

LAPAROSCOPIC CHOLECYSTECTOMY BY L-HOOK AS A SOLE DISSECTOR: OUR EXPERIENCE

General Surgery

Dr Neel Kamal Gupta*	Professor And Unit Head, Department Of General Surgery Mahatma Gandhi Medical College And Hospital, Sitapura, Jaipur *Corresponding Author
Dr Bharat Bhushan Patidar	3rd Yr Pg Resident, General Surgery Mahatma Gandhi Medical College And Hospital, Sitapura, Jaipur
Dr Vipin Yadav	3rd Yr Pg Resident, General Surgery Mahatma Gandhi Medical College And Hospital, Sitapura, Jaipur
Dr Ridham Trivedi	2nd Yr Pg Resident, General Surgery Mahatma Gandhi Medical College And Hospital, Sitapura, Jaipur
Dr Jatin Lakhani	1st Yr Pg Resident, General Surgery Mahatma Gandhi Medical College And Hospital, Sitapura, Jaipur

ABSTRACT

Introduction: Laparoscopic cholecystectomy has become the standard surgical procedure for the treatment of symptomatic gallstone disease, offering numerous advantages over traditional open surgery. The successful execution of this minimally invasive technique relies on the use of specialized instruments (Maryland, harmonic scalpel-hook) for efficient dissection and removal of the gallbladder. Among these instruments, the L-hook dissector has gained considerable attention in recent years. The L hook dissector is characterized by its unique design, featuring a curved, L-shaped tip and an ergonomic handle that resembles the letter "L". This study aims to provide a comprehensive evaluation of the effectiveness, safety, and advantages of doing laparoscopic cholecystectomy completely by L hook. **Material & Methods:** A study was conducted at Mahatma Gandhi Medical College and Hospital, Jaipur; Rajasthan including 60 patients underwent Laparoscopic Cholecystectomy Using L-Hook as a sole dissecting instrument for achievement of critical view of safety and dissection of gallbladder from GB fossa. **Results:** By using L-Hook as a dissecting instrument in laparoscopic cholecystectomy, it eliminates the need for instrument change, making operative time short, whereas in the classical technique frequent change (extraction and reinsertion) of instruments can increase the risk of tissue injury such as bowel or liver. **Conclusion:** L-HOOK Dissector provides surgeons ease and less strain to hands, easy dissection especially posterior dissection, less chances of complications. These factors results in significant reduction of operative time when L-hook is used as a sole instrument as a dissector in laparoscopic cholecystectomy.

KEYWORDS

Gb- Gall Bladder, Cbd-common Bile Duct

INTRODUCTION:

Laparoscopic cholecystectomy has revolutionized the management of symptomatic gallstone disease^{1&2}, offering significant advantages over traditional open surgery, such as smaller incisions, reduced postoperative pain, shorter hospital stays, faster recovery, and improved cosmetic outcomes. Laparoscopic cholecystectomy has since evolved to become the gold standard for cholecystectomies^{3,4}. At this time, laparoscopic cholecystectomy is indicated for the treatment of cholecystitis (acute/chronic), symptomatic cholelithiasis, biliary dyskinesia, gallstone pancreatitis, and gallbladder masses/polyps.

In terms of bile duct injuries and postoperative bleeding both approaches are equally safe. In this minimally invasive procedure, a combination of specialized instruments is employed to safely dissect and remove the gallbladder, which houses the gallstones causing the patient's symptoms.

The successful execution of this minimally invasive technique relies on the use of specialized instruments (Maryland, harmonic scalpel), for efficient dissection of calots triangle and removal of the gallbladder by instruments like L hook and Harmonic scalpel. ⁵Electrosurgery is one of the most commonly used energy systems in laparoscopic surgery. ⁶Electrical energy is converted to heat energy in tissue as the tissue resists the flow of current from the electrode. These tissue effects are possible with today's electrosurgical units—cutting, desiccation, and fulguration. Among the various instruments used during laparoscopic cholecystectomy, the L hook dissector has gained considerable attention in recent years. We have used L hook as a sole instrument for achievement of critical view of safety and dissection of gall bladder from liver bed. The L hook is a versatile instrument characterized by its distinctive curved, L-shaped tip and a handle that resembles the letter "L". This unique design allows for precise dissection and manipulation of tissues within the surgical field.

The L hook dissector offers several potential advantages over other dissecting instruments commonly used in laparoscopic cholecystectomy. Its curved tip enables surgeons to navigate

challenging anatomical structures, particularly in cases involving severe inflammation, fibrosis, or anatomical variations. The shape of the L hook facilitates the separation of adhesions, allowing for safe identification and dissection of the cystic duct and artery, crucial steps in gallbladder removal.

