Section: General Surgery

Original Research Article

STUDY ON DETERMINANTS OF POST-OPERATIVE STAY LENGTH AFTER LAPAROSCOPIC CHOLECYSTECTOMY

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Received : 02/01/2023
Received in revised form : 04/02/2023
Accepted : 16/02/2023

Keywords:
Laparoscopic Cholecystectomy, Adhesion, Drain, Hospital stay.

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DOI: 10.47009/jamp.2023.5.2.32

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2023; 5 (2); 150-155

Abstract

Background: Laparoscopic cholecystectomy has become a routine procedure for symptomatic cholelithiasis. Because of its lesser post-operative complications, shorter hospital stays and various factors. However, certain factors may increase the post-operative hospital stay in laparoscopic cholecystectomy cases. Therefore, this study was conducted to determine post-operative stay length after laparoscopic cholecystectomy. **Materials and Methods:** A cross-sectional study was conducted at Thoothukudi government medical college hospital between January 2020 to January 2021 for 13 months. Eighty patients with symptomatic gallstone disease without choledocholithiasis were included in the study. All of the patients had the standard pre-operative examination before receiving anaesthesia. In addition, all patients undergoing surgery gave their informed permission after hearing about the potential for the procedure to be converted to an open cholecystectomy, which was discussed in detail. **Result:** Most study participants belonged to the age group 31-45 years, and 85 percent of the population is female. 21.2% have bile spillage, 11.2% have difficult Calot's Triangle dissection, 22.5% have adhesion, and 48.3% of the study population had drain placement. It was found that bile spillage, difficult Calot's Triangle dissection, operative time, spillage of bile stones and initiation of oral diet did not significantly affect post-operative hospital stay. However, adhesion and placement of drain have a significant association with an increased post-operative hospital stay. **Conclusion:** We conclude that adhesion and drain placement have the strongest association with more extended hospital stay after Laparoscopic cholecystectomy, which should be dealt with carefully to overcome this burden.

INTRODUCTION

Gallstones are crystallised pieces of bile that have accumulated in the gallbladder. You may find them in sizes ranging from a speck of dust to a ball. A chemical imbalance in bile can cause the deposition of one or more components, a condition known as gallstones. Gallstone disease is a common gastrointestinal condition that necessitates hospitalisation in the general population.[1] Gallstones are more common in older people, and women have a higher risk of developing them than men. Among those aged 50-65, about 20% of women and 5% of males suffer from gallstones. Cholesterol makes up around 75% of gallstones, while pigments account for the remaining 25%. The clinical manifestations of gallstones are the same regardless of their composition.[2]

Risk factors for gallstone development include high biliary protein and fat concentrations, and gallbladder sludge is considered the typical precursor to gallstones. The calcium concentration in the biliary system affects bilirubin precipitation and gallstone calcification. Gallstone therapy should be reserved for patients experiencing symptoms. Still, prophylactic cholecystectomy is indicated for specific populations, including children, patients with sickle cell disease, and patients undergoing surgical therapies for weight loss.[3] Patients with gallstones should seek treatment for just a small subset of individuals with the condition, as most carriers never experience any discomfort. Individuals with symptoms from gallstones, those who have gall stones and sickle cell disease, and morbidly obese patients having laparotomy for other conditions should all be eligible for cholecystectomy.[4]

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Laparoscopic cholecystectomy is a minimally invasive surgical procedure for removing a diseased gallbladder. This technique has replaced the open approach for routine cholecystectomies since the early 1990s. At this time, laparoscopic cholecystectomy is indicated for treating acalculous cholecystitis, gallstone pancreatitis, biliary dyskinesia, gallbladder masses/polyps, and symptomatic cholelithiasis.[5]

