

COMPARATIVE STUDY OF CRITICAL VIEW OF SAFETY VS INFUNDIBULAR TECHNIQUE IN LAPAROSCOPIC CHOLECYSTECTOMY

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ABSTRACT:

OBJECTIVES:

The purpose of this study is to compare the critical view of safety technique with the infundibular technique in laparoscopic cholecystectomy in terms of mean operative time and bile duct injuries (BDI).

METHODOLOGY:

Between 2018 and 2020, 220 patients had laparoscopic cholecystectomy in the Surgical "A" unit at Hayatabad Medical Complex in Peshawar, Pakistan. The patients were divided into two groups, with the first receiving a critical view of safety and the second receiving an infundibular procedure. Operation time and bile duct injury were compared between the two groups.

RESULTS:

The operative time was significantly reduced with the critical view of safety (CVS) approach, with a mean time of 35.07 minutes for CVS and 40.58 minutes for infundibular technique, with a significant P-value (0.013). About 17 (7.7%) cases required open cholecystectomy; the conversion rate was higher in the infundibular group, with a significant P-value (<0.001).

CONCLUSION:

Although the "critical view of safety" requires more patience during dissections than the infundibular approach, it is proven to be faster and is considered a safe procedure in laparoscopic cholecystectomy.

KEYWORDS: Critical View of Safety (CVS), Infundibular Technique (IT), Bile Duct Injury (BDI)

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INTRODUCTION:

Laparoscopic cholecystectomy is a common surgical operation used to treat symptomatic gallstones around the world. Laparoscopic cholecystectomy was firstly used in France in

1987¹. Although laparoscopic cholecystectomy has several advantages, bile duct injuries are more common in laparoscopic cholecystectomy than in open cholecystectomy, occurring in about 3/1000 individuals. These problems cause considerable morbidity, which has an impact on the patient's life and management costs, and many findings imply that the rate of bile duct injuries is increasing². Many studies have used several types of intraoperative imaging, intraoperative cholangiogram and laparoscopic ultrasonography to help eliminate the error traps of misidentification of ductal structures, which were tested and appreciated³. A safe dissection to locate structures regardless of their normal or

abnormal configurations is one of the good strategies that surgeons need to adopt. Because the most common cause of injury is confusing the bile duct with the cystic duct, it is critical to ensure that no other structures are mistaken for the cystic duct and cystic artery and mistakenly clipped or split^{4,5}. The critical view of safety (CVS) was initially described in 1995 by Strasberg et al, from Washington University in St Louis, who used the CVS to recommend clearance of the Calot's triangle from adipose and fibrous tissues then separating the gallbladder from its bed⁶. As a result, just two structures must connect to the bottom of the gallbladder, and the common bile duct or common hepatic duct need not be exposed⁷. Cleaning the CT will provide a 360-degree imaging view of the cystic duct and artery, with the CVS visible interiorly and posteriorly⁸. According to data from several studies, while the CVS method is an effective way to reduce bile duct injuries during laparoscopic cholecystectomy, evidence suggests that it is not well understood and even surgeons frequently have a poor understanding of the critical view of safety (CVS) criteria and confuse it with the infundibular technique at times^{9,10}. As a result, CVS technique utilization has increased in recent years, however not reduced the incidence of bile duct injuries significantly, it is possible that the cause is that not all three CVS requirements were met i.e., the cystic plate was not adequately visible, and the gallbladder was not lifted from the liver surface¹¹. The aim of this study is to compare critical view of safety (CVS) and infundibular (IT) procedures in terms of bile duct injuries during laparoscopic cholecystectomy, as well as the duration of surgery between the two.

METHODOLOGY:

An intervention study was conducted in the Surgical "A" unit of the Hayatabad Medical Complex in Peshawar, Pakistan, during a two-year period (February 2018 to January 2020). A total of 220 individuals were treated with laparoscopic cholecystectomy using one of two techniques: critical view of safety (CVS) or infundibular (IT). Participants gave informed consent before the operation, and 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 all recorded. The operations were carried out by two surgical teams: the first group of patients had laparoscopic cholecystectomy performed on them in Hayatabad Medical Complex Peshawar, the goal was to apply the CVS technique to all patients, and the second group of patients had laparoscopic cholecystectomy performed on them where infundibular technique (IT) was used to identify the junction of the cystic duct and the arteries. Both groups had a mixture of gall stone cases, as well as acute and chronic cholecystitis. The conventional laparoscopic cholecystectomy approach was used in both groups, with operations conducted utilizing conventional four ports and a 30-degree laparoscope. The entrance of the first port was given special care, with an open method, enough CO₂ insufflation, appropriate lighting, and the use of diathermy after holding the tissue under complete visibility. The time it took to complete the operation, from the first incision to the gallbladder extraction, the rate of bile duct injuries, conversion to open cholecystectomy, and photo documentation of CVS have all been documented. The elements of the questionnaire were coded after data collection and before data entry and analysis. For data entry, we used an Excel spreadsheet, and the statistical analysis was done with the SPSS version 25. The data is presented in tabular style, with the frequency and relative frequency distributions of the study's various variables. The mean operation time was computed for each variable, and then an independent t-test was performed to examine the mean duration among these variables that were assumed to have an effect on the operation time. Long operation defined as one that lasts more than 1.96 standard deviations above the mean and is equivalent to or exceeds 66 minutes, or when conversion occurs. The chi-square test was used to compare the effect of different variables on making the procedure difficult or not, as well as for other categorical data. The significance of statistical tests was determined using a P-value of 0.05 as a cutoff point.

