

## ORIGINAL RESEARCH

# Advantages and disadvantages of drain in laparoscopic cholecystectomy- A comparative study

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### ABSTRACT

**Background:** Laparoscopic cholecystectomy is an increasingly accepted technique worldwide for the treatment of cholelithiasis. This technique has the advantages of a shorter hospital stay, early ambulation, better cosmetic results, and less postoperative pain and complications than other techniques. **Aim & Objective:** To study the efficacy of drain insertion after laparoscopic cholecystectomy. Objective of the study is to assess the type and amount of drainage in the postoperative period and to analyse the pain score in post-operative patients with drain with the help of VAS (Visual Analogue) score. **Material & methods:** This prospective randomized controlled study was done in Department of General Surgery, Adesh Institute of Medical Sciences & Research, Bathinda. 60 patients undergoing laparoscopic cholecystectomy with 30 patients in either group after having applied the inclusion and exclusion criteria were included in the study. **Results:** Outcomes were assessed based on - Post-operative amount and type of collection/drainage, Post-operative drain site pain. In this study  $3.83 \pm 0.83$  and  $2.77 \pm 0.77$  days of hospital stay and patient was able to ambulate at  $7.6 \pm 1.35$  and  $7.27 \pm 1.17$  hours in group A and group B respectively, which shows patients with no drainage were able to discharge early than the patient who have inserted drainage. **Conclusion:** In conclusion, the routine use of drains in laparoscopic cholecystectomy depends on surgeon's experience and condition of the patient. Overall, uncomplicated gallstone disease can be safely treated without the use of a drain in experienced hands, resulting in benefits such as reduced post-operative pain and hospital stay.

**Keywords:** Laparoscopic cholecystectomy, postoperative complications, drainage, cholelithiasis.

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### INTRODUCTION

Gallstone disease, or cholelithiasis, is a prevalent medical condition that often leads to surgical intervention. Once gallstones become symptomatic, cholecystectomy is necessary. Open cholecystectomy has been the gold standard for a long time, but laparoscopic cholecystectomy, which was introduced in the late 1980s, has revolutionized the procedure.<sup>1</sup> Laparoscopic cholecystectomy is increasingly becoming an accepted technique worldwide for the treatment of cholelithiasis, with the advantages of a shorter hospital stay, earlier return to normal activity, better cosmetic results, and lower rates of postoperative pain and complications than other techniques. However, patients may complain of postoperative shoulder pain, nausea, and vomiting. Some publications recommend the use of a short-term drain postoperatively to avoid any postoperative

collection. Drain in postoperative period helps to know the nature and amount of collection whether bile, blood or fluid.<sup>2</sup>

Routine drain use after laparoscopic cholecystectomy is still debatable. According to the Cochrane Database Systemic Review, randomized clinical studies show no benefit of a drain.<sup>3</sup> Current data indicate that biliary problems following laparoscopic cholecystectomy occur in only 0.4 percent of cases, and postoperative hemorrhagic problems are quite rare. There is minimal tissue handling in cases of lap cholecystectomy which decreases drainage chances. Therefore, prophylactic drainage after laproscopic cholecystectomy is still debatable.<sup>4</sup>

Although numerous randomized clinical trials and meta-analyses have already shown that the use of surgical drains does not improve the postoperative outcomes of patients, surgical drains are still used in

selected populations. The primary indication for the placement of a drain is to prevent fluid collection and subsequent infection. Prophylactic drainage may be beneficial for certain conditions that are frequently associated with large collections of blood and serum. However, the drain site can be painful, and there are potential drain-related complications such as bleeding, direct damage to the bowel and dysfunction of the drain. Thus, the drain should only be used when there are clear indications intra-operatively.

### AIM AND OBJECTIVE

To study the efficacy of drain insertion after laparoscopic cholecystectomy. Objective of the study is to assess the type and amount of drainage in the postoperative period and to analyse the pain score in post-operative patients with drain with the help of VAS (Visual Analogue) score.