Laparoscopic cholecystectomy has replaced open surgery as the standard therapy for cholelithiasis. The best care for individuals with severe gallbladder disease may be provided by hospitals that identify how laparoscopic cholecystectomy is used to treat these cases.[6] In the past, cholecystectomy was not recommended for patients with acute cholecystitis. Early intervention is preferable when its feasibility and safety have been established to prevent more biliary occurrences during the waiting time. Results have been better thanks to advancements in laparoscopic knowledge and equipment. Patients with acute gallbladder perforation who have early laparoscopic cholecystectomy have a greater chance of survival with the help of modern intensive care.[7]

Several factors were major contributors to postoperative length of stay, with ASA class and nonelective status having the most significant increased contribution. Long hospital stay was also correlated with prolonged operative time and complications in difficult cases. The differing results for hospital length of stay suggest that there is a need for better understanding of the relationship between hospital length of stay and factors of laparoscopic cholecystectomy.[8]

Aim

To study perioperative factors that determine the post-operative stay duration in patients undergoing laparoscopic cholecystectomy.

MATERIALS AND METHODS

A cross-sectional study was conducted at Thoothukudi government medical college hospital between January 2020 to January 2021 for 13 months. Eighty patients with symptomatic gallstone disease without choledocholithiasis were included in the study.

Inclusion Criteria: Patient's age limit of 18-60 years, adults with Symptomatic Cholelithiasis, and adults with calculous cholecystitis.

Exclusion Criteria: Age < 18 years and > 60 years, Adults with choledocholithiasis, Patients unfit for General anaesthesia, Gall Bladder Malignancy, Pregnancy, Conversion of laparoscopic to open cholecystectomy, and Laparoscopic cholecystectomy associated with other procedures.

The patients' name, age, gender, occupation, religion, socioeconomic status, and address were recorded. We asked specific questions on the severity, frequency, and timing of the pain if it was made worse by fatty foods, and whether either parenteral or oral analgesics had helped it. A complete physical examination of the digestive system and the rest of the body was conducted.

Pre-operative work-up included routine laboratory investigations like liver function tests, complete blood count, hepatitis profile, renal function test, Chest-X-Ray and abdomen ultrasound. To verify the clinical diagnosis of cholelithiasis, an Ultrasonogram of the stomach was performed on all patients. CBD dilatation or CBD calculi, gallstone size, gallbladder, and gallbladder wall thickness.

All of the patients had the standard pre-operative examination before receiving anaesthesia. Patients going under the knife had their options laid out for them in the form of a well-explained informed consent, which included the possibility of switching to open cholecystectomy. To further reduce the risk of trocar damage, we inserted a nasogastric tube into all of our patients before beginning the procedure. Antibiotic prophylaxis was administered before surgery (Inj. Ceftriaxone 1gm IV). Multiple experienced and less experienced surgeons carried out the operation. Carbon dioxide insufflation was used to carry out the standard four-port procedure successfully. Pneumoperitoneum was created using the Hasson procedure. During surgery, iron clips were used to skeletonise the cystic duct and artery. A suction drain was installed in certain patients. Patients who did not have post-operative nausea and vomiting began their post-operative recovery with an oral liquids diet.

For categorical data, we showed the frequency together with the percentage. Data were presented as means and standard deviations for typical distributions and scales. To find an association between two categorical variables chi-square test was used. The association odds ratio was calculated using Binary Logistic Regression to check for strength.

RESULTS

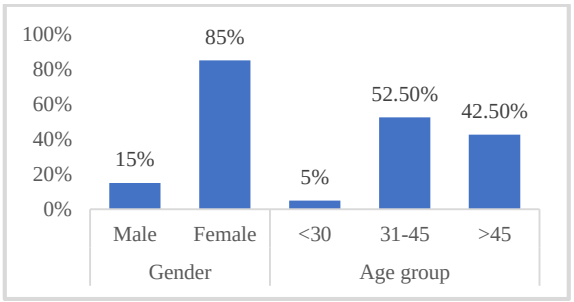

Figure 1: Distribution among the study population

Among 80 patients, the majority were females (85%), and 15% were males. The majority were 31-45 years (52.5%) and >45 years of age (42.5%). 5% of participants belonged to less than 30 years. The mean age group of participants is 42.4 years. The age ranged from 28 years to 59 years [Figure 1].

