ORIGINAL ARTICLE

Comparative Study Between Laparoscopic Cholecystectomy with Drain and without Drain in Patients with Acute Calcular Cholecystitis

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Abstract

Background: ***Between ten and fifteen percent of adults have gallstones. Each year, symptomatology develops in 1% to 4% of these persons.***

Aim and objectives: ***The purpose of this study is to compare the benefits and drawbacks of using regular abdominal drainage during laparoscopic cholecystectomy for acute patients using primary outcomes such as hospital stay length, rate of early recovery, and incidence of surgical complications.***

Subjects and methods: ***From December 2023 to December 2024, forty patients with acute calculous cholecystitis who visited the general surgery departments of Al-Azhar University Hospitals (Sayed Galal-Bab El-Sheriaa and Al-Hussein) were included in this prospective study.***

Results:In ***This study, the Intraabdominal fluid collection(ml) in group-A ranged between 40-70 and the mean±SD was 54.35±10.02, while in group-B ranged between 30-50 and the mean±SD was 43.80±6.10, With respect to the amount of intraabdominal fluid collected (in milliliters), group A was significantly different from group B (p>0.05).***

Conclusion: ***Routine drainage after laparoscopic cholecystectomy in acute cases has several drawbacks, including increased operative time and extended hospital stays, delayed recovery and return to normal activities, and higher pain scores with greater analgesic requirements. Additionally, routine drainage does not appear to prevent postoperative complications and contributes to reduced patient satisfaction.***

Keywords: Laparoscopic cholecystectomy; Acute calcular cholecystitis

1. Introduction

While there are numerous advantages to laparoscopy over open surgery, a common side effect is referred pain to the shoulder for many patients after the procedure, which is why it is typically performed after the acute cholecystitis episode has subsided. This is due to concerns about higher morbidity and the possibility of having to convert from laparoscopy to open cholecystectomy.

The use of carbon dioxide gas in high-pressure pneumoperitoneum was blamed for these consequences.[2]

Continuous drainage following laparoscopic cholecystectomy remains a matter of debate. After a laparoscopic cholecystectomy, the most common reason to utilize a drain is to stop bleeding (biloma or hematoma). The systematic review and database of trials conducted by the Cochrane Foundation found no evidence that a drain.[3]

In order to avoid abdominal collections following a laparoscopic cholecystectomy, drains are inserted. On the other hand, drain use might prolong patient stay in the hospital and raise the risk of infection.[3]

Inserting a sub-hepatic drain during elective laparoscopic cholecystectomy raises the risk of intra-abdominal abscesses, lengthens the time spent in the hospital after surgery, and worsens postoperative pain.[4]

According to a recent study by Kim et al., patients with acute gallbladder inflammation who undergo laparoscopic cholecystectomy without a drain do not experience any increased risk of postoperative complications.[5]

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This prospective study aimed to determine the effects of regular abdominal drainage during laparoscopic cholecystectomy on the duration of hospital stay, the rate of early recovery, and the incidence of surgical complications in acute patients.

2. Patients and methods

Forty patients with acute calculous cholecystitis who visited the general surgery departments of Al-Azhar University Hospitals (Sayed Galal-Bab El-Sheriaa and Al-Hussein) between December 2023 and December 2024 were included in this prospective study.

The following two groups were formed from the pool of all patients: Twenty patients underwent laparoscopic cholecystectomy with drain insertion in Group-A, while twenty patients underwent the same procedure without drain insertion in Group-B.

Inclusion criteria:

For patients in their twenties to fifty-plus years old who present with acute gallbladder inflammation, a diagnosis of acute cholecystitis was made using a combination of clinical, laboratory, and imaging criteria. These criteria included: acute right upper quadrant tenderness (a positive Murphy's sign), ultra-sonographic evidence of acute cholecystitis (gallstones, cystic duct blockage, thickened gallbladder wall, edematous fluid collections), and one or more of the following: (patients with a temperature above 38°C, a leukocytosis larger than 10×103/l, or a C-reactive protein level greater than 10mg/dL), those admitted through the emergency or outpatient clinic, and those who can give informed permission and are prepared to follow postoperative instructions.

