

## Technique for safe laparoscopic cholecystectomy: An experience of 7700 cases by a single surgeon, without any conversions to opensurgery and without any Bile duct injury

Dr. JeevanKankaria<sup>1</sup>, Dr. JitendraYadav<sup>2</sup>

<sup>1</sup>(Professor, Upgraded Department of Surgery, SMS Medical college,Jaipur ,Rajasthan (INDIA).

<sup>2</sup>(PG Resident, Upgraded Department of Surgery, SMS Medical college,Jaipur ,Rajasthan ,INDIA).

Corresponding Author: Dr. JitendraYadav

### **Aim and Objective**

To share a surgeon's experience of more than 7700 laparoscopic cholecystectomy without any conversions to open surgery and how to perform safe cholecystectomy.

### **Materials and Methods**

We analyzed the data of the 7700 patients retrospectively from a period of 2004 to 2019. All cases were operated by a single surgeon DrJeevanKankaria ,Professor, Upgraded Department of Surgery, SMS Medical College,Jaipur.

### **Results:**

Almost 60% of patients were female. Not a single case of conversion to open cholecystectomy was found. Youngest patient was 217 days old (Guinness Record) and oldest was 109 years old(Limca Book of records). Longest gall bladder(GB) was 30 cms long(Guinness record) and smallest was 9 mms long. Maximum stones recovered from a single GB 11860. No mortality occurred, and morbidity was negligible. No significant complications were recorded.

### **Conclusions:**

This experience shows that if laparoscopic cholecystectomy performed with precautions and patience chances of conversion to open surgery can be reduced to zero. Meticulously performing the surgery reduces the complication rate to minimal. With due care and caution during cholecystectomy, attention towards achieving the critical view of safety and a standardized technique, complications can be avoided.

**Key words:** Laparoscopic - cholecystectomy, conversion to open, Gall bladder stones, Cholelithiasis, single surgeon experience.

Date of Submission: 20-02-2020

Date of Acceptance: 04-03-2020

## I. Introduction

Cholelithiasis is one of the most common biliary tract diseases worldwide<sup>1, 2</sup>. It is the most common surgical condition requiring intervention<sup>3, 4</sup>. Laparoscopic cholecystectomy(LC) was introduced around 3 decades ago and since then it has become the gold standard<sup>5,6</sup>. Cholelithiasis can be symptomatic as well asymptomatic, and almost 90% cholecystectomies are performed laparoscopically<sup>7,8</sup>. Multiple factors which can be patient related or surgeon related can lead to multiple complications and conversion to open cholecystectomy<sup>4,9,10</sup>. Usually an open cholecystectomy is performed in patients with gallbladder mass or suspicion of gall bladder malignancy, late third trimester of pregnancy, multiple previous upper abdominal surgeries, age >60 years, male sex, diabetic patients, history of endoscopic retrograde cholangiopancreatography, dilated common bile duct, gallbladder status and when laparoscopic approach fails<sup>7,11, 12</sup>. With Laparoscopic Cholecystectomy the complication rate seems higher than open cholecystectomy despite the experience, but complication rates with open cholecystectomy are increasing due to decreased exposure to open procedure.<sup>7, 8, 13, 14</sup>

With due care and caution during laparoscopic procedure complication rates can be reduced<sup>11, 15</sup>. As the surgeon's experience increases the complication rate and the conversion rates decrease<sup>11,16</sup>.

Aim of this study was to share the experience of a single surgeon to perform safe laparoscopic cholecystectomy and how to decrease complication and conversion rates.

## II. Materials and Methods.

A retrospective study of laparoscopic cholecystectomies in 7700 patients performed by a single surgeon( DrJeevanKankaria ,Professor, Upgraded Department of Surgery, SMS Medical College,Jaipur) from a period of 2004 to 2019. The SMS hospital's surgical center performs the most numbers of cholecystectomy via laparoscopy except few special cases where open cholecystectomy is beneficial. The center has 8 surgical

units and the study was conducted by one unit only, in this unit around 15 laparoscopic cholecystectomies are performed in a week. Institutional Ethical Committee approval was also taken before starting the study.

Most of the patients were admitted for elective procedure. Patients with symptoms of acute cholecystitis were either operated within 2-3 days of presentation or 3-4 weeks after the resolution of symptoms. Detailed history of onset of symptoms duration progression was taken. Patients were properly investigated with routine blood investigations that include complete blood count, liver function test, kidney function test, Serum electrolytes, HIV, HBSAg, HCV, bleeding time, clotting time PT INR studies. Serum amylase lipase were also done to rule out pancreatitis and serum Alkaline phosphatase was also done to rule out biliary obstruction. Imaging such as ultrasonogram was also performed. In some doubtful cases MRCP and CT scans were performed to look for other pathology. Those with CBD stones in USG were sent for MRCP and ERCP for stone clearance and operated either within 48 hr or after 3-4 weeks interval.