RESULTS:

The sample size is equally distributed in two groups (110 patients in each group), a total of 220 patients. First group is labeled as CVS group, while the second one is labeled as IT group. A total of 154 (70%) of the 220 patients who underwent laparoscopic cholecystectomy

were females, whereas 66 (30%) were males, with a mean age of (44.5±15.9) years. The mean operation time was 35.07 minutes for CVS group and 40.58 minutes for IT group, with a significant P-value (0.013) for both groups (Table 1). According to statistical analysis, a long operation time is defined as one that exceeds 56 minutes. About 17 (7.7%) cases transitioned to open cholecystectomy, including 10 (4.5%) males and 7 (3.1%) females. The infundibular group had a higher conversion rate, with a significant P-value (0.001). Obscure anatomy was observed in 2 (1.8%) patients in the CVS group, and adhesions in 15 (7.5%) patients in the IT group. Past abdominal surgery or severely inflamed gallbladder, or history of previous ERCP or others was among the causes of conversion. A total of 4 (1.8%) cases in both groups the operation took longer than expected (Table 2). About 11 (10%) patients in the CVS group showed vascular and biliary abnormalities, and 2 (1.8%) had conversion. In the IT group, 1 (0.9%) patient experienced CBD injury due to adhesions, which was identified intraoperatively and treated with a Roux-en-Y procedure.

Table1: Distribution of Operation Times in Both Groups

Groups	Number	Mean Operative Time	Standard Deviation	P-Value
CVS	110	35.07	13.84	0.013
IT	110	40.58	19.80	

Table 2: Distribution of Conversion and Prolonged Operation Time in Both Groups

Groups	Status	CVS	IT	P-Value
Conversion	Yes	2	1	<0.001
	No	108	109	
Prolong OT	Yes	2	2	0.48
	No	108	108	

DISCUSSION:

Laparoscopic cholecystectomy is a common procedure that is now performed in practically all-surgical centers. There have been numerous attempts to detect the biliary ducts and vascular structures to minimize bile duct injuries; the most common risk factors for these injuries include the surgical team's experience, inflamed GB, and surrounding anatomical structures with biliary anatomical differences^{12,13}. Male patients appear to be at a higher risk of severe acute disease, with a higher conversion rate. Conversion was observed to be more common

among males in both groups in this study (male to female ratio is 17:4)¹⁴. Inflamed gallbladder and adhesions are predisposing factors for difficulty and the possibility of bile duct injuries, whereas a history of ERCP and the finding of thick wall gall bladder and adhesions all are indications of difficulty which were all noticed in this study. Although the CVS group had all of the vascular and biliary anomalies, there were no bile duct injuries in this group, which highlight the significance of careful dissection and clear anatomy preparation before clipping or cutting any structure^{15,16}.

Although safety and uncomplicated surgery are the most important factors in deciding which technique to use in performing laparoscopic cholecystectomy, operation time is also a consideration to avoid unnecessary and possible complications from prolonged anaesthesia^{17,18}. Some surgeons may believe that using the CVS technique takes longer because it requires more dissection, but CVS becomes familiar to the surgeons after proper training. The time of the operation was shorter in the CVS group in this study, with a significant P-value (0.013), almost same to a study done in Pakistan (50 minutes versus 73 minutes), and a study done by Santos BF et al, who found CVS has a shorter operative time (51.5 minutes versus 69.7 minutes) and also by Viswanathan et al^{19,20}. Although one bile duct injuries occurred in the infundibular group in this study, it is not without value in recommending the CVS technique for laparoscopic cholecystectomy, especially when we found less conversion in the CVS group and no bile duct injury or vascular injury in the 11 patients with vascular and biliary anomalies, as it is well known that the CVS technique may help to prevent bile duct injuries during laparoscopic cholecystectomy, even CVS is suggested to be the ultimate principle for preventing bile duct injuries during laparoscopic cholecystectomy even for acute cholecystitis^{21,22}. Finally, the technique for identifying critical views of safety is more elaborate in order to identify anomalies in Calot's triangle and avoid bile duct injuries. After being familiar with the method, the duration of surgery in CVS is reduced. The CVS procedure should be taught to surgical residents as a norm.

LIMITATIONS:

Majority of the patients in our study had

operated using CVS technique as compared to infundibular technique in laparoscopic cholecystectomy. Most of the data available on CVS technique in the literature is on BDI after LC.

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 regarded as a safe technique in laparoscopic cholecystectomy.

