

A Comparative Study on the Use of L-Hook versus Maryland Forceps as a Dissector in Laparoscopic Cholecystectomy**Naveen Khandelwal¹, Akash Maheshwari², Neelkamal Gupta³**^{1,2}PG Resident, Department of General Surgery, Mahatma Gandhi Medical College & Hospital, Jaipur, Rajasthan, India³Professor and Unit Head, Department of General Surgery, Mahatma Gandhi Medical College & Hospital, Jaipur, Rajasthan, India

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Conflict of interest: Nil

Abstract**Introduction:** Laparoscopic cholecystectomy (LC) is the gold standard treatment for symptomatic gallstone disease, and the choice of dissecting instrument influences operative efficiency and patient outcomes.**Aim:** To compare the L-hook and Maryland forceps as dissecting instruments in laparoscopic cholecystectomy with respect to intraoperative and postoperative outcomes.**Materials and Methods:** This prospective comparative study was conducted in the Department of General Surgery, Mahatma Gandhi Medical College & Hospital, Jaipur, from May 2025 to June 2026. A total of 100 patients undergoing elective laparoscopic cholecystectomy were divided equally into Group A (L-hook, n=50) and Group B (Maryland forceps, n=50). Operative time, intraoperative bleeding, stone spillage, bile duct injury, postoperative pain (Visual Analog Scale), hospital stay, and return to normal activity were recorded and compared using the Chi-square test and independent Student's t-test, with $p < 0.05$ considered statistically significant.**Results:** The mean operative time was significantly shorter in the L-hook group than in the Maryland forceps group (74.42 ± 28.83 vs 98.50 ± 27.06 minutes; $p < 0.001$). Postoperative pain scores (3.38 ± 1.19 vs 4.78 ± 0.95), duration of hospital stay (3.10 ± 0.64 vs 3.66 ± 0.79 days), and time to return to normal activity (1.96 ± 0.49 vs 2.46 ± 0.76 days) were also significantly lower in the L-hook group ($p < 0.001$ for all). Intraoperative bleeding and stone spillage were comparable between the groups, and no common bile duct injury or postoperative bile leak occurred in either group.**Conclusion:** The L-hook provides significantly shorter operative time, reduced postoperative pain, and faster recovery compared with Maryland forceps, with a comparable safety profile, supporting its use as an efficient primary dissecting instrument in elective laparoscopic cholecystectomy.**Keywords:** Calot's triangle, Electrocautery, Minimally invasive surgery, Operative time, Postoperative pain.**DOI:** 10.25258/ijcpr.18.10.36

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Introduction

Laparoscopic cholecystectomy (LC) has evolved as the gold standard for management of symptomatic cholelithiasis since its introduction [1], offering significant advantages over traditional open surgery, including reduced patient discomfort, better cosmetic results, shorter hospital stay, and shorter interval to return to work [2,3].

The selection of an appropriate dissecting instrument is a fundamental aspect of surgical technique that directly influences operative outcomes, tissue trauma, operative time, and complication rates [4]. The L-hook electrocautery dissector and the Maryland dissector forceps are two of the most commonly used instruments for

dissection of Calot's triangle and removal of the gallbladder [5], each with distinct advantages and limitations for tissue dissection and haemostasis [6]. The L-hook dissector has gained considerable attention owing to its curved tip, which enables navigation of challenging anatomical structures, particularly in cases with severe inflammation, fibrosis, or anatomical variation, and facilitates safe identification and dissection of the cystic duct and artery [5].

The Maryland dissector forceps, with fine slender jaws, an atraumatic profile, and optional serrations, provides fine control for gentle tissue manipulation, precise grasping, and careful retraction, and is

particularly valuable for blunt dissection adjacent to critical structures [6,7]. Some evidence from thoroscopic surgery suggests that Maryland forceps use may reduce thermal damage to adjacent tissue compared with electrocautery hooks [6,8]. Despite the widespread use of both instruments, there is limited literature directly comparing the L-hook and Maryland forceps as the primary dissecting instrument in laparoscopic cholecystectomy, even though the choice of instrument can influence surgery duration, tissue damage, haemorrhage control, postoperative pain, and complications.

Adoption of a universal culture of safety in cholecystectomy, centred on achieving the Critical View of Safety (CVS), has been emphasised as central to preventing bile duct injury regardless of the instrument used [9-12]. Against this background, the present study was undertaken to compare intraoperative and postoperative outcomes between the L-hook and Maryland forceps in patients undergoing elective laparoscopic cholecystectomy.

