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Use of Drain in Laparoscopic Cholecystectomy

Ayman Helmy Ibrahim, Abdel Wahab M. Abdel Wahab, Karim A. Abdel Rahman Ali
Department of General Surgery, Faculty of Medicine, Al Azhar University
Corresponding author: Ayman Helmy Ibrahim ,email: dr.aymanhelmy10@gmail.com

ABSTRACT

Background: laparoscopic cholecystectomy has become the procedure of choice for treatment of patients with gall stones. The routine placement of drains becomes a part of this operation for a long period of time. However, controversy has surrounded this practice in elective conventional cholecystectomies, with most surgeons departing from this approach. **Aim of the Work:** this study aimed to assess the value of the drain in uncomplicated laparoscopic cholecystectomy and if the insertion of a drain should be routinely done or not. **Patients and Methods:** this study was conducted at AL-Azhar University Hospitals in Cairo (Al Hussien and Bab Al Shaaria Hospitals), Kafr Al-Sheikh General Hospital and Biala Central Hospital on 180 patiants presented to general surgery clinic with gall stone disease. Patients were randomized into two groups and both groups underwent laparoscopic cholecystectomy, group A (90 patients) received a drain in gall bladder bed and group B (90 patients) receivd no drain. Postoperative mortalities and morbidities shuch as pain, nausea, vomiting, fever, abdominal collection, wound infection, need for analgesics and time of discharge from hospital were assessed. Statistical analysis was performed. Mean and standard deviation were estimated for each continuous variable. **Results:** there was no mortality in either groups and no statistically significant difference in postoperative pain, nausea, vomiting, wound infection or abdominal collection between the two groups. However, hospital stay was longer in the drain group than in group without drain. **Conclusion:** our study suggested that insertion of drain should not be routinely done in elective laproscopic cholecystectomy as it has no significant effect on postoperative morbidity, moreover, it delays hospital discharge.

Keywords: drain, laparoscopic cholecystectomy.

INTRODUCTION

Laparoscopic cholecystectomy (LC), after its advent in 1987, was rapidly established itself as the gold standard treatment of gallstones. Arguments of drainage from open era continue into the laparoscopic era, with another factor, that is, pneumoperitoneum being questioned [(1)]. Laparoscopic cholecystectomy provides a safe and effective treatment for patients with gallstones as it reduces post operative pain with almost inadvisable scar, short hospital stay and earlier return to work [(2)].On the other side, patiants complain of abdominal pain, shoulder tip pain and nausea/vomiting post-opetatively [(3)].High pressure pneumoperitoneum using carbon dioxide gas was accused for those complications, thus a drain tube is inserted [(4)].The value of surgical drainage in open cholecystectomy is an issue that is not resolved till now [(5)]. The same occurs in laparoscopic cholecystectomy, where the lack of evidence on usefulness of drain is present. Again surgeons keep being divided among those placing a drain selectively and those who never place a drain, based on their personal experience, beliefs or bias [(6)].Routine drain use after laparoscopic cholecystectomy is still debatable. The main indication for drain use after laparoscopic cholecystectomy is to prevent a biloma or hematoma. According to the Cochrane Database Systemic Review, randomized clinical studies show no benefit of a drain. Some studies even claim that drains are harmful. The tendency of surgeons to use or not use drains seems to be a matter of habit and experience [(6)].

AIM OF THE WORK

This study aimed to assess the value of the drain in uncomplicated laparoscopic cholecystectomy and if insertion of adrain should be routinely done or not.

PATIENTS AND METHODS

This work was conducted at AL –Azhar University Hospitals in Cairo (Al Hussien and Bab Al Shaaria Hospitals), Kafr Al-Sheikh General Hospital and Biala Central Hospital.

The study included 180 patiants presented to general surgery clinic with gall stone disease from May 2015 to July 2018.

Type of study: this study was a prospective clinical study.

Inclusion criteria:

1. Patients who would not had acute cholecystitis, cholangitis or pancreatitis.
2. Patients who would not had any contraindication for laparoscopic approach.
3. Patients who would not required common bile duct exploration or any other additional procedure.

