

Identification of cystic duct variations in laparoscopic visual field

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Abstract

Objective: To assess the incidence and gender distribution of Cystic duct variations visualized during laparoscopic cholecystectomy.

Study design: Observational study.

Place and Duration: This study was carried out at the department of Surgery, and department of Anatomy Dow University of Health Sciences (DUHS), from Sep 2011 to Sep 2013.

Methodology: There were 300 diagnosed cases of Cholelithiasis, undergoing Laparoscopic Cholecystectomy (LC) in Civil Hospital Karachi (CHK) and other hospitals of Karachi. Laparoscopic Cholecystectomy was performed under general anesthesia using the four port technique. The information of Anatomy on laparoscopic visual field was recorded by DVD recorder after obtaining informed consent from the patient. Over all frequencies of cystic duct variations were assessed. The gender distribution of these variations was also evaluated.

Results: Out of 300 cases, there were 78.7% female (236) patients and 21.3% (64) male patients. There were 85.7% (257) cases having normal anatomy of the cystic duct and 14.3% (43) cases had anatomical variations. Out of these we found 6.3% Short cystic duct, 3.7% Long Cystic duct, 2.7% Spiral cystic duct, 1.0% Accessory cystic duct, 0.3% Adherent cystic duct and 0.3% absent cystic duct. We found most of these variations in both the gender groups of our population.

Conclusion: We found a significant number of cystic duct variations in our patient population which may lead to surgical complication if not handled appropriately. Anatomical details and orientation are required to deal with these variations whenever they come across. We have identified the presence of these variations in both the gender groups.

Key words: Cystic duct, laparoscopic cholecystectomy, laparoscopic anatomy cholelithiasis, cholecystectomy

Introduction:

The popularity of laparoscopic surgery (LS) is due to its minimal access nature. Laparoscopy is the modern surgical technique which has made it very easy to have a look inside the body. It gives access inside the body and revealed the true tale of the condition inside.¹ Laparoscopy is a technique in which an instrument called a laparoscope is used. It is a rod shaped instrument having a light and camera at its end. A video camera is attached to the telescopic rod lens while the charged couple device is placed at the end of a digital laparoscope. The operator moves the laparoscope to view various parts and its video can be seen on the monitor. This videoscopic surgery can help the operator have better view

and analysis of the factual condition.²

In medical fields the laparoscopy is used in different ways.³ Following are the surgical procedures which are commonly done by laparoscopy i.e. Laparoscopic cholecystectomy, pancreaticoduodenectomy, splenectomy, colorectal resection, gastrectomy, hepatic lobectomy, fundoplication inguinal herniorrhaphy, anti reflux surgeries, gastrectomies, hysterectomy, tubal ligation.³ The LS, carried out by the robotic assistance is advancement in the laparoscopic field. It has various features like visual magnification for improved visibility, stabilization, nullifying the vibration of human hands and simulators for increased proficiency.⁴ The commonest LS is

Received:

16 July 2015

Accepted:

7th January 2016

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laparoscopic cholecystectomy. Calot's triangle is the prime concern area among the researchers.⁵ Most of the articles presented the data which includes anatomical variation of the cystic artery^{6,7} and cystic duct⁸. Studies also explain the important associated chances of injury are common as tactile sensation is absent.⁹ The structures, like Rouviere's sulcus, and cystic lymph nodes which are used as an anatomical landmark in preventing trauma to the other related structures.¹⁰

The cystic duct is the duct of gallbladder that joins with the common hepatic duct to form the bile duct. The duct is variable in its origin, course, length and diameter. Literature on open Calot's dissection reveals the data on the four above mention aspects of cystic duct variation, but recognition of this variation are difficult in LC due to its minimal access nature.^{11,12} The described cystic duct variations in the literature are very short or absent cystic duct, long cystic duct, parallel cystic duct, anterior spiral and posterior spiral cystic duct, high union, low union and adherent with common hepatic duct¹³. Our aim of this study was to identified the incidence of these variations in our population in different gender groups with the help of their practical description on videoscopic field.

Methodology:

Non probability, purposive sampling technique was used for sample collection in this observational cross sectional study. Patients, who were admitted to the surgical units of CHK were included in this research and evaluated to our pre developed proformas, The patient or his/her attendant was asked to sign the 'consent form' after full explanation of need of recording of the LC. LC was carried out under general anesthesia; using four port techniques. The information of Calot's triangle were viewed on a medical grade video monitor and recorded by the DVD recorder. The cystic duct variations were identified as the following descriptions

- Normal cystic duct: Cystic duct easily identified and having enough space for regular clip placement.

