

# Posterior First Infundibular Dissection: Another Safe Approach in Laparoscopic Cholecystectomy

KASHIF NADEEM<sup>1</sup>, JAVED MIRDAD TARAR<sup>2</sup>, MUHAMMADRASHID<sup>3</sup>

<sup>1</sup>Consultant General & Laparoscopic Surgery, Armed Forces Hospital Alhada Taif Kingdom of Saudi Arabia

<sup>2</sup>Assistant Professor, General & Thoracic Surgery, Bakhtawar Amin Medical & Dental College Multan

<sup>3</sup>Consultant Thoracic Surgery, Armed Forces Hospital Alhada Taif Kingdom of Saudi Arabia

Correspondence to: Javed Mirdad Tarar, Email: [drkash226@gmail.com](mailto:drkash226@gmail.com), Cell: 03067302600

## ABSTRACT

**Objective:** To test the efficacy of posterior infundibular dissection during Laparoscopic cholecystectomy

**Place and duration of the study:** Surgical ward of Bakhtawar Amin Trust Teaching Multan for 1 year

**Study design:** A retrospective study

**Methodology:** A total of 150 patients undergoing laparoscopic cholecystectomy were included in the study. Firstly, the bile duct, Calot's node and gallbladder neck were identified along with the lower third of the common duct. An incision was made in the peritoneum anterior to the Calot's node at infundibulum and extended laterally and posteriorly. By retracting the gallbladder cephalad and medially, dissection continued in avascular plane between posterior wall of gall bladder and posterior branch of cystic artery. Anteriorly, a plane is created above the calot's node and inferior to cystic artery, which was facilitated by posterior dissection of infundibulum. Posterior clipping and division of the cystic artery and duct was done. The rest of the gallbladder was dissected from the liver.

**Results:** 120 patients (80%) had an elective LC status and 30 patients (20%) underwent an emergency LC. 2 patients (1.3%) underwent subtotal cholecystectomy. 26 patients (18%) underwent MRCP due to suspicion of stones. Out of these 26 patients, 3 patients (11.5%) underwent ERCP due to the presence of stones. No bile duct injury was recorded.

**Conclusion:** Posterior first infundibular dissection reduces the risk of bile duct injury and ensures safe laparoscopic cholecystectomy.

**Keywords:** Laparoscopic cholecystectomy, infundibular dissection, bile duct injury, cholecystectomy, safe calot's dissection.

## INTRODUCTION

Dissection in the cystohepatic triangle has been a primary practice followed by surgeons during cholecystectomy. This practice continued after the laparoscopic cholecystectomy was discovered without benefiting from the changes the new procedure brought. A top-down dissection was done whenever the surgeons came across the Calot's triangle. Injury in the bile duct and bleeding remained a major life-threatening issue. Laparoscopic cholecystectomy has been a universally acceptable method but despite advances in medicine and surgical procedures, the prevalence of biliary tree injury after this procedure was still 0.08-0.5%<sup>(1-3)</sup>. According to recent data collected from large sample studies, this rate has increased to 0.14-0.23%<sup>(2, 3)</sup>. Bile duct injury has high mortality and morbidity rate, pose monetary and mental pressure on the patient, and increased the hospitalization period and additional therapy costs<sup>(4, 5)</sup>. Similarly, for surgeons too, BDI is a source of emotional distress and legal issues<sup>(6)</sup>. Therefore, there is a need to study the ways of preventing BDI rather than treating it afterwards. For this purpose, methods like Indocyanine green injection, CVS, intra-operative cholangiography and infrared imaging have been devised to prevent complications during laparoscopic cholecystectomy. We have designed this study to ensure no bile duct injury during the surgery. Our study aims to test the efficacy of posterior infundibular dissection during LC.

## METHODOLOGY

A retrospective study was conducted in the surgical ward of Bakhtawar Amin Trust Teaching Hospital Multan from June 2021-June to 2022. A total of 150 patients undergoing laparoscopic cholecystectomy were included. The patients who were younger than 15 years and older than 90 years were excluded from the study.

Data regarding age, gender, use of intraoperative cholangiogram, elective status, use of drains, Magnetic resonance cholangiopancreatography or Endoscopic retrograde cholangiopancreatography, conversion to open, course and follow-up were collected from all patients. A magnetic resonance cholangiopancreatography was performed preoperatively in patients suspected of bile duct stones.

A Veress needle was used to create pneumoperitoneum at Palmer's point. The camera port was placed at an optical trocar

entry at 30° scope. Two 5mm trocars were placed in the right anterior axillary and mid-clavicular lines while a subxipoid 10mm trocar was placed for removal of the gallbladder.