Exclusion criteria:

Individuals who fall into the following categories: those under the age of 20 or over the age of 50, those experiencing acute gallbladder inflammation along with jaundice, those with a non-acutely inflamed gallbladder (e.g., gallbladder polyp or chronic cholecystitis), associated calcium carbonate stones, operative complications (e.g., biliary tract injury), patients with debilitating diseases like liver cirrhosis or bleeding tendencies, individuals with a bleeding disorder or other contraindications for surgery, patients who cannot or will not be able to give informed consent, and those who will not or will not be able to follow postoperative instructions.

Method:

A full medical history was taken from each patient, followed by a physical examination, an ultrasound of the pelvis and abdomen, standard laboratory tests, and a local examination of the abdomen.

Surgical technique:

The usual 4-port approach was used to perform laparoscopic cholecystectomy in all patients. During the induction of anesthesia, 1.5 g of intravenous cefuroxime was administered. After eight hours of surgery, the dosage was administered twice more.

The surgeon and first assistant stand to the patient's left and right, respectively, to get abdominal access and establish pneumoperitoneum. A Hasson cannula is commonly implanted at the umbilicus (T1) using an open cutdown technique in our clinic. For individuals who have undergone previous incisions in the periumbilical midline, an alternative access site can be considered. The Verres needle can be inserted into the right upper quadrant, mid-clavicular, below the liver, or the left upper quadrant (Palmer's point), or an open epigastric incision can be made to access this region. As a result of the umbilicus moving inferiorly in obese people, a closed Verres needle access is obtained exactly above the midline, fifteen centimeters below the xiphoid. The camera port can then be positioned to provide a clear view of the dissection site.

After the pneumoperitoneum is formed, a 5 mm epigastric port (T4) is placed just to the right of the falciform ligament. Two 5 mm ports, one in the right subcostal mid-clavicular line (T3) and the other in the right lateral subcostal position (T2), are implanted. By putting cephalad strain on the fundus, a grasper is inserted from T2 to lift the gallbladder, and then withdrawn laterally and inferiorly through the mid-clavicular port. The surgeon uses trocars T3 and T4 during surgery.

Dissection of the hepatocystic triangle:

Using cephalic traction, the gallbladder is drawn back over the liver, and then, through the midclavicular port site, inferior-lateral traction is administered to the gallbladder's neck. Unless the assistant needs to make adjustments due to changes in visualization, this retractor can typically be kept constantly taut. Depending on the situation, the surgeon can access the gallbladder's anterior (medial) or posterior (lateral) aspects by manipulating its neck with T3.

If your gallbladder is enlarged, you should decompress it with a needle aspiration device to avoid perforation and the consequent loss of bile and gallstones. When using blunt or monopolar energy to remove adhesions, it is crucial to refrain from applying the energy near the duodenum since it can become adherent to the gallbladder. The initial stage of the dissection involves slicing the peritoneum along the border of the gallbladder on both sides in order to uncover the hepatocystic triangle. This should be transported to the rear wall of the gallbladder, where it connects to the liver. The fibrous and adipose tissue triangle can only be removed by a combination of sharp dissection and delicate cautery.

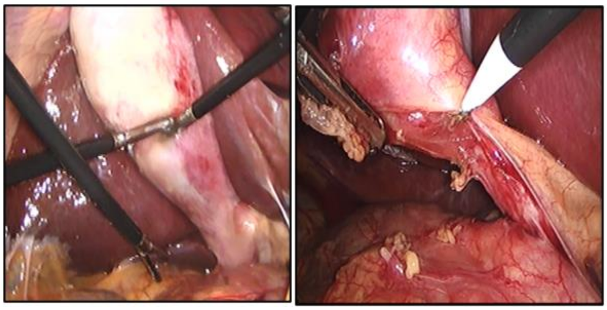


Figure 1. The first step of the dissection is to create an opening for the hepatocystic triangle by cutting the peritoneum along the gallbladder's border on both sides.