Aim: To provide comparative outcomes in laparoscopic cholecystectomy by comparing the use of the L-hook and Maryland forceps as a dissecting instrument.

Materials and Methods

Study Design and Setting: This was a prospective comparative study conducted in the Department of General Surgery, Mahatma Gandhi Medical College & Hospital, Jaipur, Rajasthan, India.

Study Period: May 2025 to June 2026.

Ethics Approval: Institutional Ethics Committee approval was obtained prior to the start of the study, and written informed consent was obtained from all participants before enrolment.

Inclusion Criteria: Patients aged 18-75 years undergoing elective laparoscopic cholecystectomy who provided consent for surgery.

Exclusion Criteria: Patients planned for other gastrointestinal surgery, those with previous abdominal surgery, severe cholecystitis, coexisting

hepatobiliary disease, pregnancy, unstable medical conditions (severe cardiovascular disease, uncontrolled diabetes, severe respiratory disease), or bleeding disorders were excluded.

Sample Size: The calculated sample size was 100 patients, with 50 participants in each group.

Methodology: Patients undergoing elective laparoscopic cholecystectomy for gallbladder disease were enrolled after obtaining written informed consent. All patients underwent detailed clinical evaluation, routine laboratory investigations, and pre-anaesthetic assessment, and comorbidities were optimised preoperatively.

All procedures were performed under general anaesthesia using the standard four-port laparoscopic technique. Patients were divided into two groups according to the dissecting instrument used: Group A (L-hook electrocautery) or Group B (Maryland forceps).

Standard dissection of Calot's triangle, achievement of the Critical View of Safety, clipping and division of the cystic duct and artery, gallbladder dissection from the liver bed, and specimen retrieval were performed in all cases. Intraoperative parameters, including operative time, blood loss, gallbladder perforation, bile spillage, and complications, were recorded, along with postoperative pain, hospital stay, and time to return to normal activity.

Statistical Analysis: The collected data were analysed using SPSS version 28.0. Categorical variables were expressed as frequencies and percentages, while continuous variables were presented as mean $\pm$ standard deviation. The Chi-square test and independent Student's t-test were used for comparison between groups, with a p-value <0.05 considered statistically significant.

Dissecting Instruments Used: Group A patients underwent dissection of Calot's triangle using the L-hook monopolar electrocautery dissector, while Group B patients underwent dissection using the Maryland dissector forceps. Schematic representations of both instruments are shown in Figure 1 and Figure 2.

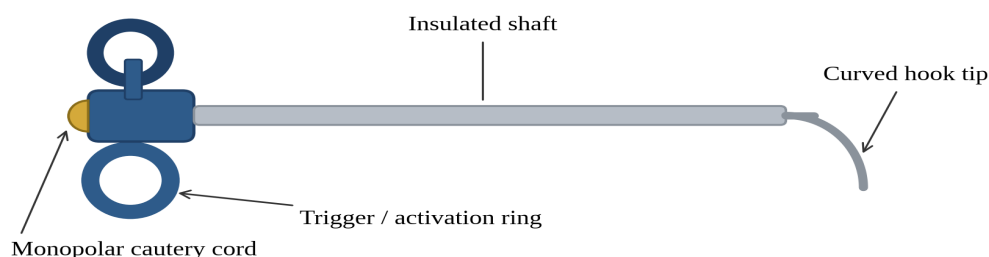


Figure 1: Schematic representation of the L-hook electrocautery dissector used in Group A

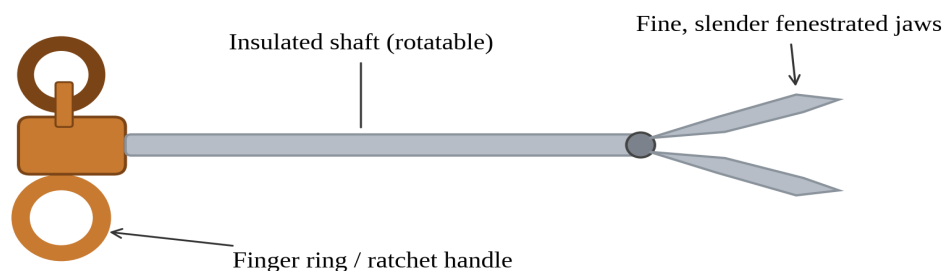


Figure 2: Schematic representation of the Maryland dissector forceps used in Group B

Results

A total of 100 patients undergoing laparoscopic cholecystectomy were included in the study, with 50 patients each in Group A (L-hook) and Group B (Maryland forceps).