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Table 1: Post-operative hospital stays among the study population

Variable		Post OP hospital stay <2 days	Post OP hospital stay >2 days	P-value
Operative time score	1	7 (100%)	0 (0%)	0.010
	2	42 (72.4%)	16 (27.6%)	
	3	6 (40%)	9 (60%)	
Bile Spillage	Present	9 (53%)	8 (47%)	0.113
	Absent	46 (73%)	17 (27%)	
Difficult Calot's triangle	Present	4 (44.4%)	5 (55.6%)	0.094
	Absent	51 (72%)	20 (28%)	
Adhesions	Present	4 (22.2%)	14 (77.8%)	<0.001
	Absent	51 (82.3%)	11 (17.7%)	
Placement of drain	Present	11 (31.4%)	24 (68.6%)	<0.001
	Absent	44 (97.8%)	1 (2.2%)	
Stone pillage	Present	6 (66.7%)	3 (33.3%)	1.000
	Absent	49 (69%)	22 (31%)	
Initiation of oral diet score	1	27 (68%)	13 (32%)	0.809
	2	28 (70%)	12 (30%)	

There was a significant association between operative time score, adhesions, placement of drain and post OP hospital stay, with a p-value of 0.010, <0.001, and <0.001. However, there was no significant association between Bile spillage, Difficult Calot's triangle, stone spillage, initiation of oral diet score and post OP hospital stay with a p-value of 0.113, 0.094, 1.000, and 0.809 [Table 1].

Table 2: The odds ratio for Post OP hospital stay >2 days

		Post OP hospital stay > 2 days	Odds ratio	95% Confidence interval		P-value
				Upper	Lower	
Adhesions	Absent	11	1	4.475	58.84	<0.001
	Present	14	16.2			
Placement of drain	Absent	1	1	11.67	789.19	<0.001
	Present	24	96			

Those with adhesions had 16.2 times higher odds of having >2 days post-OP hospital stays with a Confidence interval of 4.475-58.84. There is a significant difference, with a p-value of <0.001. Those with the placement of drain had 96 times higher odds of having >2 days post-OP hospital stays with a Confidence interval of 11.67-789.19. Again, there is a significant difference, with a p-value of <0.001 [Table 2].

DISCUSSION

About 80 patients who underwent elective laparoscopic cholecystectomy in this study were included. This study aimed to identify the significance of prolonged hospital stay among study parameters, including operational time, bile leakage, gallbladder stone spillage, adhesions, difficult Calot's Triangle dissection, drain placement, and oral food initiation with the length of post-operative stay after laparoscopic cholecystectomy. Among those, the post-operative stay was prolonged in patients where a drain was placed and the presence of adhesions.

Chong et al. studied patients who had a median age of 52. Variations in emergency surgery, surgical time, acute inflammation, perioperative transfusion, and surgical site infection were statistically significant due to perioperative variables. In addition, variations in patient characteristics such as gender, smoking status, age, diabetes mellitus, pre-operative albumin level, and ASA score were statistically significant. The findings suggest that attempts to shorten hospital stays following laparoscopic cholecystectomy should focus on patients' ages, the need for the procedure to be performed as an emergency, the length of the operation, and whether or not the patient smokes.[9]

According to the study conducted by Gelbard et al., individuals with diabetes who underwent delayed cholecystectomy for at least 24 hours after arrival had a considerably greater risk of acquiring surgical-site infections and a lengthier length of hospitalisation. However, there was no difference in complications or duration of hospital stay for individuals who did not have diabetes when cholecystectomy was delayed. The results suggest that diabetic patients who have laparoscopic cholecystectomy 24 hours or more after admission may be at a higher risk for developing a surgical-site infection in the days following the procedure.[10]