Furthermore, the sharp tip of the L hook provides secure grasping and traction, minimizing the risk of unintended injury to surrounding structures such as the bile ducts. By firmly gripping tissues during dissection, the L hook dissector offers better control and maneuverability, reducing the likelihood of accidental damage to vital structures, especially during the posterior dissection.

In addition to its unique design, the ergonomic handle of the L hook contributes to its appeal in laparoscopic cholecystectomy. The handle is designed to provide a comfortable grip and optimal control, reducing the strain on the surgeon's hand and wrist during the procedure. This ergonomic advantage may result in reduced surgeon fatigue, potentially enhancing surgical precision and decreasing the risk of technical errors.

Given the potential benefits associated with the use of the L hook dissector, this systematic review aims to comprehensively evaluate its effectiveness, safety, and advantages in laparoscopic cholecystectomy. By synthesizing the available evidence, we aim to provide valuable insights into the utility of the L hook as a dissecting instrument and its impact on surgical outcomes.

By conducting a systematic review of relevant studies, including randomized controlled trials, comparative studies, and observational studies, we aim to assess various parameters such as operative time, intraoperative complications, postoperative outcomes, and the subjective assessment of surgeons using the L hook dissector. This comprehensive evaluation will help surgeons and researchers better understand the role of the L hook in laparoscopic cholecystectomy and provide evidence-based guidance on its incorporation into surgical practice.

In conclusion, the use of the L hook dissector in laparoscopic cholecystectomy represents an innovative approach to safely and effectively dissect and remove the gallbladder. With its unique design, the L hook offers advantages in terms of precise dissection, reduced risk of bile duct injuries, and improved surgeon ergonomics. This systematic review aims to contribute to the existing body of knowledge by providing a comprehensive analysis of the current evidence regarding the use of the L hook as a dissecting instrument in laparoscopic cholecystectomy. The intra-operative and immediate post-operative complication cannot be disregarded. With the widespread acceptance of this surgery the spectrum of complications in gall bladder surgery has changed. The most severe complication is an iatrogenic injury of the common bile/hepatic duct. Injury to any of these structures may require a further surgical procedure to divert the flow of bile into the intestines. This procedure usually requires a specially trained Hepato biliary surgeon.

Procedure:-

Pre-operative assessment: Detailed clinical history and physical examination was done. Preoperative data was collected which included patient's demographics and co-morbid conditions (genitourinary, cardiac, pulmonary, gastrointestinal, renal.) and a detailed history of symptom onset.

Pre-operative investigations include:

All routine blood investigations including Ultrasonography, liver function test, coagulation profile and serum amylase & serum lipase.

Operative technique:-

The surgical procedure was carried out with patients under general anesthesia. A nasogastric tube was placed into the stomach at the beginning of the procedure. Patient kept in supine position, in an reverse-Trendelenburg position and inclined laterally to the right at an angle of 15- 30 degrees to facilitate exposure of the hepatic region. After Painting and Draping Done, Supra-umbilical incision given & veress needle inserted, Pneumoperitoneum created to a Pressure 12-14mm Hg. 10mm Port made through previous supra umbilical incision site and scope inserted. Diagnostic laparoscopy was done. 10mm epigastric port made under vision. Two 5mm standard port made under vision. Grasper inserted through laterally 5mm port & GB retracted towards Right shoulder after identification of GB, thus exposing the Calot's triangle and hilum of liver. L-hook inserted through 10mm epigastric working port & used for dissection as following:-

1. Posterior dissection, posterior peritoneum dissected.
2. Anterior dissection, anterior peritoneum dissected.
3. Creation of posterior window followed by dissection of tissue between cystic duct and artery
4. Creation of anterior window (or vice versa).
5. Achievement of critical view of safety.
6. Clipping and cutting of cystic artery and duct (or vice versa).
7. Dissection of gall bladder from liver bed
8. Achievement of hemostasis just before completely dissecting gall bladder.
9. Extraction of gall bladder.
10. Relook for any bleeding and complete achievement of hemostasis and +/- placement of the drain.
11. Through wash given with Normal saline.
12. Ports closure done.
13. Antiseptic dressing done.



