Cystic Vein and its Clinical Significance

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ABSTRACT

Background: The main complications of the cholecystectomy are injury and bleeding. the knowledge of the presence of cystic vein as an anatomic landmark is important to distinguish between cystic duct and common hepatic duct, thus decreasing the iatrogenic injury of bile duct and bleeding during the open and laparoscopic cholecystectomy. The aim of study was to observe the calot's triangle for the presence and number of cystic vein, a specific anatomic landmark that can help surgeons to perform safe cholecystectomy.

Methods: this is an observational descriptive study was performed from (May 2019) to (November 2019) through 100 patients who underwent open cholecystectomy at nangarhar regional hospital, in Jalalabad city of Nanagarhar province Afghanistan. The presence and number of cystic vein in calot's triangle was evaluated.

Results: The relationship between the cystic vein and the calot's triangle was identified in 91 (91%). One cystic vein was found in 21(23.07%) patients, while multiple cystic veins were found in 70 (76.9%) patients. All these veins were over the cystic- common bile duct junction.

Conclusion: The cystic vein and their relationship with cystic duct and cystic artery in calot triangle can use safely as anatomic landmark to prevent the bleeding and CHD/CBD injury.

Keywords: open cholecystectomy, cystic vein, bile duct injury

Introduction

Cholecystectomy is the most common major abdominal procedure performed in Western countries. Carl Langenbuch performed the first successful cholecystectomy in 1882, and for over 100 years it was the standard treatment for symptomatic gallbladder stones [1].

Laparoscopy cholecystectomy was first performed in 1989 and today is widely accepted as the gold standard for cholecystectomies [2].

The reported rate of laparoscopic bile duct injury ranges from 0.1-2.2% as opposed to the 0.1% for open cholecystectomies [3,4].

Bile duct injury is a known risk of these surgeries, such as

cholecystectomy and even an experienced surgeon is likely to at times cause some damage despite the utmost care taken during the surgeries [5,6].

It was reported by Ahmad et al that 9% of all patients who were taken for laparoscopic cholecystectomy, were converted to standard open cholecystectomy and the main cause for this was found to be the variant anatomy of this region [7].
other Various risk factors have been stated for these bile duct injuries but the common factor is the misidentification of CBD or CHD for cystic duct in an acute case [8].
To avoid misidentification of ducts, identification of cystic duct, cystic artery and the structures to be divided in cholecystectomy both open or laparoscopic cholecystectomy, Calot's triangle must be dissected and studied. Moreover, failure to define the normal anatomy and difficult to dissect the Calot's triangle results in increased incidence of iatrogenic injury to biliary and portal structures [9].

Calot's triangle is an anatomical landmark of special value in cholecystectomy. First described by Jean-François Calot as an "isosceles" triangle in his doctoral thesis in 1891, this anatomical space requires careful dissection before the ligation and division of the cystic artery and cystic duct during cholecystectomy [10].
This space usually contains cystic artery, one or two cystic veins [11].

Subsequent referral to tertiary centers for repair of transected common bile ducts resulted in published series that outlined the mechanisms of injury [12,13,14].

Hence a detailed knowledge of the vascular anatomy of this region is important to the surgeon to prevent hemorrhage in the Calot's triangle [15].

Methodology

The study was conducted at the surgery department of Nangarhar Regional Hospital in Jalalabad city of nangarhar province, an eastern province of Afghanistan.
This study is an observational descriptive analysis of the open cholecystectomies surgery which done by the team of two surgeons, equally acquainted with Open Retrograde or fundus first procedures over a 7- months period (May 2019 to November 2019). During the surgery we just observed the calot's triangle for the presence and number of cystic vein.
All the cases have been selected from the patients coming to the OPD with acute and chronic gallbladder disease. Patients excluded from the study were suspected gallbladder mass, malignancy, and empyema.
In a total 100 cases were taken in the study irrespective of age and sex. These cases were categorized into 2 groups: Group 1 consisting of the acute cases operated within one week (20 cases) and Group 2 consisting of chronic gallbladder disease (80 cases) who have been operated after 4 to 6 weeks of acute attack or later as and when they presented.
All the cholecystectomies were done taking the critical view of safety into consideration. The calots triangle was meticulously cleared of all the fat. The cystic duct and cystic artery were clearly delineated. The cystic vein was dissected out and was cauterized using sample ligation and sometime ligation with stamp sutured to secure hemostasis and then the duct and artery separately ligated.

Results (Findings)

Out of the 100 cases taken for study, Group 1 (acute cases, who were operated one week after medical treatment) consisted of 20 cases and Group 2 (electively operated cases) 80 cases. In Group 1 we had to convert 6 cases to Subtotal cholecystectomy due to severe adhesion with adjacent structures. In Group 2, 3 cases were converted. Thus 9 cases were converted (from both groups) and were not taken into consideration in this study. From the remaining cases in Group 1 (14), and Group 2 (77) were thus taken in the study.