A study by Lee et al. showed that patients differed significantly based on factors such as gender, co-morbidities, ASA score, operation duration, clinical symptoms, laboratory findings, and ultimate diagnosis. Patients' and families' unwillingness to allow surgery (13 Cases), problems during surgery (19 cases), severe infections of the gallbladder (13 cases), and stomach discomfort (13 cases) all contributed to the delays in discharging (10 cases). It was shown that many factors, mostly related to the patients themselves, contributed to postponing discharge following a Laparoscopic cholecystectomy (LC).[11]

ISSN (O): 2687-5365; ISSN (P): 2753-6556

In a study conducted by Choi et al., patients who were sent home on post-operative day 0 were asked about their post-operative discomfort, whether or not they wanted to go home, and how satisfied they were with the instruction they received. As a whole, people gave this item 8.3 out of 10 possible points. The group that was released from the hospital on post-operative day 0 spent less overall than the other group. In patients with simple pulmonary illness, stable cardiovascular disease, and managed DM, day-case laparoscopic cholecystectomy is equally effective and safe as the standard clinical route applied laparoscopic cholecystectomy.[12]

Morimoto et al. found that among patients who stayed longer than 14 days, 18.7% were readmitted. There were statistically significant differences between the two groups on 13 clinical variables. The most accurate predictors of extended hospital stays were the patient's ASA score and the severity of their laparoscopic cholecystectomy. The results indicated that a patient's length of stay in the hospital could be predicted using thirteen highly correlated criteria and the LOS prediction score.[13]

Ivatury et al. found that three pre-operative patient characteristics significantly contributed: a lower body mass index was related to a shorter post-operative stay, whereas a higher white blood cell (WBC) count and the biliary pancreatitis presence predicted a longer recovery period. The number of fluids given during surgery and the patient's ASA class was major factors in their prolonged recovery time. The findings indicated that many variables significantly contributed to the post-operative duration of stay, with ASA class and outpatient status showing the most increasing influence.[14]

Park et al. found no statistically significant differences in pain levels measured by the Numeric Rating Scale (NRS), post-operative complications, or the number of analgesic injections. In the 2-day critical route group, average admission and individual patient costs were greater, but this was not statistically significant. Therefore, a 1-day critical route can be used safely in practice for certain patients after cholecystectomy, as seen here.[15]

In a study of patients who underwent open surgery, Dickinson et al. found that shorter stay length was related to factors including younger age, urinary catheter removal before discharge, ASA grade I-II, discharge to home, and weekend release. The length of stay was no different between primary and pre-operative surgeries. There was a 5% 30-day readmission rate overall. The results show that laparoscopic surgery is the best predictor of a shorter length of stay when treating benign foregut disorders.[16]

According to the study by Zipple et al., there was a moderately favourable link between shorter hospital stays and shorter wait times for surgery. Co-morbidities such as diabetes mellitus, heart arrhythmia, anticoagulation, and prior abdominal operations were more prevalent among individuals admitted to non-surgical care. Although the duration of stay for surgical service admissions decreased when individual co-morbidities were included in the analysis of covariance, it remained considerably shorter overall. According to the findings, cholecystectomy patients were more likely to have a longer LOS and higher potential costs if they were admitted to non-surgical treatment and had to wait longer for medical intervention.[17]

Han et al. found that patients had significantly less pain, improved quality of life, and fewer gastrointestinal issues at one year post-operatively compared to one month post-operatively. Any one factor did not predict long-term post-operative discomfort and gastrointestinal problems. However, after 1-year post-op, it was shown that post-operative complications negatively impacted QoL. Therefore, patients who encounter post-operative problems need careful and extended follow-up.[18]

In our study, among 80 participants, most participants belonged to the age group 31-45 years (52.5), the majority were females (85%), and 15% were males. Adhesions are particularly common in chronic cholecystitis, post-ERCP procedures, and past upper abdominal surgeries. In addition, it made it more challenging to visualise the Calot's triangular anatomy and dissection, resulting in longer operational times and a higher likelihood of converting from laparoscopic to open cholecystectomy. Most patients with adhesions (77.8%) had a post-operative hospital stay of more than two days, while only 22.2 percent had a post-operative hospital stay of fewer than two days. Without adhesions, the majority (82.3%) had a Post OP hospital stay of fewer than two days, whereas just 19% had a Post OP hospital stay of more than two days. Those with adhesions spent a long time in the hospital after surgery. Adhesions and post-operative hospitalisation had a significant ($P<0.001$) relationship.

