COMPARISON BETWEEN CRITICAL VIEW OF SAFETY AND INFUNDIBULAR TECHNIQUE IN LAPAROSCOPIC CHOLECYSTECTOMY

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ABSTRACT

Background

Laparoscopic cholecystectomy is a one of main surgical procedures that used widely for the treatment of symptomatic gallstones throughout the world. Although laparoscopic cholecystectomy has its own advantages, but bile duct injuries occur more frequently compared to the open cholecystectomy. In this study, critical view of safety (CVS) technique is compared to conventional infundibular technique (IT).

Objectives

The aim is to compare critical view of safety with infundibular technique in laparoscopic cholecystectomy, in term of duration of the surgery and bile duct injuries (BDI).

Methods

Laparoscopic cholecystectomy was performed for 245 patients at Sulaimani city within a period from April 13th 2015 to April 13th 2016. The patients were divided into two groups; critical view of safety was used for the first group and infundibular technique for the second. Comparison performed between the both groups for operation time and bile duct injury.

Results

The operative time was significantly reduced in CVS technique as the mean time of the operations was (33.04 min) for CVS, and (38.58 min) for IT, with significant P-value (0.013). Seventeen cases (6.93%) converted to open cholecystectomy; the conversion found more in IT group, with significant P-value (< 0.001).

Conclusion

The "critical view of safety" although needs more patience in dissections with comparison to infundibular technique, but it is found to be faster and regard as a safe technique in laparoscopic cholecystectomy.

Keywords: *Critical View of Safety (CVS), Infundibular technique, Bile Duct Injury, Laparoscopic cholecystectomy.*

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INTRODUCTION

Laparoscopic cholecystectomy (LC) is a common surgical procedure worldwide and performed frequently for treatment of symptomatic gallstones (GS) [1]. LC was first applied in France in 1987 [2], and it started in Sulaimani- Iraq after March 2002, when training curve started, and now all trainees in the surgery department should complete their training in it.

Although LC has many advantages, but the bile duct injuries (BDI) are more frequent in LC compared to open cholecystectomy (OC), it seems to occur in 3/ 1000 patients having LC [3]. These complications resulting in significant morbidity that affect the patient's life and management cost [4, 5, 6], and many reports suggested an increase in the rate of BDI [7].

Utilization of different ways of intraoperative imaging has been adopted by many studies; intraoperative cholangiogram and laparoscopic ultrasound to help in eliminating the error traps of misidentification of ductal structures were tested and appreciated [8, 9, 10]. One of good strategies that surgeons needed to adopt is a safe dissection to find structures irrespective of their normal or abnormal arrangements. Confusing of bile duct (BD) with the cystic duct (CD) is the most common cause of injury, so it is important to ensure that no other structures would be mistaken for the CD and cystic artery and inadvertently clipped or divided [11, 12].

The critical view of safety (CVS) first described in 1995 by Strasberg et al. from Washington University in St Louis, they put in use a method for recognizing the structures in the cystic plate referred to as the CVS [13], they recommended clearance of the Calot's triangle (CT) from adipose and fibrous tissues, then separating the gallbladder (GB) from its bed. So there must be only two structures connecting to the bottom of the GB, and it is unnecessary to expose the common bile duct (CBD) or common hepatic duct (CHD) [14]. Cleaning of the CT will create a 360-degree view around the CD and artery, and the CVS should be apparent anteriorly and posteriorly [6].

According to the data from several studies, although CVS method is an effective way to decrease BDI during LC, but the evidences suggest that it is not understood correctly [15] and even surgeons often have a poor understanding of the criteria for CVS and confuse it with the infundibular technique (IT) sometimes [16, 17], and as observed, utilization of CVS technique in recent years, however not reduced the incidence of BDI significantly, the reason may be due to that not all the three criteria of CVS had been met, i.e. the cystic plate is not well visualized and the GB not raised from the liver surface [15].

The aim of this study is to compare CVS with IT technique regarding BDI during LC, as well as comparing the duration of surgery in these two techniques.

PATIENTS AND METHODS

An intervention study performed throughout a period of one year; from April 13th 2015 to April 13th 2016 at Sulaimani city- Iraq. A total of 245 patients underwent LC via one of two assigned techniques; CVS and IT.

Informed consents were gained from the participants who were included in the study; demographic data (age, gender and residency), body mass index (BMI), liver function tests, previous cholecystitis, pancreatitis, history of endoscopic retrograde cholangiopancreatography (ERCP) and previous abdominal surgery were recorded before the operation.

The operations were done by two surgical teams; first group of patients, LC performed for them in Shar teaching hospital and Shorsh hospital; the intention was to apply the CVS technique in all patients, even in straightforward cases, and the second group of patients where LC performed for them in Sulaimani teaching surgical hospital, where IT applied, with identification of the junction of CD and GB in all patients.