Table 1: Total number of study cases with respect to group.

Group	Total cases	Study cases	Conversion to subtotal
1	20	14	6
2	80	77	3

Out of the 14 cases in Group 1 (acute cases), cystic vein was very well delineated in 14 cases (70%). Out of the 77 cases in the group 2 (chronic) cystic vein was delineated in 77 cases (96%) Table 2.

Table 2: Percentage of cases cystic vein delineated.

Group	Cases	Cystic vein delineated	Percentage
1	20	14	70 %
2	80	77	96 %

In group 1 The cystic veins were dissected out and we found in 10 cases there were multiple cystic veins (71%) and in 4 (29%) cases there was only 1 vein.

In group 2 Out of the 77 cases we found multiple cystic veins in 60 cases (77.9%) and single cystic vein was found in 17 cases (22.1 %).

Discussion

Cholecystectomy is the most common major abdominal procedure performed in Western countries. Carl Langenbuch performed the first successful cholecystectomy in 1882, and for over 100 years it was the standard treatment for symptomatic gallbladder stones [1].

Gallbladder disease is one of the most common procedures done in the United States with more than 1.2 million cholecystectomies done annually. Before 1991, an open technique was the standard procedure for cholecystectomy. This usually included performing an intraoperative cholangiogram, and patients usually had a 2 to 6-day postoperative in-house stay. With the advent of laparoscopic surgery and the laparoscopic cholecystectomy in the early 1990s, the gold standard for cholecystectomy has changed to a laparoscopic approach. This method showed a 30% increase in the overall performance of elective cholecystectomies. Today, 92% of all cholecystectomies are done laparoscopically. There are several indications in performing open cholecystectomies, and this procedure remains an important part of training for the general surgery resident.

With the advent of laparoscopic cholecystectomies in the 1990s, CBD injuries increased by three to ten times. The injury rate dropped to 0.3% but has remained the same despite better training, preventative maneuvers, and equipment. Laparoscopic CBD injuries are typically more complex [16].

After some period of time emerged the realization that the rate of bile duct injuries has increased [3,4].

In 1990, Sir Alfred Cuschieri alerted the surgeons regarding the complication of laparoscopic cholecystectomy.4 Rate of biliary injuries in LC is almost 3 times that of OC (0.2-2.2% versus 0.2%) [4].

Stratsberg et al pointed out the importance of the critical view of safety [17].
Three criteria are required to achieve the CVS:

- Hepatocytic triangle is delineated clearly by removal of fat and fibrous tissue
- Cystic plate is dissected out
- 2 structures seen entering the gallbladder.

Cystic veins are one structure in the body which have been variously described in different books. In the Thesaurus dictionary, it is said to be having anterior and posterior branches, drain the neck of gallbladder and cystic duct along which they pass to enter the right branch of portal vein. In the anatomy books, it also has been variously described. Grant's anatomy book describes cystic vein as draining directly to liver and venous twigs joining the branches of portal vein [14,18].
Gray's anatomy describes cystic veins joining near the neck of gallbladder to form either single or double cystic veins which flow along the cystic duct and upward along the hepatic ducts.17 Schwartz principle of surgery describes the venous drainage as variable and generally does not run parallel with the arteries.18 Other books also vaguely describe the cystic vein as either draining to the liver or the portal vein [19].
The study which done by Debasish Samal et all regarding the presence and numbers of cystic veins in calot's triangle they foundt he cystic veins were delineated intraoperatively in 80 of the 93 patients. The relationship between the cystic vein and the Calot triangle was identified in 80 (86.02%) of the 93 patients. One cystic vein was found in 53 (66.25%) patients, while multiple cystic veins were found in 27 (33.75%) patients. All these veins are above the cystic common bile duct junction [8].
In our study, we delineated the cystic vein intraoperatively in 91patients. The relationship between the cystic vein and the calot's triangle was identified in 91 (91%). One cystic vein was found in 21(23.07%) patients, while multiple cystic veins were found in 70 (76.9%) patients. All these veins were over the cystic- common bile duct junction.

Conclusion

In the present study cases was the presence of cystic vein/s between the cystic duct and cystic artery. A vein is seen running longitudinally along the cystic duct or adhered to it. They are usually seen to lie between the infundibulum of the gallbladder and the junction of cystic duct and common hepatic duct or Common bile duct. They can be either multiple or single in nature. They do not cross the CHD/CBD. So, the surgeons can use safely the cystic vein as

specific anatomic landmark in calot's triangle to prevent the bleeding and CHD/CBD injury.

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