### MATERIAL AND METHODS

This prospective randomized controlled study was done at Adesh Institute of Medical Sciences and Research, Bathinda. All the patients presenting to surgery OPD and emergency department with cholelithiasis within 1 year from the approval of the Research Committee and Ethics Committee, Adesh University, Bathinda. (meeting the inclusion criteria) were undergone laparoscopic cholecystectomy were included in this study.

### SAMPLE SIZE

It was determined based on the previously published study on mean subhepatic collection noted in patients with the drain on the 3<sup>rd</sup> day was  $37.85 \pm 12.65$  ml and without drain was  $24 \pm 9.34$  ml by Darbar R and Piparya PR.<sup>5</sup> The group size of the study has been determined by considering an alpha error of 0.05 and the power of the study at 80%, so the sample size came out to be 52 in each group. Taking the dropout rate of 8-10%, 60 patients undergoing laparoscopic cholecystectomy were taken with 30 patients in each group.

Group A:(n=30): Patients undergoing laparoscopic cholecystectomy with Drain.

Group B: (n=30): Patients undergoing laparoscopic cholecystectomy without Drain.

Patients presenting to surgery OPD and emergency department at AIMSR, Bathinda with definitive diagnosis of cholelithiasis with any age of gender who willing to participate in the study were included in the study. Patients with existing co-morbidity or who are not giving consent to participate in the study were excluded from study. Patients were randomly assigned into two groups by the operating surgeon .

### PRIMARY OUTCOME

1. Post-operative amount of collection/drainage.
2. Post-operative type of collection/drainage.
3. Post-operative drain site pain.
4. Post-operative fever.

### STATISTICAL ANALYSIS

A pre-designed proforma was used to collect the data. The principal investigator was solely handling all the data. All the data collected through the proforma were entered into Microsoft Excel and analysed with the statistical package for social sciences (SPSS) version-26. Mean and standard deviation was used for parametric data like age, weight and access time while frequency and percentage stratification with gender was done. Chi-Square test was applied for categorical variables. The level of significance was determined 95% confidence interval,  $p < 0.05$  was considered significant and  $< 0.001$  was considered highly significant.

### RESULTS

In the present study, we assessed the efficacy of drain insertion after laparoscopic cholecystectomy. We observed the type and amount of drainage/collection in the postoperative period. We analyzed whether drain insertion decreases the risk of abdominal infection in a patient and observed the incidence of post-operative pain, nausea, and vomiting in patients who underwent laparoscopic cholecystectomy. Pain score in post-operative patients with drain with the help of VAS (Visual Analogue) score.

In the present study, the youngest patient was 24 years of age and the oldest was 64 years of age. The majority of the patients were found in the age group of 40-49 years of age. Cholelithiasis is a disease commoner in females, so, obviously more female than male patients are likely to get operated which is seen in our study. Male: Female ratio in both the groups in our study was 1:2 and 2:3 respectively. In the present study mean BMI of patients in groups A and B is  $23.76 \pm 3.75$  and  $24.08 \pm 4.04$  respectively, which is statistically insignificant ( $P > 0.05$ ). Park JS et al.<sup>6</sup> also observed the same range of BMI i.e.  $24.8 \pm 3.6$  and  $24.7 \pm 3.5$  in the drainage group & No drainage group respectively. Majority of patients in this study are having cholelithiasis. At the time of admission, haemodynamics and laboratory parameters of patients were assessed and found to be stable and within the normal range. (Table 1)

In the present study mean operating time of group A was more i.e.  $58 \pm 6.9$  minutes as compared to Group B  $52.67 \pm 5.83$ . the difference in both groups was found statistically significant ( $p < 0.001$ ). Pain after laparoscopic cholecystectomy is multifactorial. Eliminating the cause of the pain has a clear-cut advantage over symptomatic treatment using analgesics. Less pain decreased the postoperative stay in the hospital. Causes of post-laparoscopy abdominal pain are due to diaphragmatic stretch during laparoscopic pneumoperitoneum which causes phrenic nerve neuropraxia and stretching of the attachment of the liver.<sup>7</sup> It can also be due to retained CO<sub>2</sub> whose dissolution leads to the formation of carbonic acid which is a peritoneal irritant. (Table 3)