Patients were monitored post operatively for hospital stay, post op pain, nausea vomiting, oral intake and other complication.

### III. Results

Total of 7700 patients with 68% female were selected for the study purpose. (Table1)

**Table 1: Different Variables**

Variables	N
Total patients	7700
Males	2464/32%
Females	5236/68%
Mean age males	39 years
Mean age females	33 years
Conversion	0
Youngest Person	217 days
Oldest person	109 years
Longest GB	30 cms
Shortest GB	9 mm
Largest number of stones from single GB	11860 stones
Completion Cholecystectomy for remnant GB	35
Lap Cholecystectomy with CBD exploration	304

**Table 2: Etiology for which LC was performed**

Etiology	N
Chronic Cholecystitis	3083
Acute Cholecystitis	583
Symptomatic gallstones presenting with biliary colic	2120
Asymptomatic Gallstones	44
Gall stone pancreatitis	194
Empyema gall bladder	720
Gall bladder polyps/adenomyomatosis	146
Post ERCP	810

**Table 3: Difficult GB**

No adhesions	1905
Minimal adhesions	1635
Dense adhesions	0781
Obliteration of Calot's triangle	0736
Contracted gall bladder	1340
Mucocele/Empyema	0923
Free floating gall bladder	380

**Table 4: complications during Surgery**

Complications	N	Treatment
Perforation of gall bladder	380	Saline wash
Spilled stones	310	Stone extracted
Spilled bile	480	Saline wash with drain placement
Soiling of wound by bile/stones	10	Saline wash
Slipped cystic duct ligature	08	Reapplication/suturing
Cystic artery bleeding	06	Clip application
Bowel injury	5	Repaired Laparoscopically
Cholecysto-colic Fistula	9	Cholecystectomy with lap repair
Cholecysto-duodenal Fistula	10	Cholecystectomy with lap repair
Cholecysto-gastric Fistula	2	Cholecystectomy with lap repair

**Table 5:** Postop Complication

Complications	N	Treatment
Excess pain	27	Increased dose of analgesic
Prolonged drain(>48hr)	21	Drain in situ for couple of days
Prolonged ileus(>48hr)	26	None
Nausea/vomiting	174	Frequent antiemetics and analgesic
Subhepatic collection	3	Managed conservatively
Wound infection	4	Daily dressing
Bile duct injury	0	None
Jaundice	0	None
Retained stone	0	None

**Table 6:** degree of difficulty

Grade	Cases
I	3007
II	1573
III	1441
IV	1679
Cuschieries classification was used	

#### IV. Discussion

The present study shows the author's experience with laparoscopic cholecystectomy, in a teaching hospital, over a 15-year period

Gall stones are one of the most common and costly surgical disease<sup>17, 18, 19</sup>. Although there are a variety of non surgical treatments described and tried but most of them do not work for the patient, so surgery has become the most utilized modality for the treatment of symptomatic gall bladder disease<sup>20,21, 22</sup>. Laparoscopic Cholecystectomy has become the gold standard for removal of GB<sup>23</sup>. With increase in use of laparoscopic cholecystectomies, it's obvious that certain complications rarely seen with OC were more frequent when LC was performed. These complications included intestinal and vascular injuries from trocar or Veress needle insertion and major bile duct injuries<sup>24, 25, 26</sup>

This study shows that if Laparoscopic Cholecystectomy are performed with patience, the complication rate can be reduced to a minimal and the conversion rate can be reduced to zero.

Bile Duct injury is one of the most dreaded complications during LC than in OCs<sup>27, 28, 29, 30, 31</sup>. First iatrogenic biliary duct injury was described by Sprengel in 1891. In the infancy of (LC), CBD injury occurred more frequently during LC than during OC. Although the incidence of CBD injury during LC is no longer as high as it was initially, it still exceeds that of open cholecystectomy (0.1 % to 0.5 % in LC vs 0.2 % in OC)<sup>32</sup>

Risk Factors for CBD injury are Lack of experience (learning curve), Misidentification of biliary anatomy, Intra-operative bleeding, Lack of recognition of anatomical variation of biliary tree and improperly functioning instruments. Other factors are Acute and chronic cholecystitis, Empyema, Long standing recurrent disease, Advanced age, Obesity and Previous surgery.<sup>31, 32, 33</sup>

There are few steps that need to be taken during LCs to avoid complications rate. Critical view of safety introduced by Professor Steven Strassberg is one of the most important landmarks. Several studies confirm that routine use of these techniques eliminates the chances of complication such as CBD injury.

