

## The Use of Abdominal Drain in Laparoscopic Cholecystectomy: A Comparative Study

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Conflict of interest: Nil

### Abstract:

**Aim:** To assess the need of intraperitoneal drain placement in laparoscopic cholecystectomy.

**Materials and Methods:** Our study was carried out at JIU'S IIMSR, Warudi Jalna, India, a rural tertiary care center from August 2021 to September 2023 and includes 130 patients who underwent elective laparoscopic cholecystectomy. Drain was used for selective cases and data of post-op recovery in all patients was analysed and compared to non-drain placement.

**Results:** Although there was slightly more discomfort noted in patients who had drain placement, there was no significant difference on comparison of the 2 groups based on various parameters including operative time, post-op pain, paralytic ileus, suture site infection and duration of hospital stay. There was also no significant collection noted in patients who did not have drain placement.

**Conclusion:** The use of drains following laparoscopic cholecystectomy does not lead to significantly different outcomes compared to not using drains. The decision to place a drain should be reserved for selected cases based on the surgeon's judgement and the individual patient's condition, rather than routine practice.

**Keywords:** Abdominal Drain, Laparoscopic Cholecystectomy.

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### Introduction

Laparoscopic cholecystectomy is a widely performed surgical procedure for the treatment of symptomatic gallstone disease. It has many advantages as compared to open surgery. [1,2]

The use of a drain has been a common practice following abdominal surgery for decades now. [3] It has been routine to use a prophylactic drain in the peritoneal cavity following abdominal surgery to remove any intra-peritoneal collections such as, blood, bile, ascites, chyle, or any abscess. [4]

Drains also help with early detection of postoperative complications, such as postoperative bleeding or anastomotic leakage, and more importantly in laparoscopic cholecystectomy to detect a bile leak. [5]

However the use of drain has its own drawbacks such as potential injury to vessels, anastomotic sites, bowel or other viscera. It may also be the cause of post operative pain and discomfort thereby increasing duration of hospital stay. [6]

If placed in contaminated incisions, drains may increase the incidence of surgical site infection. [7]

The use of drains following laparoscopic cholecystectomy remains a controversial aspect of postoperative care. Our study analyses 125 cases of

laparoscopic cholecystectomy performed over 2 years, where drain was used in selective cases and its related outcome in terms of post operative recovery. Results were compared to those in whom drain was not used.

### Material and Methods

Our study group includes all patients of both genders, above 18 years of age posted for elective laparoscopic cholecystectomy in the Department of General Surgery at Indian Institute of Medical Sciences and Research, a rural tertiary care hospital in Warudi, Jalna, India.

Patients were subsequently divided into 2 groups, those in whom drain was placed and those without drain.

Patients with Acute cholecystitis, or associated choledocholithiasis, other biliary anomalies and previous biliary surgery were excluded from the study.

All procedures were performed by experienced laparoscopic surgeons. Surgical technique used in all patients was uniform. Under General Anaesthesia, with patient in supine position pneumoperitoneum was created after insertion of 10 mm umbilical port (with either open Hasson

technique or with Veress needle) which was used as camera port. Patient was then repositioned with 15° anti-Trendelenburg position with 15° right upward tilt. Three 5mm working ports were subsequently inserted in epigastrium, right subcostal region (midclavicular and anterior axillary line respectively). Gall bladder fundus was held with grasper and retracted upwards with second grasper at infundibulum for downward traction. Adhesions if present were separated with help of monopolar cautery (hook) and blunt dissection. Callot's triangle was dissected with use of monopolar hook and Maryland forceps, with skeletonization of cystic duct and artery. After achieving critical view of safety, both cystic duct and artery were clipped with LT300 Ligaclips and divided. If duct was dilated polygalactin sutures were used. Gall bladder was then separated from liver bed with monopolar cautery hook leaving cystic plate intact and specimen was retrieved from epigastric port.

Drain that was kept in selective cases was placed in subhepatic region (hepato-renal pouch) and fixed. Tube drain of 16 Fr was used. Intra-operative findings were noted and placement of drain recorded. Patients were evaluated on various parameters post-operatively, and drain if placed, was subsequently removed if there was no significant drain volume for 24 hours.

Intra-operative parameters used for the study included presence of omental/ bowel adhesions, injury to gall bladder or cystic duct causing bile

spillage, any injury to surrounding bowel, hemorrhage, duration of surgery, difficulty in performing Collot's dissection and contamination of peritoneal cavity.