Establishing the critical view of safety:

To be considered safe from a critical perspective, three conditions must be satisfied:(I) fibrous and adipose tissue are removed from the hepatocystic triangle, which is comprised of the cystic duct, the common hepatic duct, and the inferior margin of the liver. I) Dissection is used to look for the common bile and common hepatic ducts, but they are not revealed; II) In order to reveal the cystic plate, the liver is used to separate the lower 1/3 of the gallbladder. The cystic duct, cystic artery, and cystic plate—the liver bed of the gallbladder and a surrogate for the gallbladder fossa—are the three separate structures that ought to be discernible upon entrance to the gallbladder. The operating surgeon and his or her assistant should wait for confirmation before making any cuts or clips after this perspective is put up. It is of the utmost importance to identify the aberrant anatomy at this time. The site of the cystic duct and its entrance into the common bile duct might differ, as can arterial anatomy. To lessen the likelihood of harm, it is necessary to have an in-depth familiarity with abnormal anatomy. Avoiding confusion between the cystic artery and its auxiliary branches posterior to the cystic plate is a typical concern when deciding which hepatic artery to use.

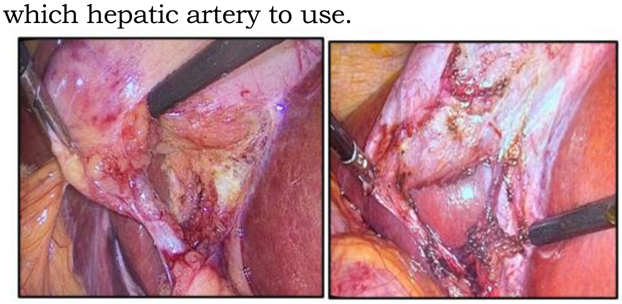


Figure 2. Establishing the critical view of safety

The cystic artery and cystic duct are clipped:

Two 8-millimeter clips are applied to the proximal side of the applier and one to the distal (specimen) side to clip the cystic artery; sufficient room is left between the clips to permit division. Hook scissors cut the artery in half. Take care not to loosen the proximal clips while you are doing this.

One end of the gallbladder is fastened to the cystic duct, and the other end to the gallbladder cap. Making the incision just near the clip could cause the distal specimen clip to come loose.

Figure 3. The Cystic artery and cystic duct are clipped.

Division of the cystic duct:

Titanium clips can be used to secure the cystic duct and artery, as well as the specimen to the stay and the gallbladder, respectively.

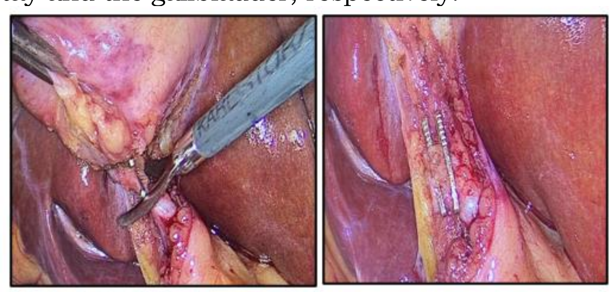


Figure 4. Division of the cystic duct.