Residual CO<sub>2</sub> can also result in loss of surface tension between viscera and parieties leading to the creation of space between the diaphragm and liver thus causing loss of suction support of heavy liver resulting in pain, especially shoulder tip pain. Systemic hypercarbia causes sympathetic nervous system excitation resulting in the amplification of local tissue inflammatory response.<sup>8</sup> Assessment of abdominal pain can be done at various sites: shoulder tip pain, epigastric port site pain, pain at the site of umbilical port, pain below the right subcostal margin and pain in the right lumbar region.

Mechanisms of shoulder tip pain can be due to diaphragmatic stretch with phrenic nerve neuropraxia, and loss of visceral surface tension after the creation of pneumoperitoneum which results in increased weight on the diaphragmatic attachments of the liver. Formation of intraperitoneal carbonic acid from CO<sub>2</sub> which is directly proportional to the duration of pneumoperitoneum and intra-abdominal pressure.<sup>9</sup> Drain helps in the egress of retained CO<sub>2</sub> causing less formation of carbonic acid. A suction drain may exert its therapeutic effect in reducing shoulder tip pain by restoring normal surface tension between the visceral and parietal peritoneum. Similar results are seen in other studies as mentioned.

In the present study different type of pain was present after the procedure in group A was 19(63.33%) and in group B 13(43.33%) patients. But statistically, it was observed as insignificant.

The intensity of the pain (VAS Score) showed in our study, 46.67% of patients are having mild pain in group A and only 16.67% and 20% of patients are suffering from mild and moderate pain respectively. The pain grade was statistically significant(p=0.011). On a post-op day, three pain score was assessed and observed 23.33% and 10% of patients are having mild & moderate pain respectively in group A. Out of the total participants of the study, 83.33% of patients were free from pain on the third postoperative day. Similar results were found in the study done by Labban GE et al.<sup>10</sup>

The present study shows the type of drain fluid collected in the drain in group A patients. 22(73.33%) patients had serohaemorrhagic discharge, and 8 (26.67%) patients had a serous discharge. There was no abdominal distension, guarding or rigidity in any case. There were no cases of postoperative ascites.

In the present study the sub hepatic fluid collection on the first ultrasound on day one was higher in group A than in group B i.e. 36.5±10.84 and 14.17±4.84 respectively. Further, on 3<sup>rd</sup> day of postop, the sub hepatic fluid decreased in groups A and B. Similar, were results seen by Darbar R and Piparya PR.<sup>5</sup>

36.75±11.75 ml fluid was noted in with drain group and 22.2±8.71 ml in the without drain group. (Table 2) Postoperative nausea/vomiting has an incidence of about 35-45% after various laparoscopic procedures. Postoperative nausea is more common in patients younger than 50 years, in women, patients who have a history of opioid use, high postoperative pain, in non-smokers, and in patients with an experience of motion sickness. Patients with extended preoperative fasting time, high levels of anxiety and delayed time of the first postoperative fluid intake are more likely to develop nausea and vomiting after laparoscopic cholecystectomy.<sup>11</sup>