Exclusion criteria:

1. Patients who refused to enter the study.
2. Patients who have chronic liver diseases or bleeding tendency

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3. Patients with previous episode(s) of acute cholecystitis, cholangitis, or pancreatitis in their history had not been included.

MATERIALS AND METHODS

180 patients were simply randomized blindly before surgical procedure into two groups and both groups underwent laparoscopic cholecystictomy.Group A of 90 patients received a gravity drain in gall bladder bed and group B (90 patients) receivd no drain.Although entrance into the trial was decided before surgery, the randomization arm had only been notified to the operating team after the completion of the cholecystectomy and just before closure of the wound.

Informed consent had been obtained from all patiants and they had been told that there was a possibility to converted to open surgery (if there is a difficulty in laparoscopic procedure) and the trial protocol had been approved by the institutional ethics committee.The procedure was performed by the same team of surgeons.

All patients were given a single use of antibiotic prophylaxis (cefuroxime 750 mg) intravenously and postoperative analgesia (Diclofenac sodium 75 mg) intramuscularly. Postoperative pain assessment was performed using a visual analog scale (VAS) with which each patient noted the severity of pain, using a linear scale between zero (no pain) and 10 (strongest conceivable pain). Abdominal drainage was assessed in terms of quantity and quality of drainage. Abdominal ultrasonography was done only to patients suspected to have collection (if they had persistent shoulder pain, fever, elevated leucocytic count and/or persistent vomiting).Statistical analysis was performed. Mean and standard deviation were estimated for each continuous variable. Independent t-test was used for detection of difference between the two means.

Differences were considered significant when P >0.05.

RESULTS

Statistical analysis of the data

Data were fed to the computer using IBM SPSS software package version 20.0.

Qualitative data were described using number and percent. Comparison between different groups regarding categorical variables was tested using Chi-square test.

Quantitative data were described by using mean and standard deviation for normally distributed data while abnormally distributed data was expressed using median, minimum and maximum.

For normally distributed data, comparison between two independent population were done using independent t-test while, more than two population were analyzed F-test (ANOVA) to be used.Significance test results were quoted as two-tailed probabilities.

RESULTS

Table 1 showed that there was no statistical significant difference between the two studied groups regarding gall bladder conditions (P > 0.05).

Table 1: comparison between the two studied groups regarding gall bladder conditions

	Group A		Group B		P
	No.	%	No.	%	
Gall bladder wall					
Normal	9	10.0	0	0.0	0.077
Mild increase	45	50.0	18	20.0	
Thick wall	36	40.0	72	70.0	
Gall bladder Stones					
Multiple tiny stone	72	70.0	36	40.0	0.096
Solitary mobile stone	18	30.0	36	40.0	
Large solitary stone	0	0.0	18	20.0	

Table 2 showed that there was no statistical significant difference between the two studied groups regarding liver status, history of previous attack of acute cholicystitis, positive Murphy's sign and bile leakage (P > 0.05).

Table 2: comparison between the two studied groups regarding liver status, history of previous attack of acute cholicystitis, positive Murphy's sign and bile leakage

	Group A		Group B		P
	No.	%	No.	%	
Liver status					
Normal	54	60.0	45	50.0	0.062
Fatty	27	30.0	45	50.0	
Cirrhotic	9	10.0	0	0.0	
History of previous attack of acute cholicystitis	9	10.0	9	10.0	1.00
Positive Murphy's sign	9	10.0	9	10.0	1.00

Table 3 showed that there was no statistical significant difference between the two studied groups regarding time of procedure, dull aching pain in the right hypochondrium, fatty dyspepsia following meals, recurrent attacks of biliary colic and patient with calcular obstructive jaundice (P > 0.05).

Table 3: comparison between the two studied groups regarding time of procedure, dull aching pain in the right hypochondrium, fatty dyspepsia following meals, recurrent attacks of biliary colic and patient with calcular obstructive jaundice

	Group A		Group B		P
	No.	%	No.	%	
Dull aching pain in the right hypochondrium	45	50.0	63	70.0	0.088
Fatty dyspepsia following meals	27	30.0	18	20.0	0.064
Recurrent attacks of biliary colic	9	10.0	9	10.0	-
Patient with calcular obstructive jaundice	0	0.0	0	0.0	-

Table 4 showed that there was statistical significant difference between the two studied groups regarding analgesia and shoulder pain.