Fig 1. L – Hook Tip

Fig 2 L - Hook

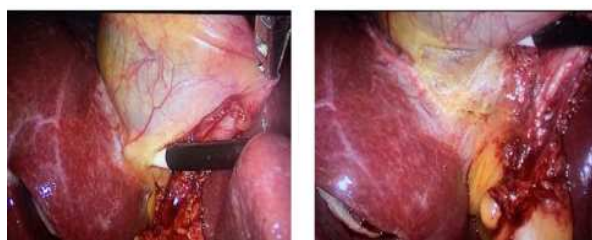


Fig 3. Posterior dissection



Fig 4. Posterior dissection



Fig 5. Anterior Dissection



Fig 6. Anterior Dissection



Fig 7. Posterior Dissection



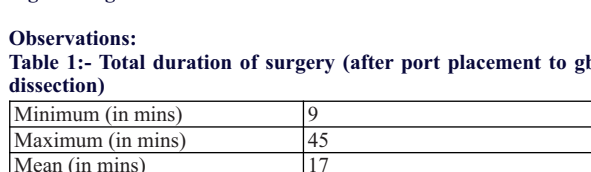
Fig 8. Posterior Dissection



Fig 9 & 10. Dissection between Cystic Duct and artery



Fig 11 & Fig 12. Creation of Anterior and Posterior Window



Observations:

Table 1:- Total duration of surgery (after port placement to gb dissection)

Minimum (in mins)	9
Maximum (in mins)	45
Mean (in mins)	17

The mean duration of surgery was 17min (after port placement to gb dissection from gb fossa)

Table 2:- Duration of post-operative hospital stay

Minimum(days)	1
Maximum(days)	3
Mean(days)	1

The mean duration of post-operative hospital stay required was 1 days (range 1-3 days).

Table 3:-Post operative pain score on vas scale

Min pain score	1
Max pain score	4
Mean pain score	2.17

The mean duration of post operative pain score on vas scale was 2.17 (range 1-10).

Table 4:-intra-operative complication

Bleeding from calot's triangle	0
Bleeding from liver bed	0
Gall bladder perforation	1
Stone spillage	1
Common bile duct injury	0
Conversion to open	0

Intraoperative complications in the form Bleeding & CBD Injury was not present in any patients but gall bladder perforation with subsequent

stone spillage was found during removal of GB from Liver bed in 1 case.

RESULTS:-

The age range for study group was 14-80 years. Total 60 Patients taken and planned for laparoscopic cholecystectomy, successfully completed in all 60 patients (100%) without any conversion to open cholecystectomy. The mean operative time (after port placement to gallbladder dissection) was 17 min.

Intraoperative and postoperative complications were observed. Intraoperative complications in the form of bleeding and CBD Injury were not present but gall bladder perforation with subsequent stone spillage was found in one case during gallbladder removal from liver bed. Mean Post-operative pain score on vas scale 2.17. Mean post-operative hospital stay was 1 day.

Hook causes a knife-like action through the tissue, with enough heating to create coagulation of small vessels. Also the wound healing was rapid and complete. It thus eliminates the need for instrument change, making operative time short, whereas in the classical technique frequent change (extraction and reinsertion) of instruments can increase the risk of tissue injury such as bowel or liver.

DISCUSSION

Mouret first successfully introduced the procedure in 1987 since then laparoscopic cholecystectomy has been extensively accepted. Muhe in 1986 first performed laparoscopic cholecystectomy(11). laparoscopic cholecystectomy is now considered to be the gold standard treatment for cholelithiasis. Significant increase in morbidity, in iatrogenic biliary injuries and arterial haemorrhage was associated with this new technique was associated initially(12). Anatomical relations on laparoscopic visualization are seen differently as compared to open surgery. The surgeon has to rely on his keen knowledge of the variations in anatomy and do thoughtful dissection in order to avoid injury to the extra-hepatic biliary tree. In Calot's triangle the length and course of the cystic artery is variable.

In our study Total 60 Patients taken and planned for laparoscopic cholecystectomy, successfully completed in all 60 patients (100%) without any conversion to open cholecystectomy.

Outcomes have proved that the L hook dissector offers several potential advantages over other dissecting instruments commonly used in laparoscopic cholecystectomy. Its curved tip enables surgeons to navigate challenging anatomical structures, particularly in cases involving severe inflammation, fibrosis, or anatomical variations. Sharp tip of the L hook provides secure grasping and traction, minimizing the risk of unintended injury to surrounding structures such as the bile ducts. By firmly gripping tissues during dissection, the L hook dissector offers better control and maneuverability, reducing the likelihood of accidental damage to vital structures. The only drawback is that it has long learning curve for the beginners and it is difficult to perform laparoscopic cholecystectomy by L hook, but with continuous use and practice it becomes easy for the surgeon to perform laparoscopic cholecystectomy by L- Hook.

In recent reports, rates for conversion to open procedure during laparoscopic cholecystectomy have ranged from 0% to 9%.

