A Study on Postoperative Outcomes of Elective Laparoscopic Cholecystectomy with or without Drain

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KEYWORDS

Laparoscopic cholecystectomy, Drain, Postoperative complications, Pain management, Hospital stay, Surgical outcomes

ABSTRACT

Introduction: Laparoscopic cholecystectomy is the preferred method for treating gallbladder diseases due to its minimally invasive approach, offering advantages such as reduced postoperative pain, smaller scars, shorter recovery times, and quicker return to normal activities. Despite these benefits, patients may experience complications such as shoulder pain, nausea, and vomiting. Drains have traditionally been used to manage pneumoperitoneum-related issues and prevent fluid accumulation like bilomas or hematomas. However, recent studies question the routine use of drains, suggesting they may lead to increased postoperative complications and longer hospital stays.

Objective: To assess the effects of drain use versus no drain on postoperative outcomes in patients undergoing elective laparoscopic cholecystectomy.

Methods: This prospective comparative study was conducted at the Department of General Surgery, Meenakshi Medical College Hospital and Research Institute, from January 2024 to June 2024, involving 70 patients. Participants were divided into two groups: one receiving a drain and the other not, based on the treatment protocol. Data were gathered through comprehensive medical histories, clinical examinations, and relevant tests. Postoperative outcomes such as pain, fever, nausea, vomiting, fluid accumulation, wound infections, and hospital stay duration were evaluated. Statistical analysis was performed using SPSS v26.0, with significance set at $p<0.05$.

Results: The study found no significant differences in baseline characteristics or intraoperative factors between the groups. However, the drain group reported significantly ($p<0.05$) higher pain scores, a greater incidence of fever, nausea, vomiting, wound infections, and longer hospital stays compared to the no-drain group.

Conclusion: Patients undergoing elective laparoscopic cholecystectomy without a drain experienced better postoperative outcomes, including reduced pain, fewer complications, and shorter hospital stays.
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Introduction:

Laparoscopic cholecystectomy has emerged as the gold standard for managing gallbladder diseases due to its minimally invasive nature and high success rates. [1] This advanced surgical procedure has revolutionized the treatment of gallbladder pathologies by offering a safer and more effective alternative to open surgery. Among its notable advantages are reduced postoperative pain, minimal external scarring, shorter hospital stays, and faster recovery times,

allowing patients to resume their normal activities much sooner compared to traditional methods. [2,3] These benefits have made laparoscopic cholecystectomy the preferred choice for surgeons and patients alike.

Despite its numerous advantages, the procedure is not without its challenges. Common postoperative issues include abdominal pain, discomfort in the shoulder tip, and symptoms such as nausea and vomiting. These complications are often attributed to the use of pneumoperitoneum, a technique employed during surgery to inflate the abdomen for better visibility and access. To address these concerns, the placement of a surgical drain is frequently recommended. Drains serve several purposes, including alleviating pneumoperitoneum-related symptoms, as well as preventing the accumulation of fluid collections, such as bilomas (bile leaks) and hematomas (localized blood clots), which could otherwise lead to severe complications. [4,5]

The utility of drain placement, however, has been a subject of ongoing debate. Numerous studies have demonstrated the benefits of using drains, citing reduced risk of complications and better management of fluid buildup. On the other hand, some research indicates that drains may inadvertently lead to increased postoperative complications, such as infections or delayed wound healing, which could prolong the patient's hospital stay.[6,7] These conflicting findings highlight the complexity of the issue and emphasize the need for a case-specific approach when deciding on drain usage.

In particular, drain placement has shown to be highly beneficial in complicated cases of laparoscopic cholecystectomy, such as those involving severe inflammation, gangrene, or bile duct injuries. In such scenarios, drains have been instrumental in improving postoperative outcomes by facilitating the early detection and management of complications. However, in uncomplicated cases, the routine use of drains remains controversial, with some experts advocating against it due to the potential risks and questionable necessity.

Given these diverse perspectives, it is crucial to evaluate the role of drain placement in laparoscopic cholecystectomy systematically. Against this backdrop, the present study seeks to investigate the postoperative complications associated with drain placement compared to non-placement. The goal is to determine whether the omission of a drain could have adverse effects on recovery and whether selective drain use might be a more effective strategy for improving patient outcomes. This study aims to provide valuable insights into optimizing postoperative care for laparoscopic cholecystectomy patients, particularly in balancing the risks and benefits of drain usage.

Materials & Methods:

A prospective comparative study was carried out in the Department of General Surgery at Meenakshi Medical College Hospital and Research Institute between January 2024 and June 2024, involving 70 patients scheduled for elective laparoscopic cholecystectomy. Participants were selected based on specific criteria: individuals aged 18 years or older with gallbladder pathology were included, while those with bleeding disorders, immunocompromised conditions, or requiring common bile duct exploration were excluded. Data collection encompassed detailed medical history, physical examination, relevant radiological and hematological assessments, intraoperative observations, and postoperative follow-up to evaluate outcomes.