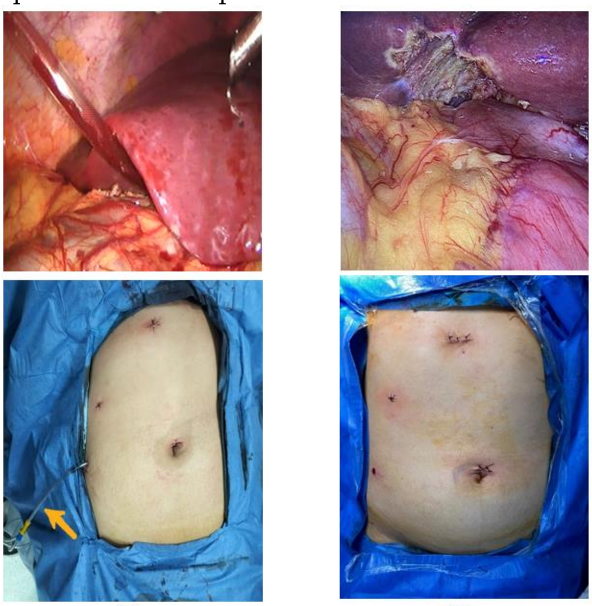
Gallbladder separation from the liver bed:

Dividing the cystic duct allows for the retrograde removal of the gallbladder from the liver bed. Using an L-hook monopolar energy device, the gallbladder is separated from the liver. You should maintain your position in the area between the gallbladder and the liver bed. This part of the operation is made easier by keeping the dissection line taut and adjusting the gallbladder's neck back and forth to improve visibility. Before fully disengaging the gallbladder from its bed, make sure to leave the last attachment in situ. This will allow you to retract the liver cephalad and see the cystic plate clearly, which is necessary for any hemostasis procedures. Any aspirated blood, bile, or other fluids are irrigated into the liver bed. After positioning the gallbladder in an entrapment bag, it is extracted through the 10-12mm port site.

Specimen and port removal:

The specimen can be taken from the epigastric region at the 10 mm port site. It may be necessary to widen the skin and fascial opening, particularly in cases when the gallbladder is enlarged or there are several or larger stones. To remove any remaining CO2 gas, all ports are evacuated after the specimen is removed. It is important to use 0-Vicryl or a comparable suture to close the fascia and skin around the extraction port location.

Before or after extraction, bile was collected from GB and sent for culture and sensitivity testing. The lateralmost port was used to implant a 20F closed tube drain into the subhepatic area in patients in Group A.



(a) (b)

Figure 5. (a): Group A with drain insertion, (b): Group B without drain insertion.

Outcome Measurements and Follow-up:

Three times daily, beginning six hours after surgery and continuing for twenty-four hours, or as needed, 650 mg tablets of oral paracetamol were given to all patients after surgery. The patient needed an extra 1 gram of paracetamol to be administered intravenously. At 6 and 24 hours after surgery, the pain was evaluated with a numeric rating scale (NRS). On the day following surgery, we measured the amount of leakage and, if it was considered serious, we removed the drain.

Patients in Group A had their drain tubes removed 48 hours after surgery unless there was a continuous loss of blood or serum above 30 milliliters per day or bile exceeding any quantity. Group B: When sonography was thought to reveal fluid accumulation in the peritoneal cavity, patients whose drains were not retained had the procedure. A verbal categorical rating scale was used for pain assessment. Hospital stay, morbidity, and death were all affected by the drain's omission.

Treatment was determined by the type of aspirate obtained from any collection on USG. Patients were treated solely with needle aspiration if the nature was serious. It was drained using a 12F pigtail catheter if the nature is dense, like pus or blood.

If the problem with the collection persists, a second attempt was made. The third time it happened, surgical drainage was supposed to be performed. The sample was sent for c/s analysis. After confirming the presence of the aforementioned clinical indications with a USG and finding no collection, a CT scan of the abdomen was ordered. Similar to USG, the drainage policy was adhered to.

For three days following surgery, patients were given intravenous antibiotics to treat any of the aforementioned complications that may arise within the first day. Using symptoms, clinical examination, and ultrasound, all patients were followed up weekly for the first month and monthly for the following six months.

Ethical Consideration:

All information gathered from the participants is kept secret. In all publications or reports pertaining to this study, the participants were named. All participants were informed of the study's goals, methodology, and risk-benefit analysis prior to their enrollment. Pupils gave their informed permission.

