ORIGINAL RESEARCH

To evaluate "critical view of safety" and bile duct injuries in laparoscopic cholecystectomy

[1]Dr. Sahil Khajuria, [2]Dr. Rohit Goel, [3]Dr. Nair Furqan

[1]Lecturer, Department of Surgery, Government Medical College Jammu, J&K .
[2]Registrar, Department of Surgery, Government Medical College, J&K
[3]Post Graduate, Departmentof Surgery, Government Medical College, J&K

Corresponding author
Dr. Rohit Goel
Registrar, Department of Surgery, Government Medical College, J&K

Abstract:
Background: Several surgical techniques have been proposed to minimize the risk of BDIs. An identification method - the Critical View of Safety (CVS) - coined by Strasberg et al., in 1995, is considered one of the most successful.The present study was conducted to evaluate "critical view of safety" and bile duct injuries in laparoscopic cholecystectomy.
Material & methods: The present prospective study was carried out among 80 cases of LC over a period of 1 year. Difficulty of GB condition made according to Nasser classification. Time in achieving in CVS is noted. Post-operative incidence of bile leak and bleeding is noted.
Results: In the present study maximum cases of LC were of age group 41-50years. 78.75% cases were females and 21.25% were males. Maximum cases i.e. 42 cases had Nasser grade 2. CVS was achieved in all cases of grade 1 and grade 2. CVS was not achieved in 3 cases of grade 3 and 2 cases of grade 4. There was no mortality, bile leak and bleeding was present in 3.75% cases.
Conclusion: The present study concluded that the Critical View of Safety had minimum no. of complications.
Keywords: Critical View of Safety, complications, laparoscopic cholecystectomy.

Introduction

A gold standard in the treatment of cholelithiasis, laparoscopic cholecystectomy (LC) is the most common procedure in general surgery. The most commonly used surgical technique is the infundibular approach, characterized by dissection of the calot triangle, clipping the cystic artery and the cystic duct. Bile duct injuries are encountered in 0.3% to 0.5% of laparoscopic cholecystectomies, and has remained the since the introduction of laparoscopic surgery.[1] It has advantages of improved quality of life with lesser pain, reduced hospital stay, faster recovery, and early return to work. But LC is also associated with increased incidence of major Bile duct injuries (BDI) compared to Open Cholecystectomy (OC) at 0.3% vs 0.1%.[2] The most common error is misidentification of Common Bile Duct (CBD) as the Cystic duct (CD) and hence cut. This is called the "classic laparoscopic injury". Injuries to the Common Hepatic duct (CHD) and Rt Hepatic artery are also common due to misidentification. Sometimes both duct and vascular injuries occur together leading to Vasculobiliary injuries which are associated with major bleeding, BDI, and even liver failure.[3] In order to reduce the BDI occurrence and implement LC more safely, the CVS has gradually become the LC standard process.[4]Strasberg and his colleagues introduced the critical view of safety (CVS) technique in 1995.[5] The safety and feasibility of CVS have been demonstrated by many studies that reported not a single BDI resulting from misidentified anatomy in surgeries, where CVS was used according to the operative

note.[1,2,6] The present study was conducted to evaluate "critical view of safety" and bile duct injuries in laparoscopic cholecystectomy.

Material & methods

The present prospective study was carried out among 80 cases of LC over a period of 1 year. Before the commencement of the study ethical clearance was taken from the Ethical Committee of the institute. Evaluation of patient is taken routinely with clinical examination, ultrasonography, liver function tests and, other necessary tests. To achieve standardisation of cases, those with previous surgical intervention in the upper abdomen, liver parenchymal disease like cirrhosis were excluded in this study. A standard 4 port LC was done under general anaesthesia. The cephalad traction of the fundus is obtained by the grasper from the anterior axillary line and together with lateral traction of the infundibulum by the grasper in mid clavicular line. Difficulty of GB condition made according to Nasser classification. The Rouviere's sulcus is noted and dissection is done above or ventral to it. Where Rouviere's sulcus is absent an imaginary line "R4U line" is drawn from the umbilical fissure across the base of segment 4 of the Liver, extended on to the extra biliary tree helps in dissection. Dissection is done with either monopolar hook or curved bipolar cautery with low power settings of < 30 watts. Dissection in Hepatocystic triangle is done by removing all fibro fatty tissue from both posterior and anterior aspects of the cystic pedicle. The Gallbladder is dissected of the liver in the lower part (cystic plate). This leaves only two structures, cystic duct and cystic artery seen entering the gallbladder. Bare surface of the liver surface seen from both anterior and posterior sides of Calots triangle (double calots view). Only after fulfilling all these 3 principles of CVS, the cystic duct and artery are clipped and cut. GB is dissected of liver and removed. Time in achieving in CVS is noted from the start of the dissection of Calot's triangle. Not being able to achieve CVS even after 30 minutes of dissection of Calot's is considered as a difficult gall bladder surgery. A second opinion of a different surgeon is taken. With the failure to achieve CVS, a decision for a bail-out is taken. All cases were drained with a sub hepatic drain which was removed after 24 hrs in no bleed or bile leak cases. Post-operative incidence of bile leak and bleeding is noted.

Results

Table 1: Age & Sex distribution

Age groups(yrs)	Male	Female	Total (%)
21-30	1(1.25%)	7(8.75%)	8(10%)
31-40	4(5%)	15(18.75%)	19(23.75%)
41-50	7(8.75%)	22(15%)	29(36.25%)
51-60	4(5%)	15(18.75%)	19(23.75%)
Above 60	1(1.25%)	4(5%)	5(6.25%)
Total	17(21.25%)	63(78.75%)	80(100%)

In the present study maximum cases of LC were of age group 41-50years. 78.75% cases were females and 21.25% were males.