The demographic characteristics of both groups were comparable. The majority of patients belonged to the 41-50 year age group (mean age

Group A: 45.02 ± 11.30 years; Group B: 44.78 ± 12.02 years), and females predominated in both groups (Group A: 60%; Group B: 70%). There was no statistically significant difference between the groups with respect to age ($p=0.100$) or gender distribution ($p=0.295$). Calculous cholecystitis was the most common diagnosis in both groups (97% of total cases), with no significant difference in diagnosis profile between the groups ($p=0.378$).

Table 1: Intraoperative complications in the two groups

Intraoperative complication	Group A: L-hook n (%)	Group B: Maryland forceps n (%)	Total n (%)
Bleeding from Calot's triangle	4 (8%)	5 (10%)	9 (9%)
Bleeding over liver bed	2 (4%)	3 (6%)	5 (5%)
Stone spillage	10 (20%)	12 (24%)	22 (22%)
Common bile duct injury	0 (0%)	0 (0%)	0 (0%)

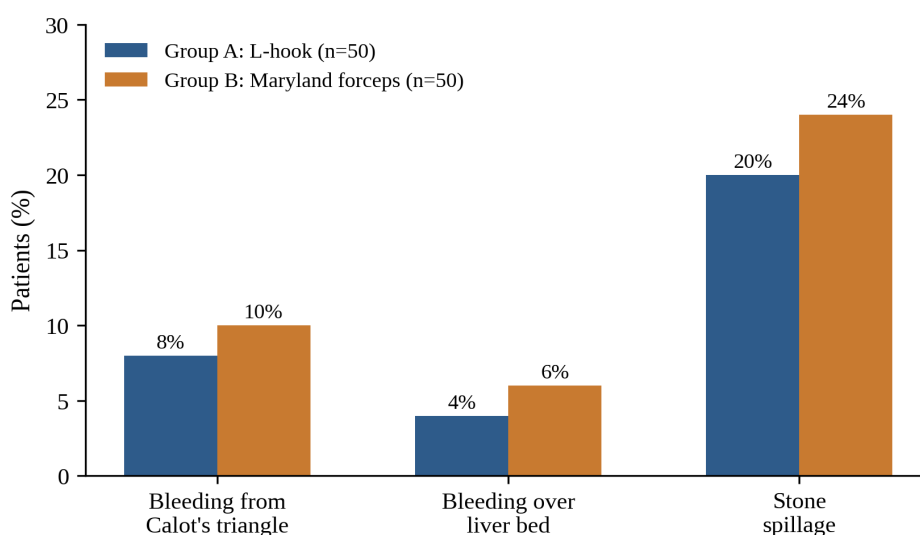


Figure 3: Comparison of intraoperative complications between the two groups

Intraoperative complications were comparable between the two groups (Table 1, Figure 3). Bleeding from Calot's triangle was observed in 8% of patients in the L-hook group and 10% in the Maryland forceps group ($p=0.72$).

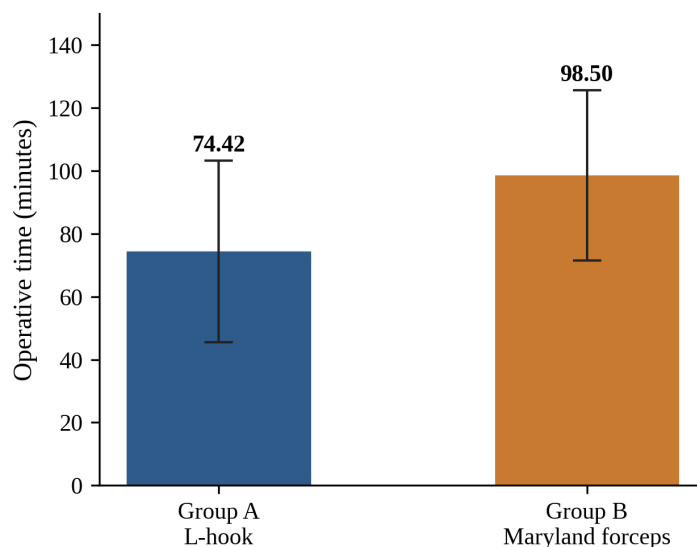
Bleeding over the liver bed occurred in 4% of patients in Group A and 6% in Group B ($p=0.64$).