The patients were categorized into two groups: one group underwent surgery with drain placement, while the other had surgery without a drain. All procedures were conducted by the same surgeon to ensure consistency. Postoperative outcomes, including complications, fever, nausea, vomiting, fluid accumulation, shoulder tip pain, wound infections, and duration of hospital stay, were analyzed. The study employed convenience sampling, and data were statistically analyzed using SPSS version 26.0. Independent t-tests and chi-square tests were utilized to determine statistical significance, with a p-value threshold set at <0.05.

Results:

In this study, a total of 70 patients who met the inclusion criteria were enrolled. The participants were evenly divided into two groups, with 35 patients assigned to the drain group and 35 to the no-drain group. The mean age of the participants was similar across both groups, with no statistically significant differences observed.

Table 1: Comparison of the mean parameters between the groups

	Drain		No Drain		p-value
	Mean	SD	Mean	SD	
Age (in years)	38.6	14.6	37.9	10.0	0.5
Weight (in kgs)	70.6	8.7	68.7	7.8	0.05
Height (in cm)	164.0	8.8	160.9	8.7	0.65
Hemoglobin	12.9	2.4	12.3	2.3	0.34
RBS	112.8	23.4	102.2	14.0	0.2
Blood Urea	21.4	3.2	19.5	2.2	0.3
Serum Creatinine	0.9	0.2	0.9	0.3	0.8
Duration of surgery (in mins)	127.9	10.9	120.1	9.3	0.5
Duration of hospital stay	8.3	1.0	5.6	.5	0.01*

A slight female predominance was noted among the participants; however, the gender distribution was balanced between the two groups, showing no significant variation. Likewise, the mean weight and height of the patients were comparable, with no notable differences identified. The prevalence of diabetes mellitus and hypertension was also consistent between the groups.

Table 2: Distribution of variables between the groups

		Drain		No Drain		Chi-square
		Count	N %	Count	N %	(p-value)
Gender	Female	16	47.1%	22	64.7%	2.141 (0.14)
	Male	18	52.9%	12	35.3%	
Residency	Rural	13	38.2%	12	35.3%	0.05(0.801)
	Urban	21	61.8%	22	64.7%	
Diabetes mellitus	Absent	16	47.1%	26	76.5%	6.24 (0.52)
	Present	18	52.9%	8	23.5%	
Hypertension	Absent	21	61.8%	30	88.2%	6.38 (0.12)
	Present	13	38.2%	4	11.8%	
Intraoperative complications	Absent	28	82.4%	31	91.2%	1.14 (0.28)
	Present	6	17.6%	3	8.8%	

Table 3: Comparison of the postoperative pain score between the groups

Postoperative Pain Score	Drain		No Drain		p-value
	Mean	SD	Mean	SD	
6 hours	1.0	0.0	1.0	0.0	-
24 hours	5.9	1.3	4.4	1.0	0.521
48 hours	5.1	0.7	3.6	0.7	0.01*
72 hours	3.8	0.8	2.6	0.8	0.01*
POD 1	3.9	1.1	3.8	1.2	0.01*
POD 2	3.0	0.8	2.0	0.0	0.01*
POD 4	2.5	0.6	2.3	0.4	0.01*
POD 7	2.2	0.5	1.4	0.5	0.01*

Postoperative pain scores were significantly higher in the drain group compared to the no-drain group across various time points, ranging from 24 hours post-surgery to postoperative day 7 ($p < 0.05$). Furthermore, the drain group exhibited a significantly greater occurrence of postoperative fever, nausea, and vomiting compared to the no-drain group ($p < 0.05$). By postoperative day 7, the incidence of wound infection was notably higher in the drain group (29.4%) than in the no-drain group (2.9%) ($p < 0.05$).