- Absent duct: Cystic duct could not be identified and there was need of subtotal Cholecystectomy and loop ligation.
- Short cystic duct: Cystic duct was identified but there was vary less space for clip placement and need to do the loop ligation¹⁴.
- Long cystic duct: Cystic duct easily identified, dissected approximately ≥ 5 cm. placement of 4-5 clips easily be done on the duct¹⁵.
- Double cystic duct: Two ducts were identified; both were entering into the gall bladder¹⁶.
- Spiral cystic duct: The cystic duct and infundibulum was funnel shaped and spiraled from lateral to posteriormedial aspect¹⁷.
- Accessory cystic duct: Cystic duct, while careful dissection of gall bladder from the liver bed, was identified by looking the bile leakage and clipped¹⁸⁻¹⁹.
- Adherent duct: The cystic duct was adherent with the common bile duct.

The data was analyzed in statistical programmed SPSS version 16.0. The overall percentages of cystic duct variation were documented.

Results:

A total of 300 cases were for analysis. Out of 300 cases there were 85.7% (257cases having normal cystic duct and 14.3% 43 having variant anatomy of the cystic duct. All the frequencies of cystic duct variations were shown in table 1, figure 1 and figure2. Out of 300 cases, there were 68% 204 females having normal cystic duct, 0.33% 1 female having no cystic duct; 4.00% 12 females had short cystic duct, while 3.00% 9 females had long cystic duct, and 2.33% 7 females were having spiral cystic duct. 1.00% 3 females were having accessory cystic duct. There were 17.67 53 males with normal anatomy of the cystic duct. 2.33% 7 males were having short cystic duct, and 0.67% 2 males had long cystic duct, no double duct was recorded. 0.33% 1 male had a

Table 1: Variant Anatomy Of Cystic Duct

Anatomy of the cystic duct	Frequency	Percent
Normal duct	257	85.7
Absent duct	1	0.3
Short duct	19	6.3
Long duct	11	3.7
Double duct	Nil	Nil
Spiral	8	2.7
Accessory duct	3	1.0
Adherent cystic duct	1	0.3

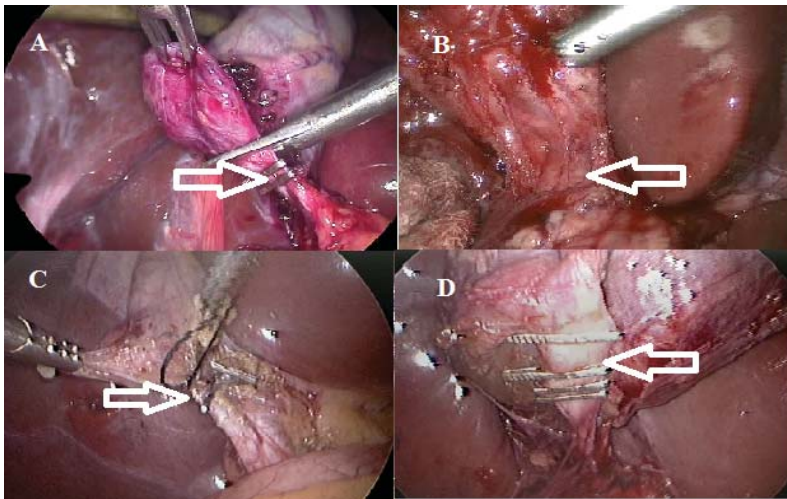


Fig.1: A. Normal cystic duct B. Absent cystic duct C.Short cystic duct D.Long cystic duct