Stone spillage was noted in 20% of patients in the L-hook group and 24% in the Maryland forceps group ($p=0.63$).

No common bile duct injury or postoperative bile leak was reported in either group, or no case in either group required conversion to open cholecystectomy [13].

Table 2: Comparison of mean operative time between the two groups

Group	N	Mean (min)	SD	t-value	p-value
Group A: L-hook	50	74.42	28.83	4.306	<0.001*
Group B: Maryland forceps	50	98.50	27.06		

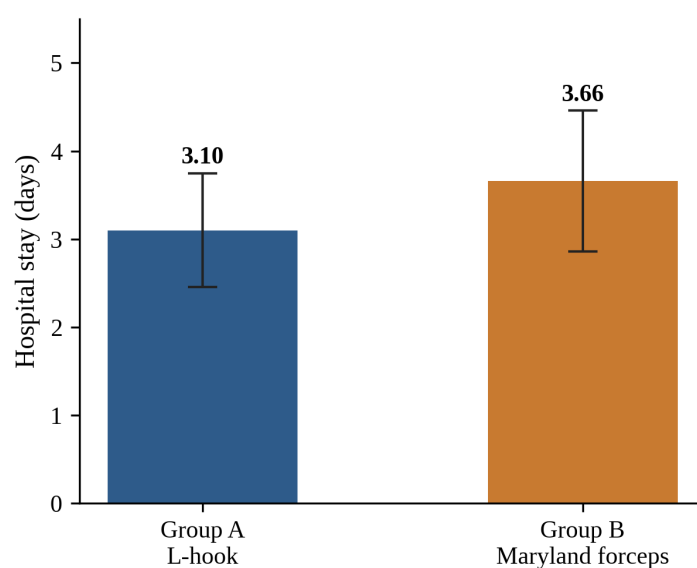
*Statistically significant, $p < 0.05$ **Figure 4: Comparison of mean operative time between the two groups (*Statistically significant, $p < 0.05$; $t = 4.306$, $p < 0.001$). Error bars indicate standard deviation.**

The mean operative time was significantly shorter in Group A (L-hook) than in Group B (Maryland forceps) (74.42 ± 28.83 vs 98.50 ± 27.06 minutes; $t = 4.306$, $p < 0.001$) (Table 2, Figure 4).

Postoperative pain assessed using the Visual Analog Scale (VAS) was also significantly lower in the L-hook group (3.38 ± 1.19) than in the Maryland forceps group (4.78 ± 0.95 ; $p < 0.001$).

Table 3: Comparison of mean duration of hospital stay between the two groups

Group	N	Mean (days)	SD	t-value	p-value
Group A: L-hook	50	3.10	0.647	3.854	<0.001*
Group B: Maryland forceps	50	3.66	0.798		

*Statistically significant, $p < 0.05$ **Figure 5: Comparison of mean duration of hospital stay between the two groups (*Statistically significant, $p < 0.05$; $t = 3.854$, $p < 0.001$). Error bars indicate standard deviation.**

Patients in Group A had a significantly shorter duration of hospital stay (3.10 ± 0.64 vs 3.66 ± 0.79 days; $p < 0.001$) (Table 3, Figure 5) and returned to normal daily activities significantly earlier (1.96 ± 0.49 vs 2.46 ± 0.76 days; $p < 0.001$) than those in Group B. No postoperative complications were reported in either group.

Discussion

Laparoscopic cholecystectomy has become the gold standard treatment for symptomatic gallstone disease owing to its minimally invasive nature, shorter hospital stay, reduced postoperative pain, and rapid recovery. The safety and efficacy of the procedure depend largely on proper dissection within Calot's triangle and accurate achievement of the Critical View of Safety (CVS) [9]. Among the commonly used dissecting instruments, the L-hook and Maryland forceps are widely preferred by surgeons, though they differ in precision, thermal spread, tissue handling, and operative ergonomics.

