	1	0.29
	Total	13	3.86
4.Right hepatic artery anomaly	Moynihan's hump	4	1.19

34 (10.14%) patients had shoulder pain which was managed by intravenous NSAIDS and Opioids as

gallbladder(0.89%) was most common followed by gallbladder fundus passing through liver(0.6%) as illustrated in figure1.

Moynihan's hump was noted in 4 patients(1.19%) as illustrated in figure 4.

Table 3: Post-operative course

Post-operative characteristic		**Frequency**	Percentage (%)
Shoulder pain		34	10
Drainage	Bloody >150ml/day up to 48 hrs.	10	2.98
	Serosanguinous >150 ml/day up to 48 h	13	3.88
Biliary Leakage		2	0.6

Majority (56.2%) patient discharged within 24 hours postoperative hospital stay

Fig2:Aberrant cystic duct

Fig4:Moynihan's hump

There was biliary leakage in drain in 2 patients (0.6%)as shown in table 3. We had 2 cases(0.6%)of minor biliary injury.One patient had bilious drain on 2nd postoperative period and subsequently require redo laparoscopy on 5th post-operative period and was found to have leak from duct of luska which was managed with prolene suture. Patient progressively improve and discharged. Another patient developed pain abdomen and multiple episode of vomiting on 2nd postoperative period. Transabdominal Ultrasonographyshowed

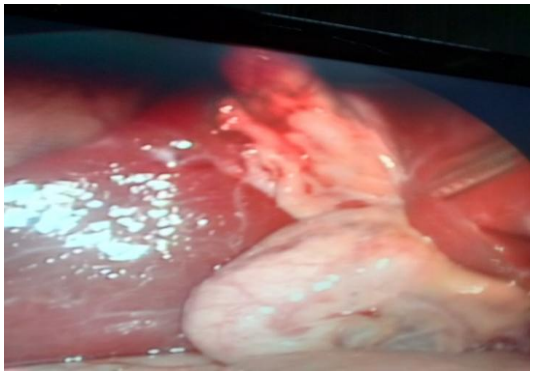

Fig 1: Hourglass appearance

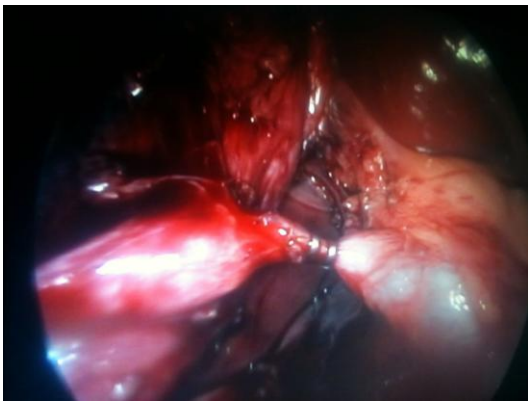

Fig3 :Short cystic duct

Fig5:Anteriorly placed Cystic artery

generalised intraabdominal collection and bilious on aspiration. Pigtail catherer was kept in Right subhepatic space and pelvis under ultrasound guidance but patient condition did not improve. Redo-laparoscopy planned on 6th postoperative period where there was also biliary leak from biliary radicles from liver bed which was tied with prolene. Drain was kept. Biliary drainage appears on 3rd postoperative period. Patient again planned for redo on 7th postoperative day. Exploratory laparotomy done and biliary radicle in liver bed was tied. Postoperatively patient gradually improve and discharge.

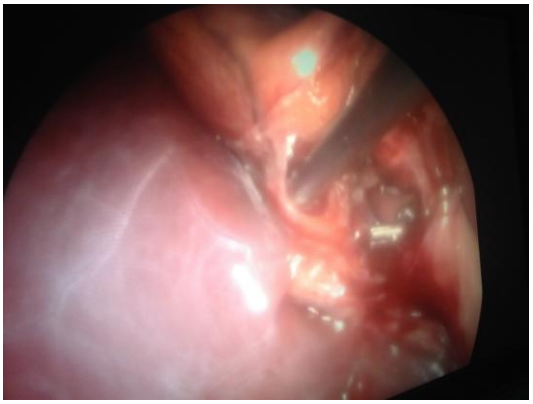

Fig6:Aberrant cystic artery

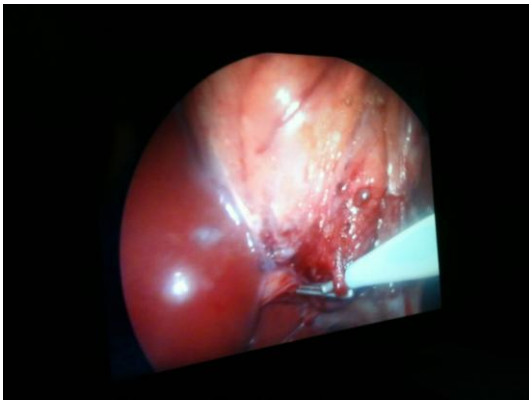

Fig 7: Aberrant cystic artery

DISCUSSION

The success and safety of laparoscopic and open cholecystectomy depends upon the basic knowledge of normal anatomy and common variants of extra-billiary system[7]. Biliary tract has more anomalies in 1cm - 13cms of the space in the cystic duct region than in any other part of the body[19].