Table 4: comparison between the two studied groups regarding analgesia and shoulder pain

	Group A		Group B		P
	No.	%	No.	%	
Analgesia					
1-2	0	0.0	90	100.0	0.0001*
Multiple	90	100.0	0	0.0	
Shoulder pain					
No	0	0	63	70.0	0.001*
Yes	90	100.0	27	30.0	

Table 5 showed that there was no statistical significant difference between the two studied groups regarding hemodynamic data (P > 0.05).

Table 5: comparison between the two studied groups regarding hemodynamic data

	Group A		Group B		P
	No.	%	No.	%	
Pulse					
Normal	90	100.0	81	90.0	0.062
Tachycardia	0	0.0	9	10.0	
Temp.					
Normal	81	90.0	81	90.0	1.00
Mild fever	9	10.0	9	10.0	
TLC					
Normal	90	100.0	90	100.0	1.00
Abnormal	0	0.0	0	0.0	

Table 6 showed distribution of group A regarding the drain characteristics

Table 6: distribution of group A regarding the drain characteristics

	Group A	
	No.	**%**
Drain amount		
Significant	9	10.0
Not significant	81	90.0
Drain nature		
Serosanguinos	81	90.0
Bloody	9	10.0

Table 7 showed that there was no statistical significant difference between the two studied groups regarding postoperative radiological findings (P > 0.05).

Table 7: comparison between the two studied groups regarding postoperative radiological findings

	Group A		Group B		P
	No.	**%**	**No.**	**%**	
Abdominal U/S					
No collection	87	96.7	85	94.4	0.360
Rim of Free fluid	3	3.3	5	5.6	
X-ray					
Not done	50	55.6	45	50.0	0.265
No sub phrenic air	40	44.4	45	50.0	

Table 8 showed that there was statistical significant difference regarding to stay at hospital (P < 0.05) while there was no statistical significant difference regarding postoperative wound infection (P > 0.05).

Table 8: comparison between the two studied groups regarding postoperative wound infection and stay at hospital

	Group A		Group B		P
	No.	**%**	**No.**	**%**	
Postoperative wound infection					
No	90	100.0	90	100.0	1.00
Yes	0	0.0	0	0.0	
Stay at hospital (days)					
Range	2 - 3		1 - 4		
Mean	2.20		1.61		0.001*
S.D.	0.40		1.02		

DISCUSSION

Laparoscopic cholecystectomy was the procedure of choice for treatment of patients with gall stones [(6)].When Langenebuch performed the first cholecystectomy in 1882, he placed a peritoneal drain as a part of the procedure. The routine placement of drains becomes a part of this operation for a long period of time. However, controversy has surrounded this practice in elective conventional cholecystectomies, with most surgeons departing from this approach [(8)].Since laparoscopic cholecystectomy was introduced as an alternative to the conventional removal of the gallbladder, the issue of routine drainage needed reevaluation[(2)].

In a study conducted by **Hawasli** and **Brown** [(9)] on 480 patients underwent laparoscopic cholecystectomy with placement of routine closed suction drain in the gallbladder bed in all patients, bile leakage was encountered in five patients and bleeding in three patients. None of the patients with bile drainage developed bile peritonitis or required reoperation; one patient with bleeding required an operation to control the oozing from the liver bed. Two of the patients had bile drainage secondary to cystic duct leak treated by endoscopic retrograde cholangiography (ERCP), two patients had

moderate bile drainage that ceased in 3 and 4 days and the fifth patient was discharged home in 23 h with the drain then drainage stopped in 2 days. No source of this drainage was established. All these drains were removed in the office after 3 weeks. Three patients had blood in the drain, one an unsuspected cirrhotic patient who required reoperation the next day due to continuous oozing from the liver bed. The second patient, who had chronic renal failure, was treated conservatively. The third patient with bleeding was monitored. He was discharged 3 days later. Hawasli and Brown [9] concluded that using a closed suction drainage after laparoscopic cholecystectomy results in no postoperative morbidity and prevens definite exploratory laparotomy in patients with cystic duct leak. In addition, use of closed suction drainage helped in early diagnosis of postoperative bleeding in three patients [9].