Bile leakage might occur during the specimen's dissection and removal. The study can explain any link between bile spilling and the length of time spent in the hospital after surgery. Most of the study population (78.8%) did not have bile spilling, but 21.2 percent of subjects did. Almost half of those with bile spilling (47%) had a post-operative hospital stay of more than two days, whereas the remaining 53 percent had a post-operative hospital stay of fewer than two days. Without bile spilling, the majority (81%) had a Post OP hospital stay of fewer than two days, whereas just 27% had a Post OP hospital stay of more than two days. Even though more people without bile spilling spent less than two days in the hospital after surgery, this was not statistically significant. With a $P=0.113$, there was no significant link between bile spilling and post-operative hospital stay.

Longer post-operative hospital stays could be related to gallbladder damage during dissection and clip slippage in the cystic duct during dissection and specimen retrieval. Forceps were used to retrieve the spilled stones, followed by saline lavage. Stone

ISSN (O): 2687-5365; ISSN (P): 2753-6556

leakage was found in 11.2 percent of the study participants. Most of the time (88.8%), no stone was spilling. The majority of stone spilling patients (66.7 percent) had a Post OP hospital stay of fewer than two days, whereas only 33.3 percent had a Post OP hospital stay of more than two days. Without stone leakage, the majority (69%) had a Post OP hospital stay of fewer than two days, whereas just 31% had a Post OP hospital stay of more than two days. Both those with and without stone leakage spent less time in the hospital after surgery. There was no statistically significant (P=1.000) link between stone leakage and post-operative hospitalisation.

Any anatomical anomalies, such as a cystic artery, cystic duct, or gall bladder abnormalities, make diagnosing the Calot's Triangle difficult. Calot's triangle was problematic in 11.2 percent of the study participants. 55.6 percent of patients with Difficult Calot's triangle had a Post OP hospital stay of more than two days, whereas 44.4 percent had a Post OP hospital stay of fewer than two days. Without Difficult Calot's triangle, the majority (72%) had a Post OP hospital stay of fewer than two days, whereas only 28% had a Post OP hospital stay of more than two days. However, those with Difficult Calot's triangle spent a long time in the hospital after surgery. This did not have any statistical significance. The correlation between Difficult Calot's triangle and post-operative hospital stay was not significant (P=0.094).

A drain tube was put in the dissection site if adhesion release, bleeding, stone spilling, or bile spillage occurred. The drain can be removed if there is no drain or if the drain is less than 10 ml for two days. Drain placement was found in 43.8 percent of the research participants. Almost half of the people in the study (56.5%) did not have a drain installed. Most drain patients (68.6%) had a post-operative hospital stay of more than two days, whereas only 31.4 percent had a post-operative hospital stay of fewer than two days. Most patients without drains (97.8%) had a Post OP hospital stay of fewer than two days, while only 2.2 percent had a Post OP hospital stay of more than two days. Those who had a drain stayed in the hospital longer after surgery. There was a significant (P <0.001) link between drain insertion and post-operative hospital stay.