Post-operative parameters included drain output and duration of drain placement, pain (assessed by visual analogue scale), fever, any evidence of collection, localized or generalized intraperitoneal infection, surgical site infections and hospital stay (Period of Recovery). Antibiotic coverage and post-operative analgesics used in all patients remained same.

All data analysis had been done by using SPSS (version 22) for windows. The initial measures of each group were compared with the final measures of the study period and compared between the groups by using student t test and chi square test.

### Observation and results

In a period of 2 years, a total of 130 elective laparoscopic cholecystectomies were performed, of which 5 converted to open, were excluded from the Study. Out of these 125 cases, drain was placed (Group A) in 42 patients (33.6%), while in 83 patients (66.4%), drain was not placed (Group B).

#### A) Age Distribution:

Out of 125 patients included in the study, 21% belong to 18-20 years, 27% belong to age group 21-30 years, 41% belong to 31-40 years, 8% in 41-50 years while 3% were above 50 years of age.

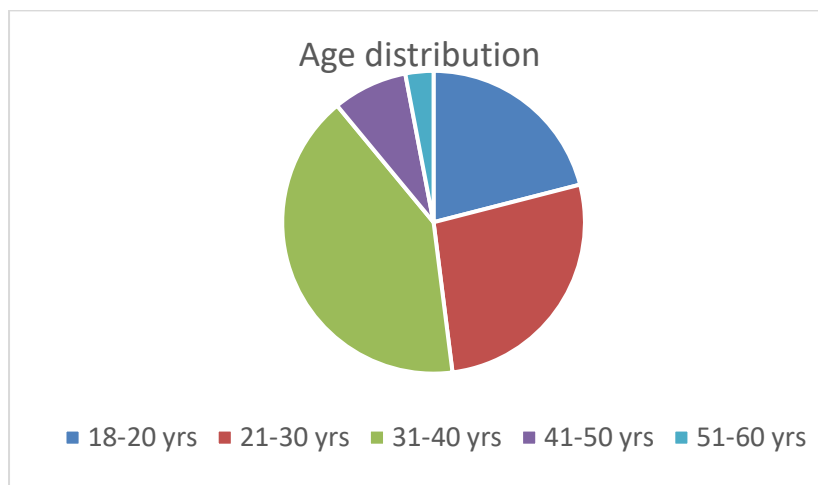


Chart 1: Age Distribution

#### B) Sex Distribution:

Out of 125 patients, 90 (72%) were female while 35(28%) were male.

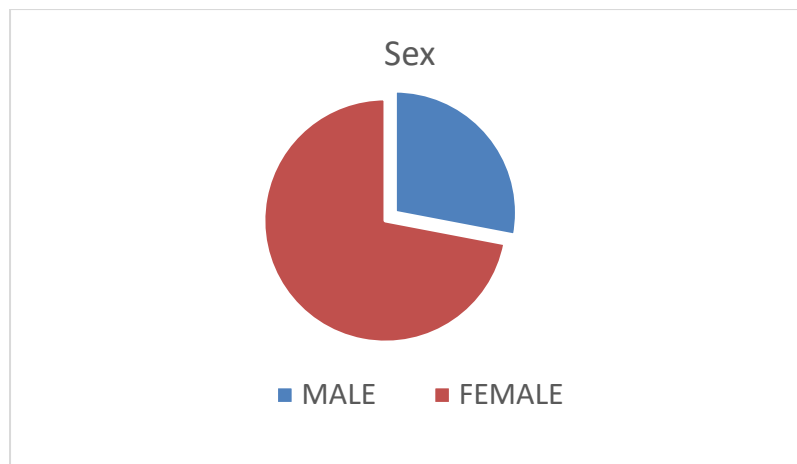


Chart 1: Sex Distribution

**C) Diagnosis :**

Acute inflammatory conditions of gall bladder were excluded from the study. Out of the 125 elective laparoscopic cholecystectomies done, the diagnosis is as follows :

Table 1: Diagnosis

Diagnosis	No. of patients
Symptomatic Cholelithiasis	102
Chronic Cholecystitis	12
Interval Cholecystectomy	9
Gall bladder Polyp	2

**E) Operative time:**

Mean operative time was 52 minutes (range 46–105 minutes). Additional time required for drain placement and fixation was an average of 3 minutes (range 2-7 minutes).