Statistical Analysis:

To tabulate and analyze the received data, an IBM-compatible computer was utilized in conjunction with SPSS version 25 (Armonk, NY: IBM Corp.). According to the type of data, numerical and percentage representations were used for qualitative data, while mean±SD was employed for quantitative data. We used the Student's t-test to compare two sets of data with parametric variables and quantitative variables that were normally distributed. The chi-square test (x2) was used to examine the correlation and comparison of two qualitative variables. Statistical significance was defined for two-tailed tests as a p-value below 0.05 and high significance as a p-value below 0.001.

3. Results

Table 1. Statistical evaluation of groups A and B based on demographic data.

	GROUP-A (N=20)		GROUP-B (N=20)		TEST OF SIG.	P-VALUE
	No.	%	No.	%		
GENDER					x2=2.85	0.091
MALE	9	45.0%	4	20.0%		
FEMALE	11	55.0%	16	80.0%		
AGE(YEARS)					t=0.270	0.789
MEAN±SD	41.75±7.83		41.05±8.57			
(MIN-MAX)	20-49		20-49			
BMI					t=0.741	0.463
MEAN±SD	28.81±4.01		27.61±6.03			
(MIN-MAX)	23-39		20-42			

(x2):Chi-square Test; t:Student T-Test; p:p-value for comparing between the studied groups

There was no statistically significant difference (p>0.05) between groups A and B, which had 9 (45%) men and 11 (55%), respectively, and 4 (55%)

males and 16 (45%) females. The average age in groups A and B was between 20 and 49 years old, with respective mean±SDs of 41.75±7.83 and 41.05±8.57 years. The BMIs of groups A and B were 23–39 kg/m2 (mean±SD: 28.81±4.01 kg/m2) and 20–42 kg/m2 (mean±SD: 27.61±6.03 kg/m2), respectively. There was no significant difference in age or BMI between groups (p>0.05).

Table 2. Comparison of groups A and B in terms of operating time (min).

	GROUP-A (NO=20)	GROUP-B (NO=20)	T	P-VALUE
OPERATIVE TIME(MIN)				
MIN-MAX	55 - 97	30 - 55	10.05	<0.001**
MEAN±SD	80.35 ± 13.011	45.10 ± 8.75		

t:Student T-Test, p:p-value for comparing between the studied groups

**:p-value<0.001 is highly significant

Group-A's operative time was 55-97 minutes (mean±SD = 80.35±13.011 minutes), but group-B's was 30-55 minutes (mean±SD = 45.10±8.75 minutes), according to the chart. Group-A's operation time was significantly longer than group-B's (p<0.001).

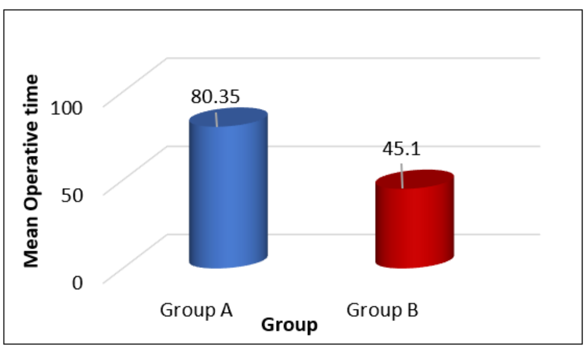


Figure 6. Comparison of groups A and B in terms of operating time (min).

Table 3. Comparison of the length of hospital stay (days) for groups A and B.

	GROUP-A (NO=20)	GROUP-B (NO=20)	T	P-VALUE
HOSPITAL STAY (DAYS)				
MIN-MAX	1 - 5	1 - 3	-2.775	0.009*
MEAN±SD	2.20 ± 1.508	1.25 ± 0.69		

t:Student T-Test, p:p-value for comparing between the studied groups

*:p-value<0.05 is significant

According to this table, hospital stays in groups A and B varied from 1 to 5 days, with mean±SDs of 2.20 and 1.508 days, respectively, and 1.25 and 0.769 days, respectively. Group-A's hospital stay was statistically significantly longer than group-B's (p<0.001).