Firstly, the right and common hepatic duct, gallbladder neck and Calot's node, one of important landmark of dissection, were identified along with anterior surface of the lower third of the common duct. An incision was made in the peritoneum anterior to the Calot's node. This incision was further extended laterally, posteriorly and superiorly above the bachelor artery. By retracting the gallbladder cephalad and medially, dissection continued in avascular plane between posterior wall of gall bladder and posterior branch of cystic artery. For anterior dissection gallbladder was retracted laterally and superiorly and a dissection plane created above the calot's node, between cystic artery superiorly and posterior wall of gall bladder inferiorly. Posterior first infundibular dissection made this anterior dissection plane easier and more safe. Cystic artery was not skeletonized and clipped as it emerged behind the Calot's node. So we avoided the trapezoid of no dissection, a part of hepatocystic triangle. Cystic duct was clipped and divided. Finally, the gallbladder was dissected from its fossa in the liver and extracted through subxipoid port.

## RESULTS

The mean age of the study patients was 57 years. 115 patients (77%) were women. 120 patients (80%) had an elective LC status and 30 patients (20%) underwent an emergency LC. 2 patients (1.3%) underwent subtotal cholecystectomy. One patient was diagnosed with cirrhosis and one patient had Mirizzi's syndrome. 26 patients (18%) underwent MRCP due to suspicion of stones. Out of these 26 patients, 3 patients (11.5%) underwent ERCP due to the presence of stones. 1 patient was reverted to open cholecystectomy due to bleeding in the cystic plate and an intra-operative cholangiogram was used in one patient. No bile duct injury was recorded.

## DISCUSSION

Laparoscopic cholecystectomy is a very difficult procedure to perform as the disease progresses. As the inflammation increases, the surgery becomes complex and the risk of BDI increases. The inaccurate visualization of the common bile duct is the major cause of bile duct injuries<sup>(7)</sup>.

The identification of the anatomy is the most crucial part to ensure successful LC. Trocar placement assists with the accurate identification by visualization of the Lund's node, common bile duct and duodenum. A perpendicular and tangential view of the surgery region is obtained by observation of the surgeon and camera placement. The anatomical identification can also be done indirectly by sonogram or cholangiogram<sup>(8, 9)</sup>. This method was used in our study for one patient suspected Mirizzi's syndrome. Thirdly, fundic dissection is also performed in case of cholecystitis which makes Calot's triangle dissection difficult. Alternatively, fenestration and fenestrated cholecystectomy can also be performed<sup>(10, 11)</sup>.

The critical view of safety is another method which was presented in 1995 in Strasberg. This method has three requirements; absence of fat and fibrous tissue in the Calot's triangle, the inferior part of the gallbladder must be apart from the cystic plate, and recognition of two structures entering the gallbladder. By identification of cystic artery and duct and cephalad dissection of Calot's triangle, CVS is achieved<sup>(12)</sup>. In our study, no dissection was required in the trapezoid region as the Calot's node was kept intact. These methods reduced the risk of injury to the liver ducts and hepatic artery. Although CVS is an effective method to identify cystic artery and duct but is not appropriate the gallbladder is extracted from the liver bed<sup>(13)</sup>. So the dissection of a third of the cystic plate helps to avoid these issues. We made this possible without dissecting the trapezoid and instead did more dissection in the posterior region.

The significance of our procedure is the achievement of the goal in patients with normal anatomy as well as aberrant anatomy. Our method constitutes posterior dissection with deliverance and skeletonization of the gallbladder which facilitates the identification of aberrant anatomy. In our experience this approach is more safe, not only in normal anatomy of hepatocystic triangle but also in aberrant anatomy related to gall bladder. This technique is helpful in the case of a hidden cystic duct by extending a small cystic duct<sup>(14)</sup>.

A middle-first approach has been introduced by Kirkwood et al for managing gangrenous cholecystitis during laparoscopic cholecystectomy<sup>(15)</sup>. This technique suggests the start of dissection from the mid gallbladder and then towards the infundibulum. For safe dissection, the distal dissection after the cystic branches have separated from the gallbladder walls. If this procedure is not followed, there can be a risk of gallbladder injuries and in case of aberrant anatomy. Our approach uses anatomical planes as a reference for dissection which is a more effective approach as it can apply to normal and defective gallbladder. However, this technique is not effective in the case of thumb nail gallbladder<sup>(16)</sup>. We suggest drainage, gallbladder unroofing and extraction of gallbladder stones. If dissection is carried out any further, it poses a risk of bile duct injuries.