Clearing the fat and fibrous tissue from the Calot's triangle, freeing up the lower third of the GB from the liver bed/cystic plate and confirming that two and only two structures are seen entering the GB are three requirements for the critical view of safety. No tubular structure duct should be clipped divided unless the critical view of safety is achieved<sup>34, 35</sup>

Always use 30 degree telescope with HD camera or with good endo-vision system<sup>36</sup>. When entering the port, first visualize where and how the CBD is located (to create a rough image in mind)<sup>37</sup>. Retraction of fundus - Apply firm cephalic traction on the fundus and lateral traction on the infundibulum so that the cystic duct is perpendicular to the CBD<sup>37</sup>. Separation of omental adhesions – Always from CBD towards fundus<sup>38</sup>.

Use Cystic Lymph Node of Lund as valuable landmark for identifying the cystic artery. Use Rouviere's Sulcus as valuable anatomical landmark for lap Cholecystectomy<sup>39</sup>. Always keep the dissection near the gallbladder. Do anterior dissections for ease of process or on complementary basis but as a rule, always do posterior dissection before clipping of cystic artery and cystic duct. Do posterior dissection with clearance of cholecystic plate at least 5 cm.

The Gallbladder – duct junction is fully mobilized to give the "elephant head" appearance. Clarify the Calot's triangle<sup>38</sup>. Check again and again to delineate the curvature of infundibulum and cystic duct for removing the possibility of CBD. Any vessel that pulsates before cutting is hepatic artery and one which pulsates after cutting is cystic artery. Follow Strasberg's rule of 'Critical View of Safety'. Clear the stones from the cystic

duct. Apply clips on cystic duct and artery separately and never together. Cutting of cystic duct and artery by using scissors only and not any kind of energy sources. If bleeding occurs then keep your patience, never use any type of energy sources until the clearance of structures. It is better to stop the bleeding using gauze piece. And of course, wait for sometime. Always recheck the area of CBD after removal of gallbladder specimen. (to see any bile leak, bleeding or even clip dislocation).

Use cholangiogram or ICG Dye when presence of doubts, if facilities are available. Do partial cholecystectomy and save the life of the patient rather than risking it, whenever there is a doubt<sup>40</sup>. Never hesitate to convert into open surgery whenever necessary, life of the patient is worth more than a challenge for you<sup>34, 41, 42, 43,44, 45</sup>.

## V. Conclusion

This study shows the experience of a single surgeon that if laparoscopic cholecystectomies are performed with precautions and patience chances of conversion to open surgery can be reduced to zero. Meticulously performing the surgery reduces the complication rate to minimal. With due care and caution during cholecystectomy, attention towards achieving the critical view of safety and a standardized technique, complications can be avoided. This study has discussed some simple steps to follow to perform safe laparoscopic cholecystectomy. Every surgeon must include these steps in their practice.

