ORIGINAL RESEARCH PAPER

Volume-8 | Issue-6 | June-2019 | PRINT ISSN No. 2277 - 8179

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

10 STEPS FOR SAFE CHOLECYSTECTOMY

General Surgery

Dr. Rohit Bansal* M.S, F.M.A.S Consultant Department of Minimal Access and G.I Surgery, Max Superspeciality Hospital, Mohali-160055 Punjab India *Corresponding Author

Dr. Kanwarjit Singh Dhillon M.S,F.M.A.S Director & HOD Department of Minimal Access and G.I Surgery, Max Superspeciality Hospital, Mohali

Dr. Gourav Kaushal M.S, M.Ch Consultant Department of Minimal Access and G.I Surgery, Max Superspeciality Hospital

ABSTRACT

Background- Laparoscopic cholecystectomy is the gold standard & most common surgical procedure for the treatment of gall stone disease performed by a laparoscopic surgeon. Even today, this procedure has a devastating complication of biliary injury. Surgical steps have been described & various guidelines have been published by surgical societies. We have compiled all the steps of safe cholecystectomy starting from the preoperative period to surgical steps & tried to describe it as 10 steps of safe cholecystectomy.

Method- This study is neither a randomized control trial nor any comparison study. This article describes the 10 steps of safe cholecystectomy along with various illustrations that we follow at our institute.

Conlusion- Knowledge of the different aspect of gall stone disease including its different presentation, correct time of surgery, variations in surgical anatomy & correct way of performing the procedure will lead to the ultimate common goal of every surgeon to perform a safe cholecystectomy.

KEYWORDS

Safe cholecystectomy, 10 steps, Preoperative assessment, Intraoperative techniques

INTRODUCTION

Laparoscopic cholecystectomy (LC) is one of the most commonly performed laparoscopic procedures. It has become the gold standard in the treatment of gallstone disease since 1992. Parallel to the increase in the number of laparoscopic cholecystectomies, bile duct injuries also increased. The reported incidence of bile duct injuries in literature ranges from 0.3% to 1.4%. Many of the bile duct injuries during laparoscopic cholecystectomy are not due to inexperience, but are the result of basic technical failures and misinterpretations. Iatrogenic biliary injury is a catastrophic complication of laparoscopic cholecystectomy and an important issue in malpractice claims. Misidentification of the biliary anatomy is the major cause of biliary injuries. To avoid this, various guidelines has been published by various societies. These form the basis of contemporary clinical practice standards in terms of proper surgical technique. For example the "critical view of safety" technique has been well described for performing safe cholecystectomy.10 steps of safe cholecystectomy are intended to make a safe operation safer. They do not supplant surgical judgment in the individual patient. The final decision on how to proceed should be made by the operating surgeon, according to his/her experience & judgment.

Steps1.

When to operate - half battle can be won preoperatively by:

- Proper History taking
- Assessing ultrasonographic pictures
- Deciding right time to intervene

Gall stone disease has different clinical manifestations that vary from biliary colic, stone passers to acute cholecystitis. Various clinical presentations & intraoperative findings have been described as:

- Inflammation of the gallbladder wall (acute cholecystitis) causes severe abdominal pain, especially in the right upper quadrant, with nausea, vomiting, fever, and leucocytosis. [1] Intraoperatively, patient has edema of the gall bladder wall [Fig1a]. Calot's triangle will be edematous in these types of cases. Routine use of gauze piece helps in these cases as it soaks the edema fluid & provides the clear field [Fig 1b].
- Recurrent episodes of right-upper-quadrant or epigastric pain are probably related to the impacted stone at gall bladder neck. [2] Impacted stone at neck of gall bladder results in stasis of bile in the gall bladder [Fig 1c]. Gall bladder is distended in these cases. Intraoperatively one should expect mucocele/pyocele of gall bladder [Fig 1d]. Hartman's pouch area may be found resting on the common bile duct.
- Epigastric pain radiating to back suggests the passage of small calculi into the common bile duct. These kinds of patients are known as stone passers. [3] Stone passers are very difficult to handle as patient has deranged liver function test. Amylase level may be raised .Mrcp in these cases fail to show choledocholithiasis due to its low sensitivity to detect common bile duct stone less then 5mm in size.[4] This potential weakness can be corrected by careful clinical follow up. Liver function tests can be repeated after 3-4 days. These patients may require multiple admissions & close monitoring. Depending upon clinical judgment, patient can be taken up for surgery when there is declining trend in liver function tests.
- Gall stones may provoke acute pancreatitis, probably by transiently obstructing the main pancreatic duct where it passes near the common bile duct at the ampulla of Vater.There will be rise in liver function test, amylase and lipase levels.[5]Surgery planning in these cases will depend upon severity of pancreatitis .Mild cases of biliary pancreatitis can be taken up for surgery either during the same admission or after 2 weeks depending on various factors like age of the patient, comorbidities, improvement in liver function tests etc. In cases of moderate pancreatitis surgery may be planned after 6-8 weeks.
- Gall stones may cause obstructive jaundice commonly by a stone migrating into the common bile duct .Other mechanism is direct compression of the common hepatic duct by a large stone in the neck of the gall bladder or cystic duct (Mirrizi syndrome).[6]
- Gallstones may fistulate directly into the viscera (duodenum/colon) from the gallbladder during a period of silent inflammation. Patient will give a history of severe pain which suddenly got relieved. [7]
- **Ultrasound** has the best sensitivity and specificity for evaluating patients with suspected Gallstones. [8]

In addition to the presence of stones look for:

- Gallbladder lumen- contracted or distended
- Gallbladder wall thickness - An increased gallbladder wall thickness of > 3.5 mm has

been found to be a reliable and independent predictor of acute cholecystitis.[9]

- Pericholecystic fluid [10]
- Common bile duct diameter

- Liver surface

2. Watch that muzzle! –Be calm & concentrated –

- Use 30 degree telescope
- Do not rush
- 1st look of peritoneal cavity
- See Liver surface
- Any adhesions
- Morrison pouch
- Pylorus & duodenum 1st part position
- Colon position

After getting a generalized picture of peritoneal cavity then have combined view of anatomy. Look at the gall bladder shape

- Its shape – "s" shape gall bladder are dangerous as they sit on common bile duct. They need proper infundibular retraction [Fig 1e,1f]
- Distended - stone impacted at neck causing mucocele, pyocele.
- Contracted-These gall bladders are fibrotic due to repeated attacks of infection & healing. Gall bladder may be shrunken to very small size [Fig 2a]. Liver notching is seen near the fundus of gall bladder [Fig 2b]. Significant finding in these cases is that bile duct is pulled up towards the gall bladder neck area. Calot's triangle has fibrotic adhesions. [Fig 2c]

3. Know the identifying features of the game you hunt

Fundal retraction – fundal retraction will depend upon anatomy of gall bladder, liver shape, calot's anatomy. It is not always the maximum traction towards patient right shoulder. You may have to modify its direction to left side depending upon other anatomical variables like liver size, gall bladder shape. Traction should be such that calot's triangle can be opened up.

4. Infundibulum retraction- lateral & outwards, try to open a calot's like a book, we will remain on one page of book that is gall bladder. [Fig 2d]

5. Rolling the infundibulum

Be sure of the target and what is in front of it and beyond it. Means you have to see what is in front of calot's & what is **behind that by rolling the infundibulum**

6.Controlled Hypotensive anesthesia

Controlled hypotensive anesthesia that is very well described in other surgeries helps in laparoscopic cholecystectomy also. Blood pressure of 90/60mmhg for 10-15 minutes during calot's dissection helps the surgeon in providing clear bloodless visual field. Clear operative vision will help in preventing any biliary injury.

7. Opening the calot's triangle -Always do dissections close to gall bladder

- Dissect peritoneal reflection - anterior & posterior junction of peritoneum
- Go posterior – open the Maryland like you open artery in open dissection .Window to be made posteriorly [Fig 3a]
- Remain superior to fat pad enclosed within peritoneal folds [Fig 3b]
- Identify whether structure is going into the gall bladder
- Identify cystic lymph node – it is a important landmark, cystic artery lies posterior to it in most of cases
- Anteriorly, open the Maryland with curve parallel & concavity upwards to common bile duct [Fig 3c]
- No need to go right upto cystic duct & common hepatic junction as it can lead to lateral tear due to dissection.
- Do not hurry for applying clips

8.Don't run, jump, or climb with a loaded firearm - Avoid thermal injury

- Check insulation of the instrument before use
- Avoid excessive and unnecessary dissection or use of electrocautery near the CBD
- In case of bleeding does not get panic for unnecessary cauterization/clipping. It can cause injury to common bile duct which can present later as its stricture. [11] Take a gauze piece just press for 2-3 minutes. This will surely help.
- Don't use electrocautery on tissues close to metal clips because thermal energy gets concentrated and leads to desiccation of tissue. This will make the clips less secure predisposing to bleeding and biliary fistula.