The incidence of postoperative nausea was 26.7% in Group A vs 63.3% in Group B patients in the recovery room, Similar result was found by Hawasli et al<sup>12</sup> in a study, where postoperative nausea/vomiting was seen in 24% of the cases in drain group as compared to 34% of the patients in no drain group. Narsal et al.,<sup>13</sup> in their study, showed the incidence of nausea/vomiting in 31% of cases in the drain group vs 38% of the cases in no drain group at 6 hrs postoperative, 11% vs 21% at 12 hrs, 6% vs 15% at 24 hrs and 9% vs 30% at 48 hrs. Mrozowicz et al<sup>14</sup> showed the incidence of nausea/vomiting in 6% of cases in the drain group vs 9% of the cases in the no drain group at 48 hrs postoperative. Thus all the studies showed a higher incidence of nausea/vomiting in the no-drain group than in the drain group. A drain placed in subhepatic space can act as a conduit for the escape of retained CO<sub>2</sub> thus reducing intra-peritoneal acidosis and hence reducing nausea/vomiting. In this study, Wound infection was noticed in 11(36.67%) patients of Group A and 4(13.33%) patients in Group B. similar results were observed by Darbar R and Piparya PR.<sup>5</sup> (Table 4)

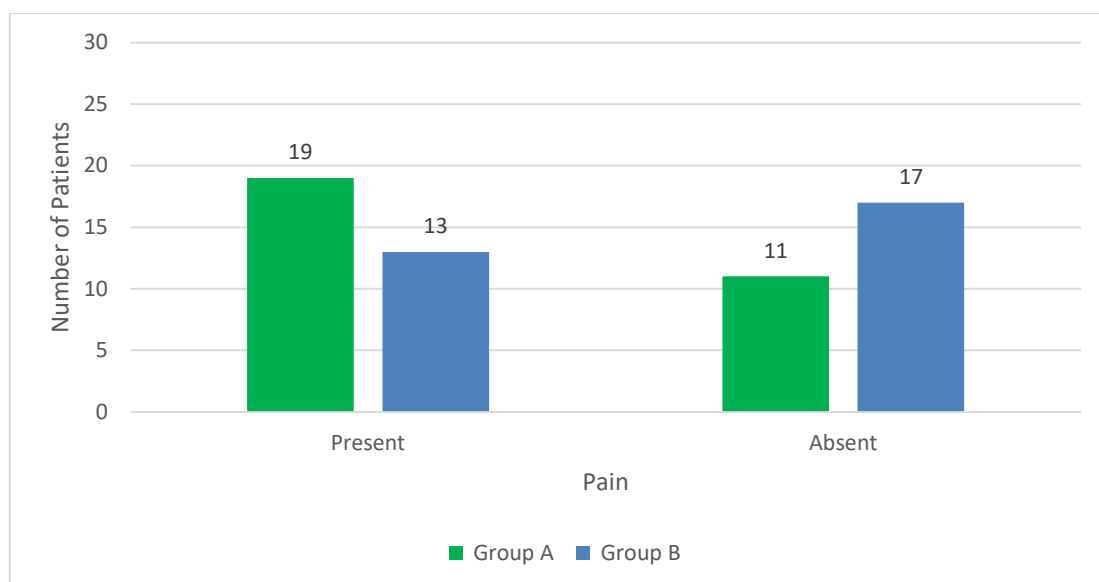
It is observed that the patient was able to ambulate in group A at 7.6±1.35 hours and in group B at 7.27±1.17 hours. The difference in time taken to ambulate between the two groups was statistically insignificant. Qiu J and Li M<sup>15</sup> also revealed in their study that in the drainage group patients, resumed their daily activities later than in the drain group. (Table 3)

In this study group A had mean of 3.83±0.83 days and Group B had mean of 2.77±0.77 days of hospital stay, which shows patients with no drainage were able to discharge early than the patient who have inserted drainage. The difference in both groups is statistically highly significant. Similar results were observed by Bawahab MA, et al.<sup>16</sup> and Gurer A, et al.<sup>17</sup>who conclude in their study that the hospital stay of patients in the drain group was shorter than those who underwent laparoscopic cholecystectomy with no drainage. (Table 3)

**Table 1: Demographic Data of patients in both the groups**

	<b>Group A (With Drain)</b>	<b>Group B (Without Drain)</b>	<b>p value</b>
	<b>Mean±SD</b>	<b>Mean±SD</b>	
Age(Years)	40.73±10.98	44.3±8.87	0.172