## References:

- [1]. Shea JA, Berlin JA, Bachwich DR, et al. Indications for and outcomes of cholecystectomy: a comparison of the pre and postlaparoscopic eras. *Annals of Surgery*. 1998;227(3):343-350.
- [2]. Thomas RG. US experience with laparoscopic cholecystectomy. *Am J Surg* 1993, 165: 450-53.
- [3]. Champault G, Cazacu F, Taffinder N (1996) Serious trocar accidents in laparoscopic surgery: a French survey of 103,852 operations. *Surg Laparosc Endosc* 6:367-370
- [4]. Javaid A, Bashir T, Ali M (2017) Laparoscopic Cholecystectomy; Conversion Rate, Experience of a Single Surgeon over 4-year period. *J Surg Surgical Res* 3(2): 030-033. DOI: <http://doi.org/10.17352/2455-2968.000041>
- [5]. Gollan J, Kalsner S, Pitt H (1993) National Institutes of Health (NIH) consensus development conference statement on gallstones and laparoscopic cholecystectomy. *Am J Surg* 165: 390-396.
- [6]. Reynolds W Jr (2001) The first laparoscopic cholecystectomy. *Journal of the Society of Laparoendoscopic Surgeons* 5: 89-94.
- [7]. Bhattacharjee PK, Halder SK, Rai H, Ray RP. "Laparoscopic Cholecystectomy: A Single Surgeon's Experience in some of the Teaching Hospitals of West Bengal." *The Indian Journal of Surgery*. 2015;77(Suppl 2):618-623. doi:10.1007/s12262-013-0945-x.
- [8]. Vollmer CM, Jr, Callery MP. Biliary injury following laparoscopic cholecystectomy: why still a problem? *Gastroenterology*. 2007;133:1039. doi: 10.1053/j.gastro.2007.07.041.
- [9]. Livingstone EH, Rege RV. A nationwide study of conversion from laparoscopic to open cholecystectomy. *Am J Surg*. 2004;188:205-211. doi: 10.1016/j.amjsurg.2004.06.013.
- [10]. Sujit VS, Supreet SB, Ronald SC. Laparoscopic cholecystectomy conversion rates two decades later. *JLS* 2010; 14: 476-483.
- [11]. Demiral G, Aksoy F. Single surgeon experience: intraoperative complications and conversion to open surgery in laparoscopic cholecystectomy, the fore and aft of 20 years' experience. *Biomedical Research*. 2017;28(15):6671-6.
- [12]. El Nakeeb A, Mahdy Y, Salem A, El Sorogy M, El Rafea AA, El Dosoky M, Said R, Ellatif MA, Alsayed MM. Open cholecystectomy has a place in the laparoscopic era: a retrospective cohort study. *Indian Journal of Surgery*. 2017 Oct 1;79(5):437-43.
- [13]. Khan MH, Howard TJ, Fogel EL, Sherman S, McHenry L, Watkins JL, Canal DF, Lehman GA (2007) Frequency of biliary complications after laparoscopic cholecystectomy detected by ERCP: experience at a large tertiary referral center. *Gastrointest Endosc* 65:247
- [14]. Visser BC, Parks RW, Garden OJ (2008) Open cholecystectomy in the laparoendoscopic era. *Am J Surg* 195:108
- [15]. Ashfaq A, Ahmadi K, Shah AA, Chapital AB, Harold KL, Johnson DJ. The difficult gall bladder: Outcomes following laparoscopic cholecystectomy and the need for open conversion. *The American Journal of Surgery*. 2016 Dec 1;212(6):1261-4.
- [16]. Yang TF, Guo L, Wang Q. Evaluation of preoperative risk factor for converting laparoscopic to open cholecystectomy: A meta-analysis. *Hepatogastroenterol* 2014; 61: 958-965.
- [17]. Wani NA, Khan ZA. Experience with biliary tract surgery. *Ind J Surg* 1995; 181-86.
- [18]. Hussain A, Ahmed N, Zarger HU. Gall stones: A chemical study in Kashmir. *Ind J Surg* 1984: 156-60.
- [19]. William TL. Clinical manifestation and impact of gallstone disease. *Am J Surg* 1993: 165: 405-8.
- [20]. Lee SH, Burhenne HJ. Gall bladder surgery following cholelithotripsy: Suggested guidelines for treatment. *Br J Surg* 1990; 77:1268-71.
- [21]. Moody FG. Lithotripsy in the treatment of biliary stones. *Am J Surg* 1993; 165: 479-81.
- [22]. Tarry M Gilliland et al. Modern standard of comparison of cholecystectomy with alternative treatment of symptomatic cholelithiasis with emphasis on long term relief of symptoms. *Surg Gynecol Obstet* 1990; 170: 39-44.
- [23]. Litwin DE, Cahan MA. Laparoscopic cholecystectomy. *Surg Clin North Am*. 2008;88:1295-1313.
- [24]. Azevedo JL, Azevedo OC, Miyahira SA, et al. Injuries caused by Veress needle insertion for creation of pneumoperitoneum: A systematic literature review. *Surg Endosc*. 2009;23:1428-1432.
- [25]. Adamsen S, Hansen OH, Funch-Jensen P, Schulze S, Stage JG, Wara P. Bile duct injury during laparoscopic cholecystectomy: A prospective nationwide series. *J Am Coll Surg*. 1997;184: 571-578.
- [26]. Way LW, Stewart L, Gantert W, et al. Causes and prevention of laparoscopic bile duct injuries. *Ann Surg*. 2003;237:460-469.
- [27]. Cuschieri A, Dubois F, Mouiel J, Mouret P, Becker H. (1991) The European experience with laparoscopic cholecystectomy. *Am J Surg* 161(3):385-387
- [28]. Schol FP, Go PM, Gouma DJ. Risk factors for bile duct injury in laparoscopic cholecystectomy: analysis of 49 cases. *British journal of surgery*. 1994;81(12):1786-8.
- [29]. Jatzko GR, Lisborg PH, Pertl AM, Stettner HM. Multivariate comparison of complications after laparoscopic cholecystectomy and open cholecystectomy. *Annals of surgery*. 1995 Apr;221(4):381.