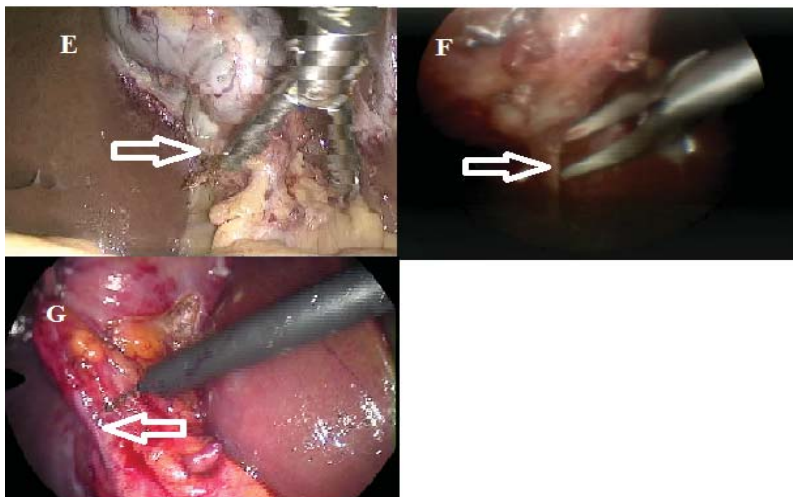


Fig.2: E. spiral cystic duct F. Accessory cystic duct G. Adherent cystic duct

spiral cystic duct, 0.33% 1 male was having an adherent cystic duct.

Discussion:

Cystic duct forming the inferior border of Calot's triangle is an important relevant structure of LC. Its proper identification and clipping is one of the crucial steps in LC. Literature has shown varieties of the cystic duct through imaging techniques, like Magnetic resonance cholangiopancreatography, endoscopic retrograde cholangiopancreatography and on table cholangiography.¹⁵ These variations include the parallel cystic duct to hepatic duct with low insertion¹⁵, Accessory cystic duct like duct of lushka,^{18,19} anterior and posterior spiral insertion of the cystic duct on the hepatic duct¹⁷ and a very rare double cystic duct.¹⁶ Truly absence of cystic duct, which is a unusual anomaly. Huge dilatation of cystic duct due to impacted stone, on laparoscopic visualization appears as an absent cystic duct and is dealt accordingly. The identification of these variations in open dissection is comparatively difficult but their recognition in the laparoscopic view is easier except that of absent tactile sensation.

We have very few data on the frequency of these variations. Researchers have presented different case reports on the cystic duct variations during LC. Our study is different from the other authors as we have identified nearly all the possible variants of cystic duct, that can be seen on telescopic field. We used clipping space for the length differentiation. Lamah. M in 1999, found (n=3) aberrant cystic ducts. (n=1) double cystic duct and (n=5) accessory ducts²⁰. Ahmad Hassan khan in 2008 presented the data about the extrahepatic biliary tree anomalies seen during laparoscopic cholecystectomy. He found double cystic duct in 1% of cases, long cystic duct in 15 of cases.²¹ Abdul Sahib khan in 2012, found short cystic duct in 2.3% cases, long duct in 1.7% cases and double cystic duct 1.3% cases during open cholecystectomy²². Our study has documented accelerated the description in recognition of cystic duct variations which was not observed previously. Few anomalies that are reported in the literature could not be found may be due to small sample size. We further observed that these variations of the cystic duct were creating problems such as prolong surgical time, difficulties in clipping, bile duct injury, and in-

crease rate of conversion to open cholecystectomy. Identification of these variations in proper time and location are helpful in LC.

Conclusion:

There is a great variability in the cystic duct variation. Thorough details were required for the safe laparoscopic surgery. The frequencies of these variations were found significant. Surgeons can come across any of these variations during LC. Accurate identification of the relevant structures in the right location at the right time and make very quick decision to proceed further with safe surgical approach.

Role and contribution of Authors:

Dr Nabeel Qamar, Department of Anatomy, King Saud bin Abdulaziz university, Riyadh, Saudi Arabia, did the original research and wrote the introduction, methodology, discussion and conclusion.

Dr Imran Ishaque, Department of Anatomy, Jinnah Medical and Dental College, helped in collecting the data and write up of discussion.

Dr Amber Ilyas, Department of Anatomy, Jinnah Sindh Medical University, JSMU, helped in collecting the references.

Dr Khalida Parveen, Department of Anatomy, Dow international medical college, Karachi, helped in collecting the references and writing the methodology.

Dr Mohammad Zubair, Department of Surgery, Civil hospital Karachi, Dow Medical College, he is a consultant surgeon, operated the case and give the final touches to the discussion and results.

Dr Saeed Ahmad, Department of Surgery, University of Hail, Hail, Saudi Arabia, consultant general surgeon operated the cases and helped in discussion and conclusion writing.

Conflict of Interest: None

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