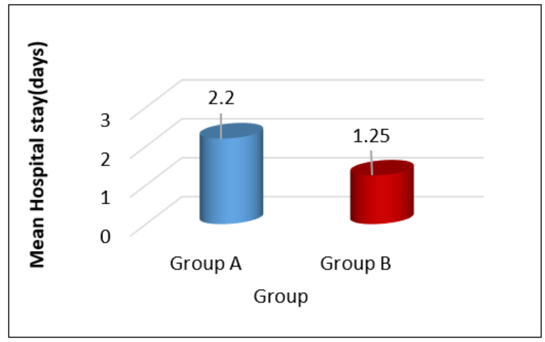


Figure 7. Comparison of hospital stays (days) between groups A and B.

Table 4. Evaluation of groups A and B with respect to postoperative pain using a visual analog scale (VAS).

	GROUP-A (NO=20)	GROUP-B (NO=20)	T	P-VALUE
PAIN SCORE AFTER OPERATION(VAS)				
MIN-MAX	2 - 7	1 - 6	-4.205	0.000**
MEAN±SD	4.50 ± 1.36	2.65 ± 1.42		

t:Student T-Test,p:pvalue for comparing between the studied groups

**:p-value<0.001 is highly significant

According to the table, group A's visual analogue pain score six hours post-surgery ranged from 2 to 7, with a mean±SD of 4.50±1.357. Group B's pain score had a mean±SD of 2.65±1.424 and ranged from 1 to 6. The pain score in group A was substantially higher than that in group B (p<0.001).

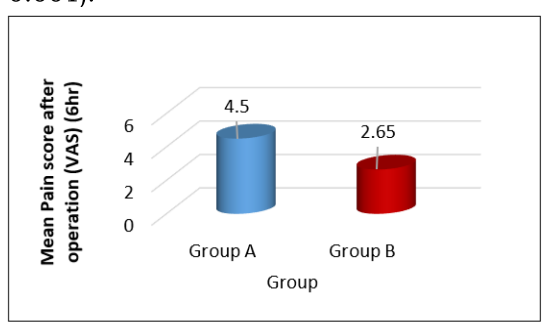


Figure 8. Evaluation of groups A and B with respect to VAS pain scores six hours following surgery.

Table 5. Evaluation of Groups A and B with Respect to Postoperative Complications.

POST-OPERATIVE COMPLICATIONS	GROUPS				TOTAL		X2	P-VALUE
	Group-A (n=20)		Group-B (n=20)					
	N	%	N	%	N	%		
WOUND INFECTION	4	20.0%	1	5.0%	5	12.5%	2.057	0.151
NAUSEA AND VOMITING	2	10.0%	6	30.0%	8	20.0%	2.500	0.114
FEVER	2	10.0%	1	5.0%	3	7.5%	0.360	0.548
MILD PERI HEPATIC COLLECTION	0	0.0%	2	10.0%	2	5.0%	2.105	0.147
ACUTE PANCREATITIS	1	5.0%	0	0.0%	1	2.5%	1.026	0.311
PROLONGED SHOULDER PAIN	0	0.0%	1	5.0%	1	2.5%	1.026	0.311

(x2):Chi-square Test, p:p-value for comparing between the studied groups

*:p-value<0.05 is significant

tatistical analysis revealed no significant differences in the occurrence of post-operative complications, such as wound infection, fever, and pancreatitis, between the two groups (p<0.05), as shown in the table.