9.Size of elements & beware of any abnormal biliary anatomy

- Common bile duct is usually larger then cystic duct but this is not always the case. Common bile duct size varies from patient to patient. One should kept in mind ultrasonography diameter of cbd. Variations in biliary anatomy should always be kept in mind. [Fig 4a, 4b]
- Before clipping critical view of safety should be obtained .Only two structures should be going into the gall bladder. All fat in calot's triangle should be cleared. Through the window liver should be seen clearly. [Fig 4c]

10.What to do in frozen calot's triangle?

- No plane between gall bladder, common bile duct. Calot's triangle cannot be opened up.
- Safe to do partial cholecystectomy instead of fiddling. Open gall bladder at neck, remaining mucosa to be burnt with bipolar cautery. Cystic duct is usually fibrosed in these cases. Gall bladder cuff can be left open as such or suture closed. [Fig 5a, 5b] Drain is placed in these cases.

CONCLUSION

These steps are not the only way to perform laparoscopic cholecystectomy. Surgeons have modified their techniques with increase in experience. Every surgeon has developed a method for performing an optimum and safe laparoscopic cholecytectomy. Steps of laparoscopic cholecystectomy have been described in surgical textbooks. We have tried to compile these steps altogether in a shorter way including the importance of preoperative assessment. This article has focused only on steps to prevent biliary injury. Port insertion techniques are not covered. Knowledge of the different aspect of gall stone disease including its various manifestations, correct time of surgery, variations in surgical anatomy & correct way of performing the procedure will lead to the ultimate common goal of every surgeon to perform a safe cholecystectomy.

Images

FIG 1A Acute calculous cholecystitis; 1B- Use of gauze piece

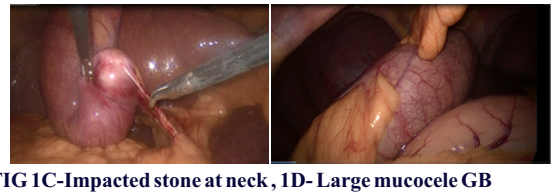


FIG 1C-Impacted stone at neck , 1D- Large mucocele GB

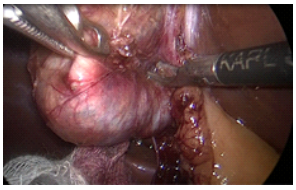
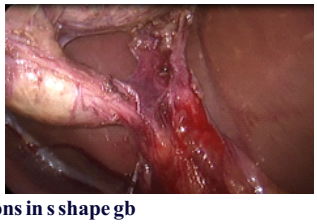


FIG 1E –S shape GB



1F-CD adhesions in s shape gb

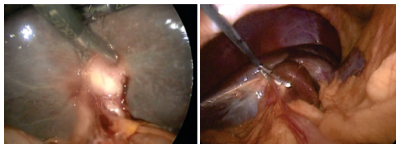


FIG 2a- small shrunken contracted GB, 2b- Liver notching due to fibrosis

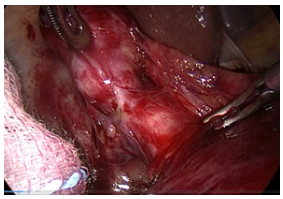
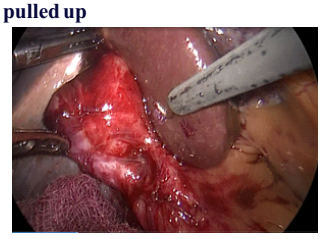


FIG 2c –CBD pulled up



2d- Open like a book

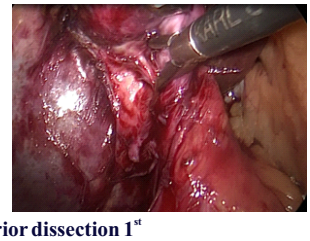
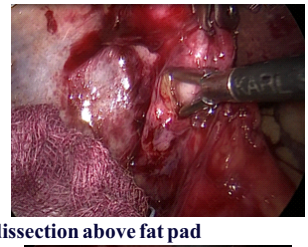