Table 2: Difficulty and CVS achieved

Nasser grade	No. of cases	CVS achieved	Not achieved
Grade 1	19	19	0
Grade 2	42	42	0
Grade 3	14	11	3
Grade 4	5	3	2

Maximum cases i.e. 42 cases had Nasser grade 2. CVS was achieved in all cases of grade 1 and grade 2. CVS was not achieved in 3 cases of grade 3 and 2 cases of grade 4.

Table 3: Complications

Complications	N(%)
Mortality	0(0%)
Bile leak	0(0%)
Bleeding	3(3.75%)

There was no mortality, bile leak and bleeding was present in 3.75% cases.

Discussion

BDI is a major complication of LC with increased morbidity, mortality, and decreased quality of life. BDI is a complex problem affecting healthy young people. The major cause of BDI is the misidentification of the biliary ductal system. The problem of misidentification of the common bile duct as the cystic duct during LC is well recognised and documented.[7]

In the present study maximum cases of LC were of age group 41-50years. 78.75% cases were females and 21.25% were males. Maximum cases i.e. 42 cases had Nasser grade 2. CVS was achieved in all cases of grade 1 and grade 2. CVS was not achieved in 3 cases of grade 3 and 2 cases of grade 4. There was no mortality, bile leak and bleeding was present in 3.75% cases.

Terho, Petra MDet al did a study among 1532 patients. Residents had higher rates of satisfactory CVS in elective LCCs compared with consultants (34.9% vs. 23.0%, P<0.001), but not in emergency LCCs (18.4% vs. 15.0%, P=0.252). No significant differences in BDIs or postoperative complications emerged between residents and consultants. After the lecture, elective LCCs were photographed more frequently (80.3% vs. 74.0%, P=0.032), but rates of satisfactory CVS, BDIs, and postoperative complications remained unchanged.[8]

Mohan Rao Voruganti DN et al showed that Critical View of safety was achieved in 47 (94%) of cases without BDI.[3]

Jin Y et al collected 169 laparoscopic cholecystectomy surgical videos undergone by 124 surgeons, among which 105 participants gave valid answers to the questionnaire. Excluding those who conducted the bail-out process directly, the overall critical view of safety achievement rates for non-inflammatory and inflammatory groups were 18.18% (18/99) and 9.84% (6/61), respectively. Although 80.95% (85/105) of the surgeons understood the basic concept of the critical view of safety, only 4.76% (5/105) of the respondents commanded all three criteria in an error-free way. Multivariate logistic regression results showed that an unconventional surgical workflow (OR:12.372, $P < 0.001$), a misunderstanding of the 2nd (OR: 8.917, $P < 0.05$) and 3rd (OR:8.206, $P < 0.05$) criterion of the critical view of safety, and the don't mistake "fundus-first technique" as one criterion of the critical view of safety (OR:0.123, $P < 0.01$) were associated with lower and higher achievements of the critical view of safety, respectively.[9]

Conclusion

The present study concluded that the Critical View of Safety had minimum no. of complications.

References

1. Yegiyants S, Collins JC. Operative strategy can reduce the incidence of major bile duct injury in laparoscopic cholecystectomy. Am Surg. 2008; 74:985–987. PMID: 18942628.
2. Steven Strasberg M. A prospective on the Critical View of Safety in Laparoscopic Cholecystectomy, Annals Laparoscopic and endoscopic surgery 2017;2:91.
3. Mohan Rao Voruganti, D.N.M. and Aditya, V., 2022. Evaluation of "critical view of safety" in laparoscopic cholecystectomy. *International Journal of Surgery*, *6*(1), pp.01-05.
4. Wong HJ, Kojima Y, Su B, et al. Long-term retention after structured curriculum on attainment of critical view of safety during laparoscopic cholecystectomy for surgeons. Surgery. 2021;S0039-6060(21):00996-X.
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. Annals of hepato-biliary-pancreatic surgery. 2017 Feb;21(1):17.
6. Avgerinos C, Kelgiorgi D, Touloumis Z, Baltatzi L, Dervenis C. (2009) One thousand laparoscopic cholecystectomies in a single surgical unit using the "critical view of safety" technique. J Gastrointest Surg 13:498–503.
7. Heistermann HP, Tobusch A, Palmes D. (2006) Prevention of bile duct injuries after laparoscopic cholecystectomy. "The critical view of safety". ZentralblChir 131:460–465.
8. Terho, Petra MD[*]; Sallinen, Ville MD, PhD[*,†]; Lampela, Hanna MD, PhD[*]; Harju, Jukka MD, PhD[*]; Koskenvuo, Laura MD, PhD[*]; Mentula, Panu MD, PhD[*]. The Critical View of Safety in Laparoscopic Cholecystectomy: User Trends Among Residents and Consultants. Surgical Laparoscopy, Endoscopy & Percutaneous Techniques 32(4):p 453-461, August 2022. | DOI: 10.1097/SLE.0000000000001077
9. Jin Y, Liu R, Chen Y, Liu J, Zhao Y, Wei A, Li Y, Li H, Xu J, Wang X, Li A. Critical view of safety in laparoscopic cholecystectomy: a prospective investigation from both cognitive and executive aspects. Frontiers in Surgery. 2022 Aug 1;9:946917.