The present study found that the L-hook offered a significantly shorter operative time compared with Maryland forceps (74.42 ± 28.83 vs 98.50 ± 27.06 minutes; $p < 0.001$). This may be attributed to the simplicity of the L-hook, its precise monopolar energy application, and rapid division of areolar and fibrous tissue in Calot's triangle without the need for repeated instrument exchange between grasping and cutting, unlike the Maryland forceps, which requires alternating blunt grasping and sharp dissection. Similar findings of more rapid dissection with the L-hook were reported by Yildirim et al. [5], who observed that its curved tip facilitated safe and efficient dissection of the cystic duct and artery, even in cases with adhesions or fibrosis. In contrast, Kapoor et al. [14] noted that multifunctional grasping instruments can reduce repeated instrument exchange in some settings; in the present series, however, this advantage did not translate into a shorter operative time for the Maryland forceps group, likely reflecting the additional manipulation required for its articulating jaws during sharp dissection.

Concerns regarding thermal spread with monopolar cautery instruments have previously been highlighted by Hunter¹⁵, who noted that excessive thermal spread may contribute to biliary complications. In the present study, however, no common bile duct injury, bile leak, or major thermal complication occurred in the L-hook group, suggesting that with adherence to the CVS principles described by Strasberg et al. [9,11] and judicious, controlled application of energy, the L-hook can be used safely without compromising outcomes.

Intraoperative bleeding from Calot's triangle and the liver bed, as well as stone spillage, were

comparable between the two groups. This indicates that the L-hook does not carry an increased risk of these complications when used with appropriate surgical technique, consistent with the observations of Deziel et al. [16] and Schafer et al. [17], who emphasised that careful technique, rather than instrument choice alone, is the key determinant of intraoperative bleeding and gallbladder perforation during laparoscopic cholecystectomy.

Postoperative outcomes also favoured the L-hook group in the present study, with significantly lower VAS pain scores, shorter hospital stay, and earlier return to normal activity. The shorter operative time in this group may itself have contributed to reduced tissue handling time and a lesser inflammatory response, translating into faster recovery. These findings align with reports that instruments enabling a more efficient surgical workflow and reduced operative time are associated with improved perioperative outcomes [14].

The Maryland forceps, with its articulating jaws, offers superior atraumatic grasping and fine blunt dissection, and continues to be valuable in select difficult cases with dense adhesions or distorted anatomy [6-8]. In the present cohort of routine elective cases, however, this theoretical advantage did not translate into a shorter operative time, less postoperative pain, or faster recovery. The L-hook, meanwhile, continues to remain popular among laparoscopic surgeons because of its simplicity, easy availability, and cost-effectiveness⁴. Surgeon familiarity and technical skill significantly influence outcomes irrespective of the instrument used, and the choice between the L-hook and Maryland forceps should also consider surgeon preference, patient anatomy, and intraoperative difficulty [12].

The present study supports the L-hook as an efficient, safe, and cost-effective primary dissecting instrument for elective laparoscopic cholecystectomy, while acknowledging that surgeon experience, adherence to CVS principles, and case-specific anatomical difficulty remain the most important determinants of a safe outcome, irrespective of the instrument used.

Limitation(s)

This study has certain limitations. It was conducted at a single tertiary care centre with a modest sample size of 50 patients per group, which may limit the generalisability of the findings. Allocation of the dissecting instrument was not randomised and may have been influenced by surgeon preference and anticipated case difficulty. Patients with severe cholecystitis and prior abdominal surgery were excluded, and hence the results may not be generalisable to more complex or difficult

gallbladders. Long-term follow-up for port-site complications and quality of life was not assessed.

Conclusion

The present study concludes that the L-hook offers significant advantages over Maryland forceps as a dissecting instrument in laparoscopic cholecystectomy, including shorter operative time, lower postoperative pain, shorter hospital stay, and earlier return to normal activities, with a comparable safety profile in terms of intraoperative bleeding, stone spillage, and bile duct injury. The L-hook may therefore be considered an efficient and safe primary dissecting instrument for elective laparoscopic cholecystectomy, particularly in routine, uncomplicated cases, while Maryland forceps remains a valuable adjunct in cases with dense adhesions or distorted anatomy requiring fine atraumatic grasping. Proper surgical training, adherence to the Critical View of Safety, and sound intraoperative judgement remain the key determinants of successful outcomes in laparoscopic cholecystectomy, irrespective of the instrument used.

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