Both groups included mix cases of GS, acute and chronic cholecystitis. In both groups the standard technique of LC was achieved; the operations performed by using standard four ports and a 30-degree laparoscope. Special attentions were paid in the entrance of the first port through an open technique, enough insufflation of CO_2, good lightning, and using of diathermy after holding the tissue under complete visualization.

The duration of the operation calculated since the first incision done until GB extraction. Conversion to open cholecystectomy (OC), rate of BDI and photo documentation of CVS has been reported.

Statistical analysis

After data collection and prior to data entry and analysis, the items of the questionnaire were coded. We used excel spreadsheet for data entry, and the statistical analysis was completed by version 21 of SPSS program (IBM SPSS Statistical Package for the Social Sciences).

The data presented in tabular forms showing the frequency and relative frequency distribution of different variables of the study. The mean duration of the operation calculated in respect to each variable and then independent t-test and ANOVA test were used to compare the mean duration among these variables that thought to have an effect on the operation duration (we exclude the converted cases). Prolonged operation identified by the duration of more than 1.96 standard deviation above the mean, and found to be equal to 66 minutes or more, or when conversion occurred. Chi-square tests were employed to compare the effect of different variables on making the operation a difficult or not, the chi-square test also used for other categorical data. Different types of Bar charts and Pie charts were used to depict some variables of the study diagrammatically.

P values of 0.05 were used as a cut off point for significance of statistical tests.

RESULTS

From total of 245 patients underwent LC; 193 (78.77%) were females and 52 (21.22%) were males, with mean age of (44.5±15.9) years. Mean time of the operations was (33.04 min) for CVS, and (38.58 min) for IT, with significant P-value (0.013) (Table 1). Long operation time regarded when it exceed 66 min, as extracted from the statistical analysis.

Seventeen cases (6.93%) converted to OC; 9 males and 8 females. The conversion found more in IT group, with significant P-value (<0.001). Causes of conversion were obscure anatomy by: Anomaly in 2 patients (11.76%), both were found in the CVS group, and adhesions in 15 patients (88.2%) in the IT group; due to previous abdominal surgery or severely inflamed GB, or history of previous ERCP, or others. Four cases (2%) had prolonged operation time. (Table 2).

Eleven patients had vascular and biliary anomalies, all found in the CVS group; 2 patients had conversion. One male patient developed CBD injury in IT group, who had obscure anatomy due to adhesions, it discovered intraoperatively and treated by Roux-en-Y Hepatico-jejunostomy.

Table 1. Distribution of operation times in both groups.

	Duration of operation			P-value
	Number	Mean	Standard Deviation	
CVS	152	33.04	13.74	0.013
IT	76	38.58	18.96	

Table 2. Distribution of conversion and prolonged operation time in both groups.

		Groups		P-value
		CVS	IT	
Conversion	Yes	2	15	< 0.001
	No	152	76	
Long OT	Yes	2	2	0.48
	No	150	74	

DISCUSSION

LC is a common operation and now it is performed almost all in all surgical hospitals. Many attempts trying to identify the biliary ducts and vascular structures to avoid BDI, and the commonest risk factors for these injuries are experience of the surgical team, inflamed GB, and nearby anatomical structures with biliary anatomical variations [18, 19].

Male patients appear to be at special risk for severe acute disease, with increased rate of conversion [20, 21]. In this study Conversion found more in males, in both groups; (male to female: 17% to 4% conversion).

Inflamed GB and adhesions are predisposing factors for difficulty and possibility for BDI, history of ERCP and finding of thick wall GB [22, 23], adhesions [22], all are indications of difficulty, which were all noticed in this study.

Although all cases of vascular and biliary anomalies were found in the CVS group, no BDI found in this group, which raise the value of careful dissection and preparing clear anatomy before clipping or cutting any structure.

Although safety and uncomplicated surgery is the most aspect of choosing the different technique in performing LC, operation time is also an important issue to avoid unnecessary and possible complications of prolonged anaesthesia, and it may believe by some surgeons that using of CVS technique needs more time, because it needs more dissection, but after well training CVS become familial to the trainees. In this study the time of the operation was less in CVS group, with significant P-value (0.013), almost same as study done in Pakistan (50 mins versus 73 mins) [24], and study done by Vettoretto N and collogues; they found CVS has shorter operative time (51.5 mins versus 69.7 mins) [25] and also by Viswanathan and collogues [26].

We had just one BDI in this study occurred in IT group, although it is insufficient for exact judgment which technique is more safer, but also it is not without value in suggesting the CVS technique for LC, especially when we found less conversion in CVS group, and also no any BDI or vascular injury in those 11 patients who had vascular and biliary anomalies, as it is well known that the CVS technique may help to prevent BDI during LC [27], even CVS is suggested to be the ultimate principle for preventing BDI during LC even for acute cholecystitis by Tokyo Guidelines TG13 [28].

In conclusion, the technique of identifying critical view of safety is more elaborate to identify anomalies in Calot's triangle and preventing BDI. The duration of operation is less in CVS after being familiar with the procedure. We recommend that CVS technique to be standard in training the surgical residents.

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