CONFLICT OF INTEREST: None

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REFERENCES:

- Singh R, Brunt LM. Critical view of safety-its feasibility and efficacy in preventing bile duct injuries. *Ann Laparosc Endosc Surg.* 2018;3(2).
- Daly SC, Deziel DJ, Li X, Thaqi M, Millikan KW, Myers JA, et al. Current practices in biliary surgery: do we practice what we teach?. *Surg Endosc.* 2016;30(8):3345-50.
- Chen CB, Palazzo F, Doane SM, Winter JM, Lavu H, Chojnacki KA, et al. Increasing resident utilization and recognition of the critical view of safety during laparoscopic cholecystectomy: a pilot study from an academic medical center. *Surg Endosc.* 2017;31(4):1627-35.
- Zarin M, Khan MA, Khan MA, Shah SA. Critical view of safety faster and safer technique during laparoscopic cholecystectomy. *Pak J Med Sci.* 2018;34(3):574-7.
- Barrett M, Asbun HJ, Chien HL, Brunt LM, Telem DA. Bile duct injury and morbidity following cholecystectomy: a need for improvement. *Surg Endosc.* 2018;32(4):1683-8.
- Fong ZV, Pitt HA, Strasberg SM, Loehrer AP, Sicklick JK, Talamini MA, et al. Diminished survival in patients with bile leaks and ductal injuries: management strategy influences outcomes. *J Am Coll Surg.* 2018;226(4):568-76.
- Manatakis DK, Vitalis A, Agalianos C, Terzis I, Kyriazanos ID, Davides D. Teaching and learning the critical view of safety technique in laparoscopic cholecystectomy. *HPB.* 2016;18:664-5.
- Kaya B, Fersahoglu MM, Kilic F, Onur E, Memisoglu K. Importance of critical view of safety in laparoscopic cholecystectomy: a survey of 120 serial patients, with no incidence of complications. *Ann Hepatobiliary Pancreatic Surg.* 2017;21(1):17-20.
- Strasberg SM, Pucci MJ, Brunt LM, Deziel DJ. Subtotal cholecystectomy-"fenestrating" vs "reconstituting" subtypes and the prevention of bile duct injury: definition of the optimal procedure in difficult operative conditions. *J Am Coll Surg.* 2016;222(1):89-96.
- Ansaloni L, Pisano M, Coccolini F, Peitzmann AB, Fingerhut A, Catena F, et al. WSES guidelines on acute calculous cholecystitis. *World J Emerg Surg.* 2016;14(11):25.
- Hariharan D, Psaltis E, Scholefield JH, Lobo DN. Quality of life and medico-legal implications following iatrogenic bile duct injuries. *World J Surg.* 2017;41:90-9.
- Gupta V, Jain G. Safe laparoscopic cholecystectomy: adoption of universal culture of safety in cholecystectomy. *World J Gastrointest Surg.* 2019;11(2):62-84.
- Rystedt JM, Montgomery AK. Quality-of-life after bile duct injury: intraoperative detection is crucial: a national case-control study. *HPB.* 2016;18(12):1010-6.
- Gupta V, Jain G. Safe laparoscopic cholecystectomy: adoption of universal culture of safety in cholecystectomy. *World J Gastrointest Surg.* 2019;11(2):62-84.
- Booij KA, de Reuver PR, van Dieren S, van Delden OM, Rauws EA, Busch OR, et al. Long-term impact of bile duct injury on morbidity, mortality, quality of life, and work related limitations. *Ann Surg.* 2018;268(1):143-50.
- Pucher PH, Brunt LM, Davies N, Linsk A, Munshi A, Rodriguez HA, et al. Outcome trends and safety measures after 30 years of laparoscopic cholecystectomy: a systematic review and pooled data analysis. *Surg*

17. Endosc. 2018;32:2175-83.
Sutherland F, Dixon E. The importance of cognitive map placement in bile duct injuries. *Can J Surg.* 2017;60(6):424-5.
18. Shang PZ. Guiding significance to ensure security of laparoscopic cholecystectomy by localization by imaginary clock for ampulla of gallbladder. *Chin J Oper Proc Gen Surg.* 2018;12(1):15-20.
19. Santos BF, Brunt LM, Pucci MJ. The difficult gallbladder: a safe approach to a dangerous problem. *J Laparoendosc Adv Surg Tech.* 2017;27(6):571-8.
20. Viswanathan V, Garg HP. Critical view of safety technique during laparoscopic cholecystectomy in prevention of biliary injuries. *Int J Int Med Res.* 2016;3(4):35-40.
21. Honda G, Hasegawa H, Umezawa A. Universal safe procedure of laparoscopic cholecystectomy standardized by exposing the inner layer of the subserosal layer (with video). *J Hepato-Biliary-Pancreatic Sci.* 2016;23(9):E14-9.
22. Anandhi PG, Alagavenkatesan VN. Anatomical variations in the extra hepatic biliary system: a cross sectional study. *Int J Med Sci.* 2018;6(4).

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3. **Khalid Aziz** - Data Acquisition; Drafting Manuscript



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