By utilizing the posterior dissection technique, no bile duct injuries occurred in any of our patients. For the success of this technique, we suggest high trocar placement, keeping Lund's node intact, not dissecting the trapezoid, dissection of infundibulum by posterior technique and clipping and dividing the cystic artery.

## CONCLUSION

Posterior first infundibular dissection reduces the risk of bile duct injury and ensures safe laparoscopic cholecystectomy.

## REFERENCES

1. Altieri MS, Yang J, Obeid N, Zhu C, Talamini M, Pryor A. Increasing bile duct injury and decreasing utilization of intraoperative cholangiogram and common bile duct exploration over 14 years: an analysis of outcomes in New York State. *Surgical endoscopy*. 2018;32(2):667-74
2. Halbert C, Pagkratis S, Yang J, Meng Z, Altieri MS, Parikh P, et al. Beyond the learning curve: incidence of bile duct injuries following laparoscopic cholecystectomy normalize to open in the modern era. *Surgical endoscopy*. 2016;30(6):2239-43
3. Barrett M, Asbun HJ, Chien H-L, Brunt LM, Telem DA. Bile duct injury and morbidity following cholecystectomy: a need for improvement. *Surgical endoscopy*. 2018;32(4):1683-8
4. Sinha S, Hofman D, Stoker DL, Friend PJ, Poloniecki JD, Thompson MM, et al. Epidemiological study of provision of cholecystectomy in England from 2000 to 2009: retrospective analysis of Hospital Episode Statistics. *Surgical endoscopy*. 2013;27(1):162-75
5. Moore DE, Feurer ID, Holzman MD, Wudel LJ, Strickland C, Gorden DL, et al. Long-term detrimental effect of bile duct injury on health-related quality of life. *Archives of surgery*. 2004;139(5):476-82
6. Berney CR. Major common bile duct injury and risk of litigation: a surgeon's perspective. *Elsevier*; 2012. p. 800-2.
7. Wakabayashi G, Iwashita Y, Hibi T, Takada T, Strasberg SM, Asbun HJ, et al. Tokyo Guidelines 2018: surgical management of acute cholecystitis: safe steps in laparoscopic cholecystectomy for acute cholecystitis (with videos). *Journal of Hepato-biliary-pancreatic Sciences*. 2018;25(1):73-86
8. Törnqvist B, Strömberg C, Akre O, Enochsson L, Nilsson M. Selective intraoperative cholangiography and risk of bile duct injury during cholecystectomy. *Journal of British Surgery*. 2015;102(8):952-8
9. Machi J, Tateishi T, Oishi AJ, Furumoto NL, Oishi RH, Uchida S, et al. Laparoscopic ultrasonography versus operative cholangiography during laparoscopic cholecystectomy: review of the literature and a comparison with open intraoperative ultrasonography. *Journal of the American College of Surgeons*. 1999;188(4):360-7
10. Michael Brunt L, Deziel DJ, Telem DA, Strasberg SM, Aggarwal R, Asbun H, et al. Safe cholecystectomy multi-society practice guideline and state-of-the-art consensus conference on prevention of bile duct injury during cholecystectomy. *Surgical Endoscopy*. 2020;34(7):2827-55
11. 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. *Journal of the American College of Surgeons*. 2016;222(1):89-96
12. Strasberg SM, Brunt ML. Rationale and use of the critical view of safety in laparoscopic cholecystectomy. *Journal of the American College of Surgeons*. 2010;211(1):132-8
13. Tuveri M, Borsezio V, Calo PG, Medas F, Tuveri A, Nicolosi A. Laparoscopic cholecystectomy in the obese: results with the traditional and fundus-first technique. *Journal of Laparoendoscopic & Advanced Surgical Techniques*. 2009;19(6):735-40
14. Strasberg SM, Eagon CJ, Drebin JA. The "hidden cystic duct" syndrome and the infundibular technique of laparoscopic cholecystectomy—the danger of the false infundibulum. *Journal of the American College of Surgeons*. 2000;191(6):661-7
15. Kirkwood R, Damon L, Wang J, Hong E, Kirkwood K. Gangrenous cholecystitis: innovative laparoscopic techniques to facilitate subtotal fenestrating cholecystectomy when a critical view of safety cannot be achieved. *Surgical endoscopy*. 2017;31(12):5258-66
16. O'Leary D, Myers E, Waldron D, Coffey J. Beware the contracted gallbladder—Ultrasonic predictors of conversion. *the surgeon*. 2013;11(4):187-90