In our study, significant postoperative drainage occurred in 9 patient, no patient required re-exploration for bleeding. In those operations the available diathermy was cutting only, however there was nothing obviously abnormal during the operation. One of those patients developed mild dyspnea, fever 38 and tachycardia 100, TLC was 8,900, drain amount only 100cc.Next day abdominal U/S and Hb% were done for the patient and revealed that:

Hb% was 10.2 gm%, and abdominal U/S revealed:

- A small rim of collection in the hepatorenal pouch.
- Minimal Fluid collection in the pelvis.

The patient admitted under observation and to follow up vital signs

Two days later abdominal U/S revealed no collection. In our study, in group A only three patients had small rim of free fluid in the abdomen and in group B five patients had a small rim of free fluid, in four of them the small rim disappeared after two days in the abdominal ultrasound but in the fifth patient the rim of free fluid still present and we made ultrasound guided fluid aspiration from th abdomen and the next abdominal ultrasound was free.There was no mortality in any group and no statistically significant difference in postoperative pain, nausea and vomiting, wound infection or abdominal collection between the two groups. However, hospital stay was longer in the drain group than in group without drain and it is appearing that the use of drain delays hospital discharge [10]. In a study conducted by **Hawasli and Brown** [9] on 100 patients underwent elective laparoscopic cholecystectomy and they were categorized into 2 groups; group 1 patients (n=50) had a drain placed through the epigastric trocar site. Group 2 patients (n=50) did not have a drain. There was no wound infection or postoperative fever in every group. In another study carried out by **Panzera *et al***. [11]on 989 patients, they had 12 cases (1.2%) of infection of the umbilical wound [11]. In a study conducted by **Champault *et al*.** [12] on 112 patients, they had only one patient (0.9%) who had developed an umbilical abscess 7 days after the operation and was drained spontaneously [12].In our study, no wound infection occurred in any patient. In our study, nine patients of group A and nine patients of group B had mild postoperative fever; one of them was the case that had significant post operative drainage. **Hawasli and Brown** [9] in their study they found that there were minor with no statistically significant differences between group 1 and group 2 in postoperative severity and duration of abdominal pain shoulder pain and nausea. Likewise, **Lewis *et al***. [5] found no increased morbidity in a prospective controlled randomized study of the short-term placement of a drain in simple cholecystectomy.In our study; all patients in group A needed multiple doses of analgesics for the first day but all patients of group B needed one or two doses of analgesics. In those patients with multiple doses the postoperative ultrasound revealed small rim of free fluid in hepatorenal pouch. With the advent of laparoscopic cholecystectomy, the incidence of bile duct injuries and hence, bile collections in the abdomen, has increased [13]. Lee [13] found that most patients with bile collections did not present with peritonitis; instead, they had bile ascitis, with mild, relatively non-specific symptoms. Among the series of his patients, the correct diagnosis was missed initially in 77% of patients. The important points of this study are that once a bile collection has been drained, the major potential for immediate serious illness has usually been eliminated. This allows the injury to be fully delineated and treatment to be planned and carried out in an unhurried manner.In another study conducted by **Albasini *et al*.** [14] on a series of 500 laparoscopic cholecystectomies, in which both operative cholangiography and drainage of the gallbladder bed were routine, bile leakage was identified in ten patients (2%). There was no bile duct injury. Nine of the ten patients presented with bile in the drain within 24 h. of operation and one patient presented 1 week after operation with a subphrenic collection. Of the ten patients, five settled spontaneously. Of the five remaining patients, two needed laparotomy- one for a subphrenic collection not responding to percutaneous drainage and one for biliary peritonitis. One patient was treated by relaparoscopy and suture of a duct of Luschka and one patient had successful percutaneous drainage of an infected collection; the fifth patient who