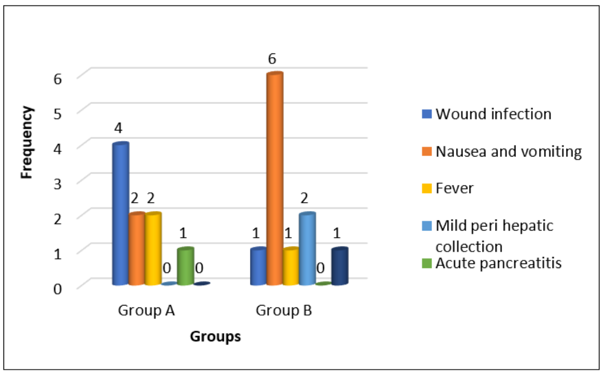


Figure 9. Comparison of post-operative complications between groups A and B.

4. Discussion

Cholecystitis and gallstones are among the most prevalent surgical complications. These days, LC is the method of choice for GB removal. As the most common and effective method for treating cholelithiasis, LC has many advantages, including better cosmetic outcomes, a shorter hospital stay, an early recovery, and the ability to return to physical activity and work.[6]

A comparable level of demographic uniformity was noted by Kim et al.,[5] found that, demographically speaking, the two groups were very similar.

In agreement, Rhemtulla et al.,[7] They sought to determine if, during laparoscopic cholecystectomy for acute cholecystitis, draining the abdomen was an additional benefit. In terms of age, sex, and body mass index, they did not find any statistically significant difference between the two groups.

In comparison to the no-drain group, which had a considerably shorter operating time of 45.10±8.75 minutes, our study showed that the drain group had an operating time of 80.35±13.011 minutes (p<0.001).

This discovery is consistent with Tzovaras et al.,[8] documented an extra 5-10 minutes of surgical time for cases involving drain installation.

That lines up with what a systematic review found by Cirocchi et al.,[9] according to those who participated, the no-drain groups had a far shorter operating time.

In our study, we found that the drain group required a substantially longer duration of hospitalization (2.20±1.508 days) than the no-drain group (1.25±0.769 days) (p<0.001).

The results are in line with Dharamdev et al.[10] According to the survey, patients with drains had an average hospital stay of 8.38±1.86 days, while patients without drains had an average stay of 4.68±1.25 days. The p-value was less than 0.05, indicating a significant difference.

In agreement, Qiu and Li[11] noted that the non-drainage group had a marginally shorter hospital stay (P=0.04).

In contrast, Cirocchi et al.,[9] found no statistically significant variation in the average duration of hospital stays.

Whereas the no-drain group, the drain group had considerably greater pain scores (4.50±1.357) (p<0.001).

Two meta-analyses found that patients who had their drains removed experienced far higher pain, so this makes sense.[12]

In accordance with Qiu and Li[11] according to those individuals, the drainage group had a considerably higher early VAS score (p<0.05).

This disagrees with Cirocchi et al.,[9] who stated that neither group experienced much more discomfort after the operation than the other.

Wound infections were more common in the drain group (20% vs. 5%); however, this difference was not statistically significant.

In agreement, Dharamdev et al.,[10] found that the rate of wound infection was significantly higher in group A (patients with drains) (14% vs. 2% in group B).

In accordance, Cirocchi et al.,[10] who stated that, those who did not have drains after surgery had a reduced incidence of wound infections.

Thirty percent of patients in Group B experienced nausea and vomiting after surgery, compared to ten percent in Group A, based on what we found. Still, the two data sets were not significantly different from one another (P=0.114).

This agrees with Kim et al.,5 Statistical analysis revealed no significant difference (p=0.62) in PONV between both groups. Based on these findings, it appears that drainage following laparoscopic cholecystectomy is not necessary to avoid PONV.

4. Conclusion

Routine drainage after laparoscopic cholecystectomy in acute cases has several drawbacks, including increased operative time and extended hospital stays, delayed recovery and return to normal activities, and higher pain scores with greater analgesic requirements. Additionally, routine drainage does not appear to prevent postoperative complications and contributes to reduced patient satisfaction.

Disclosure

The authors have no financial interest to declare in relation to the content of this article.

Authorship

All authors have a substantial contribution to the article

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Conflicts of interest

There are no conflicts of interest.

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