In this study, the age of the patients ranged from 18 to 70 years with mean age of 40±14 .There was similar result in study done by Dawani[15]**.**Another study done by Talpur(39.85±18.82 yr) and khan(46.13±7.77 yr) were similar[16,18].We found that there were a total of 80 males (23.9%) and 25 females(76.1%)with male:female ratio 1:2.8. In the study of Dawani in 2013**,**there were 11.8% male and 88.2% female patients with male:female ratio 1:7.5[15].Another Study conducted by Talpur in 2010 include 85% female and 15% male patients of gallstone disease and Khan in 2012 include 82.7% female and 17.3% male gallstone patients[16,18].

In our study there was 5 patient (1.49%) with gallbladder anomalies which was similar to study done by Talpur where 2% had gallbladder anomalies[18]. Hassan conducted another studywhere he found 1.6%[6]. In gallbladder anomalies there was hourglass appearance in 3 patients(0.85 %) and gallbladder fundus passing through liver in 2 patients(0.6%). Rajguru found 3.33 % hourglass appearance gallbladder[20].

There was cystic duct anomalies in 11 patients(3.28%) in our study. There were 5(1.49%) long cystic duct,4 short cystic duct(1.2%) and 2(0.6%) abberant cystic duct anomalies in our study. Talpur found 4.35% cystic duct anomalies in whichshort cystic duct in 8 patients(2.67%) and abberant cystic duct anomalies in 2 patients(0.6%)[18].Khanstudied 300 cases in which there was cystic duct anomalies in 25 patients(8.33%)[16].Among which there were 4 short cystic duct(1.2%) and 1.7 % long cystic duct[16] .There was 4.4% cystic duct anomalies in Hassan study[6].Dawani found 1% long cystic[15]. Larobina found short cystic duct in 4 patient(2.15%)[9].Lamah got aberrant cystic duct in 5 patient(0.24%)[7]The incidence of accessory bile ducts varies form 1%[4] to 30%[21]The true congenital absence of cystic duct is very rare[1] . Double cystic duct is also rare but well described in the literature and may be responsible for post-operative biliary leak. No double cystic duct or its absence was seen in this series..Most cases of short cystic duct was due to severe fibrosis and stone impaction at the junction of contracted chronically inflamed gallbladder.

In present study, Moynihan's hump was present in 4 patients(1.19%).Different studies had variable frequency of Moynihan hump ranging from 1% in Ayyazstudy[13],2.67% in Talpur[18],5.9% in Dawani[15], 4-15% in Bergman study[4],12.9% in Bergamaschi study[14]and 6.4% in Bensonstudy[3].

In our study,there was cystic artery anomaly in 13 patients(3.88%).Among themthere were aberrant cystic artery in 8 patient(2.38%), artery anterior to cystic duct in 4 patients(1.19%) and artery arising above calot's triangle in 1 patient(0.19%).In study done by Talpurthere was cystic artery anomalies in 10.67% among which aberrant cystic artery in 2.33%, artery anterior to cystic duct in 2.675%(n=8) and artery arising above calot's triangle in 1%(n=3)[18].There were aberrant cystic artery in 7.4% cases in Suzuki[17]and 3.7% in Dawani[15].

In our study shoulder pain present in 34 patients(10%) which was more than Talpur[18]. Shoulder pain was due to pneumoperitoneum created by carbon-dioxide which irritate diaphragm which in turn irritate phrenic nerve. There was biliary leakage in drain in 2 patients(0.6%) comparable to study done by

Talpur[18]in which biliary leakage present in 1.67% cases.Reoperation was done in 2 patients(0.6%) which was similar to Balijastudy(0.6%)[2].In our study there was no mortality.

In our study mean hospital stay was 4±1 day which was similar to 3.6±1.5 days in Khan[16].

CONCLUSION

We had total of 33 patients(9.85%) with biliovascular variation.We had cystic artery variation as the common anomaly.Aberrant cystic artery anomalies was seen in 2.38% cases while long cystic duct seen in 1.49% cases.

We conclude that anatomic variations are not uncommon in our set up. Both aberrant cystic artery and long cystic duct are the common anatomic variants in our patients. These anatomic variants are prone to injuries during cholecystectomy.

Congenital anomaliesand 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.

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