presented with a late subphrenic collection of bile was shown at endoscopic retrograde cholangiopancreatography (ERCP) to have a cystic duct stump leak and was treated with an endoscopic stent.**Albasini *et al*.** [14] believed that use of routine gallbladder bed drainage was justified for this reason alone. In a retrospective analysis of personnel experience of **Panzera *et al.*** [11] with laparoscopic cholecystectomy, compared to the literature on the subject, he presented the data of 989 laparoscopic cholecystectomies they had performed. They had 3 cases with injury of the biliary tracts, which did not occur during the training period, contrary to what quoted in the literature. Also there were 2 cases of postoperative bleeding (1 from cystic artery and 1 from the umbilical wound). They suggested the use of a systematic sub hepatic drainage during the first 24 postoperative hours, since it can be useful to reveal possible bleeding [11]. In our study, there were no cases with injury of the biliary tracts. No bile was encountered in the drain or detected in postoperative abdominal U/S. During laparoscopic cholecystectomy the gallbladder was inadvertently entered and stones were spilled. Although this complication is not unique to LC, spillage of stones is probably more common than during open surgery. Spillage of the stones from the gallbladder can occur during mobilization of the gallbladder from gallbladder bed, during manipulation of the cystic duct in preparation for intra operative cholangiogram, or during removal of the gallbladder through the abdominal wall [7]. In case report of **Zamir *et al.*** [7] they described four patients who presented with complications associated with dropped gallstones. In their study they confirmed the potential danger of spilled gall stones. Spilled gall stones not only caused intraperitoneal adhesions but also resulted in abscess formation. The infective complications described can be divided into two major categories. The first was the formation of trocar site abscess with late discharge of a stone either spontaneously or during subsequent wound exploration.The second category of complications was the formation of intraperitoneal abscesses. These abscesses usually formed in the sub hepatic or subphrenic spaces.These complications can become manifest at a very late stage after surgery ranging from 1 to 14 months postoperative.In another case report study by Bandyopadhyay [15] reported a case of late and recurrent subphrenic abscess following LC in a 65-year-old gentleman who underwent LC in 1991. He presented 3 years and even 10 years after the operation with subphrenic abscess. Bandyopadhyay recommended surgical open drainage as opposed to percutaneous drainage. The author also stressed on taking precautions to avoid spillage of stones [15].Also another case report study of **Papasavas *et al.*** [16] they treated a 77-year-old woman who underwent laparoscopic cholecystectomy. Subsequently, a right flank abscess developed. During the cholecystectomy, the gallbladder was perforated and stones were spilled. After a failed attempt to drain the abscess percutaneously, the patient required open drainage, which revealed retained gallstones in the right flank.In our study, 28 patients had intraoperative gallbladder injury with spilled stones in which the stones were totally extracted in 4 patients and most of the stones were extracted in the other cases. A study of **Voitk** [17] was conducted on 100 patients booked for elective laparoscopic cholecystectomy on an outpatient basis, 94 were successfully treated as outpatients who spent an average of less than 6 hours in hospital. Six patients required postoperative admission, four because of conversion to open operation, staying an average of 2.8 days in hospital. One patient was admitted because of persistent postoperative hypoxia due to atelectasis and one elderly lady because she failed to arrange for someone to stay with her for the first postoperative night; the last stayed 1 day each.There were two later complications: one patient was readmitted 3 weeks after surgery for percutaneous drainage of a right subphrenic abscess and one patient was readmitted 8 months postoperatively for repair of an incisional hernia at the umbilicus. None of the 2 readmissions were related to the outpatient status.This study confirmed that about 90% of all elective cholecystectomies can be done as outpatients, both safely and with good patient acceptance [17].In our study, all patients in group A discharged on the third or fourth day postoperative and all patients in group B discharged on the second day except for two patient there post operative ultrasound shows small rim of free fluid in the hepatorenal pouch they discharged at the fourth day.

CONCLUSION

From the results of our study we can come to a conclusion that there was no mortality in either group and no statistically significant difference in postoperative pain, nausea and vomiting, wound infection or abdominal collection between the two groups. However, hospital stay was longer in the drain group than in group without drain and it is appearing that the use of drain delays hospital discharge, also use of analgesia was more in the drained group than in group without drain, also th pain (specialy shoulder pain) was more in the drained group than in the group without drain, so

drainage could not be considered a routine use for uncomplicated cases.

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