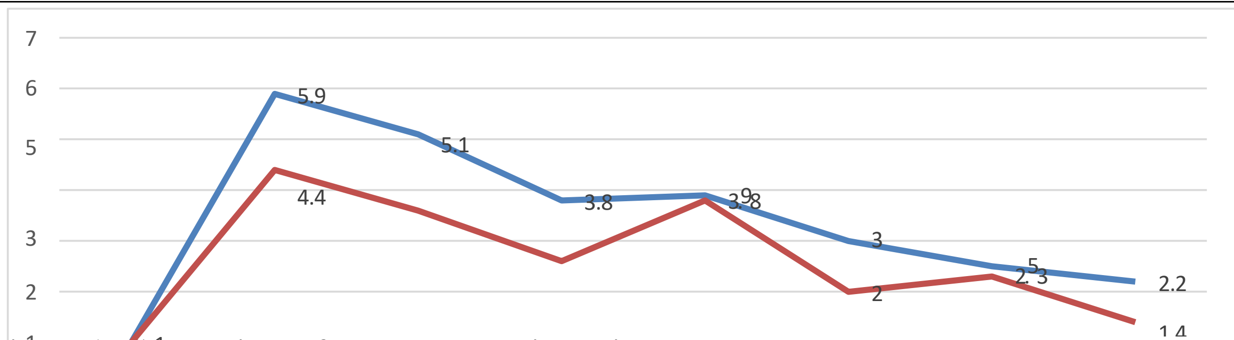

Figure 1: Comparison of the postoperative pain score between the groups

Table 4: Comparison of presence of fever, nausea and vomiting between the groups

Postoperative period		Drain		No Drain		Chi-square (p-value)
		Count	%	Count	%	
Fever	Absent	14	41.2	30	88.2	16.00 (0.01)*
	Present	20	58.8	4	11.8	
Nausea	Absent	19	55.9	28	82.4	5.14 (0.01)*
	Present	15	44.1	6	17.6	
Vomiting	Absent	23	67.6	34	100.0	13.00 (0.01)*
	Present	11	32.4	0	0.0	
Wound infection on POD 7	Absent	24	70.6	33	97.1	8.66 (0.01)*
	Present	10	29.4	1	2.9	

Discussion:

Laparoscopic cholecystectomy is a widely performed procedure for treating symptomatic gallbladder disease, known for its minimally invasive nature and generally favorable results. However, the routine use of drains following surgery remains a topic of ongoing debate among surgeons. Drains are traditionally used to prevent fluid accumulation and reduce complications like bile leaks and infections. Despite this, their routine application has been questioned due to potential disadvantages, such as increased pain, longer hospital stays, and a higher risk of complications, including wound infections.

In the present study, 68 patients were enrolled and equally divided into two groups: one receiving a drain and the other not. Both groups were similar in terms of age, gender distribution, physical characteristics (weight and height), and the prevalence of comorbidities like diabetes and hypertension. Additionally, there were no significant differences in baseline blood parameters or the duration of surgery between the groups.

A similar study by Bawahab et al. found no significant age difference between the groups, with a higher proportion of females, though gender distribution remained statistically comparable between the groups. Likewise, Shams et al. documented no significant age or gender differences, with the majority of patients falling within the 31 to 50-year-old range.

The drain group in the present study experienced significantly more postoperative pain at various intervals (24 hours to day 7) compared to the no-drain group. This finding is in agreement with Antoniou et al., who noted significantly higher pain scores in the drainage group within the first 24 hours post-surgery. Similarly, Qiu et al. reported significant differences in early pain scores (VAS) between the groups, although later pain scores, cosmetic satisfaction, and postoperative blood test results showed no major differences. These findings suggest that drain-related complications in acute calculous cholecystitis cases are comparable to those observed in non-drainage groups, indicating that routine drainage may not be necessary.

In contrast, Picchio et al. observed no significant differences in pain scores, use of parenteral ketorolac, nausea, or vomiting between the two groups. Alrekabi et al. also found no significant differences in nausea and vomiting but observed more notable differences in abdominal and shoulder tip pain, as well as hospital stays, with the drain group experiencing more pain and longer stays. Their study supports the idea that avoiding drains in uncomplicated laparoscopic cholecystectomy could reduce postoperative complications and morbidity.

Similar to the present study, Qiu et al. reported an overall complication rate of 12.5%, with no statistically significant difference between the drain and no-drain groups. In Cirocchi et al.'s research, the no-drain group had a reduced incidence of postoperative abdominal collections and wound infections, although the benefit was most pronounced for wound infections when analyzing randomized controlled trials (RCTs).

The no-drain group in the present study also had a significantly shorter hospital stay, which not only suggests faster recovery but also implies potential cost savings and reduced strain on healthcare resources. This is consistent with findings from Bawahab et al., who documented a shorter hospital stay for the no-drain group, as well as Qiu et al., who found that patients in the no-drain group resumed normal activities more quickly and had a slightly shorter hospital stay. Cirocchi et al. also observed that the no-drain group had a shorter hospital stay and operative time, although this was within a context of some study heterogeneity.

Overall, the available evidence indicates that routine drain placement is not necessary following laparoscopic cholecystectomy for acute cholecystitis. Shams et al. concluded that subhepatic drain placement is unnecessary in uncomplicated cases, and Bawahab et al. found no benefit to prophylactic drain insertion, regardless of whether the cholecystitis was complicated. The findings of the present study suggest that patients undergoing elective

laparoscopic cholecystectomy without drains generally experience better postoperative outcomes, including less pain, fewer complications, and shorter hospital stays. These results support the selective use of drains in laparoscopic cholecystectomy, prioritizing patient safety and quality of care. Further research with larger sample sizes and longer follow-up is needed to confirm these findings and potentially refine surgical guidelines for this common procedure.

Conclusion:

This study presents strong evidence that patients undergoing elective laparoscopic cholecystectomy without the use of a drain tend to experience better postoperative outcomes. These include significantly lower pain levels, fewer complications such as fever, nausea, vomiting, and wound infections, as well as reduced hospital stay durations compared to those with a drain. The findings highlight the potential benefits of selective or minimal use of drains in laparoscopic cholecystectomy, with a focus on enhancing patient safety and improving care quality. However, additional studies with larger sample sizes and longer follow-up are necessary to confirm these results and refine surgical guidelines, ultimately improving patient outcomes for this widely performed procedure.

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Conflict of Interest: None

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