**F) Intra-operative findings:**

Pericholecystic Adhesions including that with omentum or small bowel were seen in 42 (33.6%) cases which were separated by monopolar hook electrocautery and blunt dissection. In 28 of these 42 cases, dissection of Callot's was difficult but critical view of safety was achieved. However for 9 cases (7%), subtotal cholecystectomy was done.

Cystic duct was dilated in 8 cases for which intracorporeal knotting with 2.0 polygalactin was done, while in all other cases duct was clipped with LT300 Ligaclips.

In 4 cases there was bleeding during Callot's dissection (average 50 ml) which was controlled. In all other cases blood loss was minimal with mean of 10-20 ml.

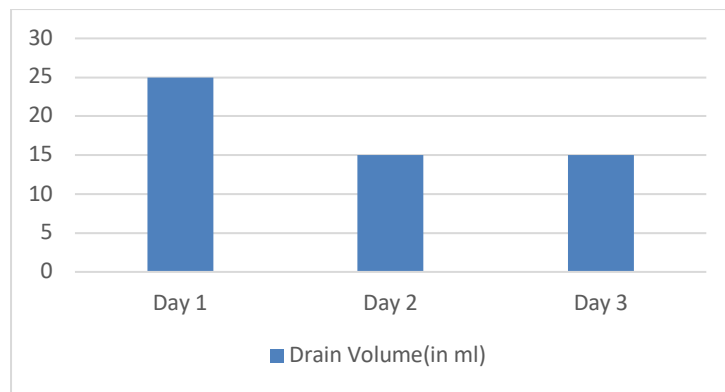
Six cases with dense adhesions were converted to open surgery, which were later excluded from the study.

No injury to bile duct, small bowel or any other viscera were encountered during the procedure.

**G) Post operative course:**

1) **Drain Volume:** In patients in whom drain was placed it was subsequently removed if there was no significant drain volume for 24 hours.

Average drain volume was 25 ml, 20 ml and 10 ml for post operative day 1, 2 and 3 respectively, which was sero-hemorrhagic. There was no bile leak noted in any of the patients.

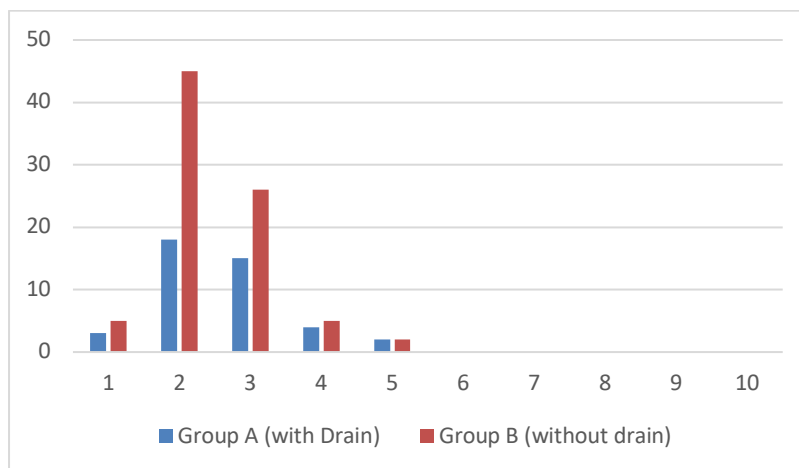


**Chart 3: Average Drain Volume**

There was no significant collection noted clinically in any of the patients in whom drain was not placed.

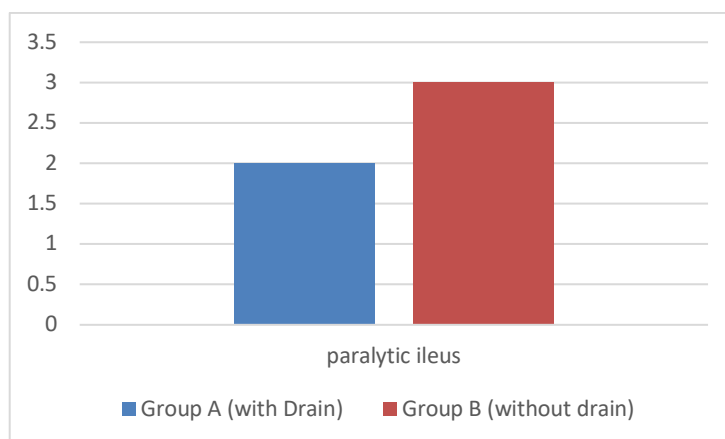
2) **Post-op Pain:** Post-operatively patients received analgesics as and when required subjective to individual requirement. Patients

were evaluated 12 hours after the procedure for degree of pain on a scale of 0-10 using VAS (visual analogue scale). In group A, mean VAS was 2.62 (SD = 0.85 ), while in group B it was 2.45 (SD = 0.79). There was no significant difference in terms of post-op pain in the 2 groups (p value = 0.378).