*Technique for safe laparoscopic cholecystectomy: An experience of 7700 cases by a single surgeon, ..*

- [30]. Woods MS, Shellito JL, Santoscoy GS, Hagan RC, Kilgore WR, Traverso LW, Kozarek RA, Brandabur JJ. Cystic duct leaks in laparoscopic cholecystectomy. *The American journal of surgery.* 1994 Jan 1;168(6):560-5.
- [31]. Russell JC, Walsh SJ, Mattie AS, Lynch JT. Bile duct injuries, 1989-1993: a statewide experience. *Archives of surgery.* 1996 Apr 1;131(4):382-8.
- [32]. Deziel DJ, Millikan KW, Economou SG, Doolas A, Ko ST, Airan MC. Complications of laparoscopic cholecystectomy: a national survey of 4,292 hospitals and an analysis of 77,604 cases. *The American journal of surgery.* 1993 Jan 1;165(1):9-14.
- [33]. Huang SM, Wu CW, Hong HT, King KL, Lui WY. Bile duct injury and bile leakage in laparoscopic cholecystectomy. *British journal of surgery.* 1993 Dec;80(12):1590-2.
- [34]. Wakabayashi G, Iwashita Y, Hibi T, Takada T, Strasberg SM, Asbun HJ, Endo I, Umezawa A, Asai K, Suzuki K, Mori Y. 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 Jan;25(1):73-86.
- [35]. Deal SB, Stefanidis D, Brunt LM, Alseidi A. Development of a multimedia tutorial to educate how to assess the critical view of safety in laparoscopic cholecystectomy using expert review and crowd-sourcing. *The American Journal of Surgery.* 2017 May 1;213(5):988-90.
- [36]. <https://emedicine.medscape.com/article/1582292-overview#a4>
- [37]. Talebpour M, Panahi M. New aspects in laparoscopic cholecystectomy. *Journal of Laparoendoscopic & Advanced Surgical Techniques.* 2007 Jun 1;17(3):290-5.
- [38]. Hori T, Oike F, Furuyama H, Machimoto T, Kadokawa Y, Hata T, Kato S, Yasukawa D, Aisu Y, Sasaki M, Kimura Y. Protocol for laparoscopic cholecystectomy: Is it rocket science?. *World journal of gastroenterology.* 2016 Dec 21;22(47):10287.
- [39]. Lockhart S, Singh-Ranger G. Rouviere's sulcus—Aspects of incorporating this valuable sign for laparoscopic cholecystectomy. *Asian journal of surgery.* 2018 Jan 1;41(1):1-3.
- [40]. Hirajima S, Koh T, Sakai T, Imamura T, Kato S, Nishimura Y, Soga K, Nishio M, Oguro A, Nakagawa N. Utility of Laparoscopic Subtotal Cholecystectomy with or without Cystic Duct Ligation for Severe Cholecystitis. *The American Surgeon.* 2017 Nov 1;83(11):1209-13.
- [41]. Pucher PH, Brunt LM, Davies N, Linsk A, Munshi A, Rodriguez HA, Fingerhut A, Fanelli RD, Asbun H, Aggarwal R. Outcome trends and safety measures after 30 years of laparoscopic cholecystectomy: a systematic review and pooled data analysis. *Surgical endoscopy.* 2018 May:1-9.
- [42]. Bailey RW, Zucker KA, Flowers JL, Scovill WA, Graham SM, Imbembo AL. Laparoscopic cholecystectomy. Experience with 375 consecutive patients. *Annals of surgery.* 1991 Oct;214(4):531.
- [43]. Fabre JM, Fagot H, Domergue J, Guillon F, Balmes M, Zaragosa C, Baumel H. Laparoscopic cholecystectomy in complicated cholelithiasis. *Surgical endoscopy.* 1994 Oct 1;8(10):1198-201.
- [44]. Sormaz İC, Soytaş Y, Gök AF, Özgür İ, Avtan L. Fundus-first technique and partial cholecystectomy for difficult laparoscopic cholecystectomies. *Ulus Travma Acil Cerrahi Derg.* 2018 Jan 1;24(1):66-70.
- [45]. Santos BF, Brunt LM, Pucci MJ. The difficult gallbladder: A safe approach to a dangerous problem. *Journal of Laparoendoscopic & Advanced Surgical Techniques.* 2017 Jun 1;27(6):571-8

DrJeevanKankaria. "Technique for safe laparoscopic cholecystectomy: An experience of 7700 cases by a single surgeon, without any conversions to open surgery and without any Bile duct injury." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 19(3), 2020, pp. 55-59.