FIG 3a-Posterior dissection 1st



3B-posterior dissection above fat pad

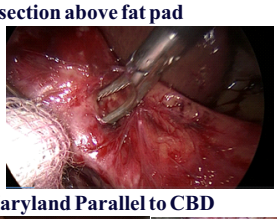


FIG 3c – open Maryland Parallel to CBD

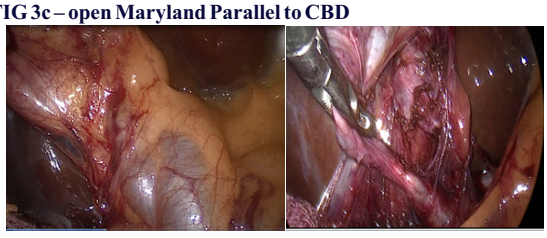


FIG 4a- CD parallel TO CBD ,4b- Arteriovenous malformation in gb fossa

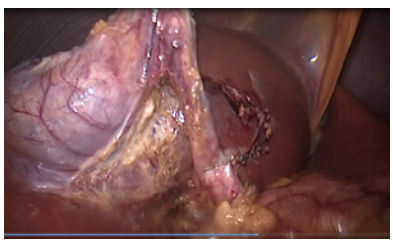


FIG 4c- posterior window

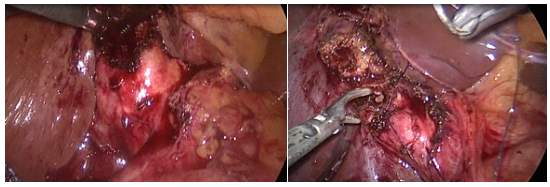


FIG 5a- GB cut open in frozen calots's triangle, 5b- introcorporeal suture applied to stump

REFERENCES

[1] Johnston DE, Kaplan MM. Pathogenesis and treatment of gallstones. N Engl J Med. 1993;328:412–21.

[2] Rigas B, Torosis J, McDougall CJ, Vener KJ, Spiro HM. The circadian rhythm of biliary colic. J Clin Gastroenterol. 1990;12:409–14.

[3] Fitzgerald JE, Fitzgerald LA, Maxwell-Armstrong CA, Brooks AJ. Recurrent gallstone ileus: Time to change our surgery? J Dig Dis. 2009;10:149–51.

[4] Polistina, F. A., Frego, M., Bisello, M., Manzi, E., Vardanega, A., & Perin, B. (2015). Accuracy of magnetic resonance cholangiography compared to operative endoscopy in detecting biliary stones, a single center experience and review of literature. World Journal of Radiology, 7(4), 70–78.

[5] Trotman BW, Petrella EJ, Soloway RD, Sanchez HM, Morris TA, 3rd, Miller WT. Evaluation of radiographic lucency or opaqueness of gallstones as a means of identifying cholesterol or pigment stones. Correlation of lucency or opaqueness with calcium and mineral. Gastroenterology. 1975;68:1563–6.

[6] Johnson LW, Sehon JK, Lee WC, Zibari GB, McDonald JC. Mirizzi's syndrome: Experience from a multi-institutional review. Am Surg. 2001;67:11–4.

[7] Sanders G, Kingsnorth AN. Gallstones. BMJ. 2007; 335:295–9.

[8] Shea JA, Berlin JA, Escarce JJ, Clarke JR, Kinosian BP, Cabana MD, Tsai WW, et al: Revised estimates of diagnostic test sensitivity and specificity in suspected biliary tract disease. Arch Intern Med 1994, 154(22):2573-2581.

[9] Imhof M, Raunest J, Ohmann C, Röher HD: Acute acalculous cholecystitis complicating trauma: a prospective sonographic study. World J Surg 1992, 16(6):1160-1165, discussion 1166.

[10] Trowbridge RL, Rutkowski NK, Shojania KG: Does this patient have acute cholecystitis. JAMA 2009, 289:80-86.

[11] Strasberg SM. Avoidance of biliary injury during laparoscopic cholecystectomy. J Hepatobiliary Pancreat Surg 2002;9:543-7.