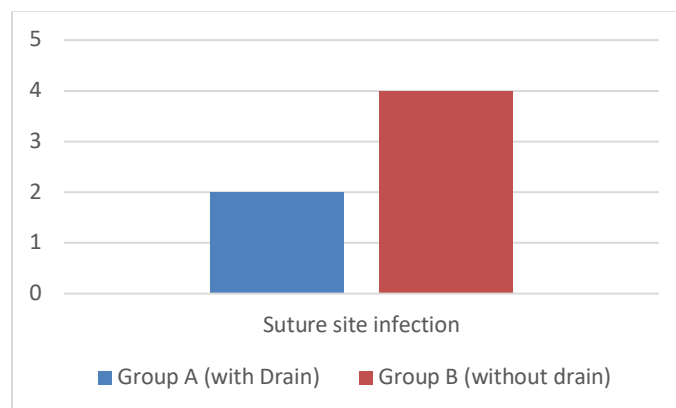
**Chart 4: Post operative pain (On visual analogue scale from 1 to 10)**

3) **Paralytic ileus:** Paralytic ileus was noted in 5 patients, of which 2 patients (4.7%) were in group A (n=42), and 3 cases (3.6%) in group B (n=83). Using two proportion Z test, there was no difference in the 2 study groups.(p-value = 0.378 )



**Chart 5: Paralytic Ileus**

- 4) **Suture Site Infection:** Suture site infection was seen in a total of 6 out of 125 patients (4.6%). Of these, 2 patients (4.7%) were in group A (n=42) and 4 patients(4.8%) in group B(n=83). Using two proportion Z test, there was no difference in the 2 study groups. (p-value = 0.494)



- 5) **Duration of hospital stay:** Difference in 2 groups could not be estimated due to standardized departmental discharge protocols. However it may be noted that there was no prolonged duration of stay due to delay in post op recovery in either group.

### Discussion

Laparoscopic cholecystectomy is now considered the standard of care for symptomatic cholelithiasis. With advancements in minimally invasive techniques, the procedure has shown significant benefits, such as reduced postoperative pain, shorter hospital stays, and quicker recovery times [1,2]

The use of drain in peritoneal cavity is still controversial. While drain placement offers early detection of bleeding or bile leak, some studies suggest it increases the likelihood of intra-abdominal and wound site infections and hence the duration of hospitalization with worsening lung function. [8] The decision to place a drain after laparoscopic cholecystectomy varies among surgeons and is often based on individual preferences or institutional protocols.

With the progress in minimally invasive technique for a safe cholecystectomy, and increasing experience of operating surgeons, the use of surgical drain in laparoscopic cholecystectomy has been restricted to a more case specific approach rather than its generalised use. [9]

Ahmet et al [10], in 2013 retrospectively analysed data of 250 cases of laparoscopic cholecystectomy ,of which 52 out of 199 (26.1%) patients without drains had postoperative fluid collection, compared to 15 of 51 (29.4%) patients with drains (P>0.05). The study demonstrated no relationship between the presence of a drain after laparoscopic cholecystectomy and the presence of postoperative fluid collection. [10]

In their study of 409 cases of laparoscopic cholecystectomy Calini G et al.[11] in 2022, identified predictive factors that drive surgeons to place drains following laparoscopic cholecystectomy including Age >64 years, male sex, inflamed gall bladder, Charlson comorbidity index  $\geq 1$ , intraoperative technical difficulties, need for an additional trocar, operative time >60 min, and estimated blood loss >10 ml. [11]

In 2015, Chee W. et al.[12] conducted a systematic review and meta-analysis of 12 randomized control trials involving 1763 patients (897 with drain versus 866 without drain). There was no statistically significant difference in incidence of intra-abdominal collections, post operative nausea, vomiting, shoulder tip pain or wound infections rates. However drain group had prolonged operative time and higher pain scores. They concluded that there is no significant advantage of drain placement and it seems to have unfavourable clinical outcome. [12]