Gender(M/F)	10/20	12/18	0.789
ASA Grade (I/II)	21/9	22/8	0.774
BMI	23.76±3.75	24.08±4.04	0.751
Pulse	78.7±9.49	80.17±10.49	0.572
SBP	121.87±10.01	125.5±9.59	0.156
DBP	76.63±6.89	80±6.98	0.065
Respiratory rate	15.43±1.01	15.87±0.97	0.095



**Figure 1: Pain over stitch line and drain site in both groups of patients post-operatively**

**Table 2: Amount of fluid collection in right subhepatic space on follow-up USG**

Collection(mL)	Group A (With Drain)	Group B (Without Drain)	P value
Amount of Drain on POD one	36.5±10.84	14.17±4.84	<0.001
Amount of Drain on POD Three	8.5±4.82	2.23±2.27	<0.001

**Table 3: Mean operating time, ambulation and days of hospital stay of both groups**

	Group A	Group B	p value
	Mean±SD	Mean±SD	
Operating Time(min)	58±6.9	52.67±5.83	0.009
Ambulation (hours)	7.6±1.35	7.27±1.17	0.312
Hospital stay(days)	3.83±0.83	2.77±0.77	<0.001

**Table 4: Post-operative complications of patients in both groups post operatively**

Post op Complications	Group A(drain)		Group B		Total Number	p Value
	Number	Percentage	Number	Percentage		
Postoperative Nausea	8	26.67	19	63.33	27	0.009
Shoulder Tip Pain	5	16.67	6	20.00	11	0.739
Wound Infection	11	36.67	4	13.33	15	0.036

**DISCUSSION**

Laparoscopic cholecystectomy is a widely accepted surgical technique for the removal of gallbladder stones due to its advantages such as less pain and discomfort, shorter hospital stay, and early return to normal activities. However, in some cases, patients experience significant postoperative pain and nausea/vomiting. The factors responsible for these complications include retained CO<sub>2</sub> and pneumoperitoneum. Efforts should be made to

minimize the presence of CO<sub>2</sub> by using abdominal wall lifting devices and by letting all the gas out before closing the ports. In the present study, the efficacy of drain insertion after laparoscopic cholecystectomy was evaluated. The incidence of post-operative pain, nausea, and vomiting in patients who underwent laparoscopic cholecystectomy was also analyzed. The study found that the type and amount of drainage/collection in the postoperative period decreased the risk of abdominal infection. The study

observed that the mean age of patients in both groups was between the forties, with more female patients than male patients. The majority of patients were found to be in ASA grade I, and only a few were in ASA grade II. The mean BMI of patients in both groups was statistically insignificant. The majority of patients were admitted with complaints of cholelithiasis. The haemodynamics and laboratory parameters of patients were found to be stable and within the normal range. The operating time of group A was more than Group B, and the difference was statistically significant. The study found that eliminating the cause of pain has an advantage over symptomatic treatment using analgesics. Shoulder tip pain, epigastric port site pain, pain at the site of umbilical port, pain below the right subcostal margin, and pain in the right lumbar region are the possible sites of abdominal pain. Overall, the study suggests that drain insertion after laparoscopic cholecystectomy may decrease the risk of abdominal infection and that eliminating the cause of pain has an advantage over symptomatic treatment using analgesics.

## CONCLUSION

In conclusion, the routine use of drains in laparoscopic cholecystectomy depends on surgeon's experience and condition of the patient. The use of drain to reduce nausea/vomiting, postoperative pain, fever, morbidity, longer hospital stay depends on the condition of gall bladder and biliary tract inflammation and infection. In selected cases (Acute cholecystitis, adhesions, empyema, mucocoele, aberrant anatomy) where there is a fear of potential bile leak, haemorrhage it may be justifiable to leave a drain. Surgeons must not make a routine to place drain placement post laparoscopic cholecystectomy. Overall, uncomplicated gallstone disease can be safely treated without the use of a drain in experienced hands, resulting in benefits such as reduced post-operative pain and hospital stay.

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