The use of monopolar electrocautery did not pose any additional risk of post-operative hemorrhage or bile leak. The added advantage with electro cautery was that it did not have the risk of postoperative complications like clip slippage, dislodgement, ulceration, migration, internalization and necrosis of cystic duct with the risk of bile leakage. The cost factor and availability makes electro cautery a more feasible option than, especially in a low resource setting. However, with monopolar electrocautery, the depth of burn is less predictable and current can be conducted through non-insulated instruments and trocars. So the laparoscopic surgeon must pay attention to the anatomical dissection of the Calot's triangle. L-HOOK Dissector provides surgeons ease and less strain to hands, easy dissection especially posterior dissection, less chances of complications due to frequent changing of instruments. Monopolar electro cautery offers surgeons a reliable means of tissue dissection and hemostasis during laparoscopic cholecystectomy. Its ability to cut and seal tissues minimizes the risk of postoperative complications associated with traditional methods, such as clip-related issues. Moreover, its cost-

effectiveness and widespread availability make it an invaluable resource, particularly in resource-constrained settings. While the L hook dissector and monopolar electro cautery represent significant advancements in laparoscopic cholecystectomy, their safe and effective utilization requires ongoing vigilance and adherence to best practices. Surgeons must prioritize meticulous anatomical dissection and procedural accuracy to mitigate risks and optimize patient outcomes. In conclusion, the evolution of laparoscopic cholecystectomy has been marked by significant advancements in surgical techniques and instrumentation. The integration of innovative tools such as the L hook dissector and monopolar electro cautery has revolutionized the safety and efficacy of this procedure. Moving forward continued emphasis on skill development and procedural refinement will further enhance the quality of care provided to patients undergoing laparoscopic cholecystectomy.

CONCLUSION:

In conclusion L-HOOK Dissector provides



Fig 13. Showing ease of handling

- surgeons ease and less strain to hands
- Easy dissection especially posterior dissection
- Less chances of complications due to frequent changing of instruments

Due to above these factors results in significant reduction of operative time when L-hook is used as a sole instrument as a dissector in laparoscopic cholecystectomy.

REFERENCES

1. Ros A, Carlsson P, Rahmqvist M, Bachman K, Nilsson E. Nonrandomized patients in a cholecystectomy trial; characteristics, procedure, and outcomes. *BMC Surg*. 2006;6:17.
2. Ji W, Li LT, Li JS. Role of Laparoscopic subtotal cholecystectomy in the treatment of complicated cholecystitis. *Hepatobiliary Pancreat Dis Int*. 2006;5:584-9.
3. The first laparoscopic cholecystectomy. Reynolds W. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3015420/> JSLs. 2001;5:89-94. [PMC free article] [PubMed] [Google Scholar]
4. Strasberg SM. Tokyo Guidelines for the Diagnosis of Acute Cholecystitis. *J Am Coll Surg*. 2018 Dec;227(6):624. [PubMed] [Reference list]
5. Wu MP, Ou CS, Chen SL, Yen EYT, Rowbotham R. Complications and recommended practices for electrosurgery in laparoscopy. *Am J Surg*. 2000;179:67-73 [PubMed] [Google Scholar]
6. Advincula AP, Wang K. The evolutionary state of electrosurgery: where are we now? *Curr Opin Obstet Gynecol*. 2008;20(4):353-358 [PubMed] [Google Scholar]
7. Asbun HJ. Technique of laparoscopic cholecystectomy. *Surg Clin North Am*. 1994;74:755-75.
8. Schreuder AM, Busch OR, Besselink MG, Ignatavicius P, Gulbinas A, Barauskas G, Gouma DJ, van Gulik TM. Long-Term Impact of Iatrogenic Bile Duct Injury. *Dig Surg*. 2020;37(1):10-21. [PMC free article] [PubMed]
9. The Effect of L-Hook Dissection and Scissors Dissection on Liver Injury in Laparoscopic Cholecystectomies; Murat Baki Yildirim I, Murat B Ozkan I, Ramazan Topcu I; PMID: 34178550 PMCID: PMC8226039 DOI: 10.7759/cureus.15245
10. Laparoscopic Cholecystectomy and Newer Techniques of Gallbladder Removal; Jeffrey B Comitalo ; PMID: 23318066 PMCID: PMC3535814 DOI: 10.4293/108680812X13427982377184.
11. Muhe e long term follow up after laparoscopic cholecystectomy. *endoscopy* 1992;24(9):754-8
12. Jain sk, tanwar r, raza rc, etal. A prospective, randomized study of comparison of clipless cholecystectomy with conventional laparoscopic cholecystectomy. *J laparoendosc adv surg tech* a 2011;21(3):203-8