A similar Cochrane based review of 12 trials including 1831 participants showed a longer operative time with no significant difference in terms of adverse effects, quality of life, length of hospital stay. [13] The proportion of patients who were discharged as day-procedure laparoscopic cholecystectomy was significantly lower in the drain group than the 'no drain' group. [13]

In a recently published randomised control trial, Zhu et al [14] demonstrated no drainage after elective Laparoscopic cholecystectomy is safe and associated with fewer complications, even in patients with gall bladder perforation. The trial also shows that presence of drain is an independent risk factor for postoperative fever and may lead to unsuccessful day-care procedure by causing fever, elevated CRP, and extended hospital stay. [14]

## Conclusion

In conclusion, this prospective study demonstrates that the use of drains following laparoscopic cholecystectomy does not lead to significantly different outcomes compared to not using drains. The decision to place a drain should be based on the surgeon's judgment and the individual patient's condition, rather than routine practice. These findings may aid in guiding future clinical practices and contribute to the ongoing debate on the use of drains in laparoscopic cholecystectomy.

## References

1. Keus F, de Jong JA, Gooszen HG, van Laarhoven CJ. Laparoscopic versus open cholecystectomy for patients with symptomatic cholelithiasis. *Cochrane Database Syst Rev.* 2006; CD006231.
2. Okamoto K, Suzuki K, Takada T, Strasberg SM, Asbun HJ, Endo I, et al. Tokyo Guidelines 2018: flowchart for the management of acute cholecystitis. *J Hepatobiliary Pancreat Sci.* 2018; 25:55–72.
3. T.W. O'Connor, T.B. Hugh. Abdominal drainage: a clinical review. *Aust. N. Z. J. Surg.*, 1979;49(2): 253-260
4. S.H. Dougherty, R.L. Simmons. The biology and practice of surgical drains. Part 1. *Curr. Probl. Surg.*, 1992;29(8): 559-62.
5. M.A. Memon, M.I. Memon, J.H. Donohue. Abdominal drains: a brief historical review. *Ir. Med. J.*, 2001;94(6): 164-16.
6. M.A. Memon, B. Memon, M.I. Memon, J.H. Donohue. The uses and abuses of drains in abdominal surgery. *Hosp. Med.*, 2002;63(5): 282-288.
7. A.J. Mangram, T.C. Horan, M.L. Pearson, L.C. Silver, W.R. Jarvis. Guideline for prevention of surgical site infection, 1999. Centers for Disease Control and Prevention (CDC) Hospital Infection Control Practices Advisory Committee. *Am. J. Infect. Control*, 1999; 27(2): 97-132.
8. Ammori BJ, Davides D, Vezakis A, et al. Day-case laparoscopic cholecystectomy: a prospective evaluation of a 6-year experience. *J Hepatobiliary Pancreat Surg.* 2003; 10:303–8.
9. Gurusamy KS, Samraj K, Mullerat P, Davidson BR. Routine abdominal drainage for uncomplicated laparoscopic cholecystectomy. *Cochrane Database Syst Rev.* 2007; CD006004.
10. Is a Drain Required after Laparoscopic Cholecystectomy? Ahmet Gurer, Ersin Gurkan Dumlu, Erol Dik-ili, Gulden Kiyak, and Nuraydin Ozlem, *Eura-sian J Med.* 2013 Oct; 45(3):181–184.
11. Calini G, Brollo PP, Quattrin R and Bresadola V. Predictive Factors for Drain Placement After Laparoscopic Cholecystectomy. *Front. Surg.* 2022; 8:786158.
12. Chee S. Wong, Grainne Cousins, John C. Duddy, Stewart R. Walsh,
13. Intra-abdominal drainage for laparoscopic cholecystectomy: A systematic review and meta-analysis, *International Journal of Surgery*, Volume 23, Part A, 2015, Pages 87-96.
14. Gurusamy KS, Koti R, Davidson BR. Routine abdominal drainage versus no abdominal drainage for uncomplicated laparoscopic cholecystectomy. *Cochrane Database Syst Rev.* 2013 Sep 3;(9):CD006004.
15. Zhu, H., Liu, D., Zhou, D. et al. Effectiveness of no drainage after elective day-case laparoscopic cholecystectomy, even with intraoperative gallbladder perforation: a randomized controlled trial. *Langenbecks Arch Surg.* 2023; 408: 112.