After 24 hours, the patient is usually on an oral diet. There were no complaints of nausea or vomiting on starting oral meals. The patients were divided into two groups: those who were started on an early oral diet (less than 24 hours) and those who were started on an oral diet (more than 24 hours), underscores 1 and 2, respectively. Initiation of an oral diet score of 2 was seen in 37.5 percent of the study population. The majority (62.5%) scored 1 for the oral diet beginning. The majority (68%) of patients with an oral diet initiation score of 1 had a Post OP hospital stay of fewer than two days, while 32% of patients with an oral diet initiation score of one had a Post OP hospital stay of more than two days. The majority (78%) of patients with an initiation of oral diet score of 2 had a Post OP hospital stay of fewer than two days, while 30% of patients with an initiation of oral diet score of two had a Post OP hospital stay of more than two days. Most of those with a beginning oral diet score of 1 and 2 stayed in the hospital for less than two days after surgery. There was no significant (P=0.809) link between the start of an oral diet and the length of time spent in the hospital after surgery. Patients who had no nausea or vomiting, could tolerate oral food, had pain that could be managed with oral analgesics, and were mobile were discharged. Early discharge is defined as a discharge of a patient in less than two days, whereas late discharge is defined as a discharge of a patient in more than two days

CONCLUSION

Laparoscopic cholecystectomy is the gold standard procedure for any gallbladder issues nowadays. Therefore, we conclude it allows for a speedier recovery from surgery, earlier mobilisation, and a faster recovery time. However, some individuals had to stay in the hospital for longer periods. Adhesions and drain placement exhibited the strongest relationship with post-operative stay time after surgery of all the study factors.

REFERENCES

1. Njeze GE. Gallstones. Niger J Surg. 2013;19(2):49–55.
2. Sharma RK, Sonkar K, Sinha N, Rebala P, et al. Gallstones: A worldwide multifaceted disease and its correlations with gallbladder carcinoma. PLoS One. 2016;11(11): e0166351.
3. Panwar A, Lata K, Davis AA, Kriplani A. Spilled gallstones as an unusual cause of infertility: Laparoscopic management. J Minim Invasive Gynecol. 2020;27(7):1467–8.
4. Jain K, Garg PK. Could the type and size of gallstones influence gallbladder carcinogenesis? Ann Surg. 2016;263(3): e57.
5. Hassler KR, Collins JT, Philip K, Jones MW. Laparoscopic Cholecystectomy. In: StatPearls. StatPearls Publishing; 2022.
6. Gupta V. Landmarking for safe laparoscopic cholecystectomy. HPB (Oxford). 2021;23(7):1137.
7. Krishnamurthy G, Ganesan S, Ramas J, Damodaran K, et al. Early laparoscopic cholecystectomy in acute gallbladder perforation: Single-centre experience. J Minim Access Surg. 2021;17(2):153–8.
8. Ivatury SJ, Louden CL, Schwesinger WH. Contributing factors to postoperative length of stay in laparoscopic cholecystectomy. JSLS. 2011 Apr-Jun;15(2):174-8.
9. Chong JU, Lee JH, Yoon YC, Kwon KH, et al. Influencing factors on post-operative hospital stay after laparoscopic cholecystectomy. Korean J Hepatobiliary Pancreat Surg. 2016;20(1):12–6.
10. Gelbard R, Karamanos E, Teixeira PG, Beale E, et al. Effect of delaying same-admission cholecystectomy on outcomes in patients with diabetes: Delaying cholecystectomy in diabetic patients. Br J Surg. 2014;101(2):74–8.
11. Lee SR, Shin JH. Clinical study of Delayed discharge after laparoscopic-cholecystectomy. J Minim Invasive Surg. 2013;13(1):11–6.
12. Choi JB, Lim JH, Kim SH, Lee SY, et al. Feasible factors to reduce hospital days after laparoscopic cholecystectomy. J Minim Invasive Surg. 2014;17(4):80–4.
13. Morimoto Y, Mizuno H, Akamaru Y, Yasumasa K, et al. Predicting prolonged hospital stay after laparoscopic cholecystectomy: Predicting prolonged hospital stay. Asian J Endosc Surg. 2015;8(3):289–95.

ISSN (O): 2687-5365; ISSN (P): 2753-6556

14. Ivatury SJ, Louden CL, Schwesinger WH. Contributing factors to post-operative length of stay in laparoscopic cholecystectomy. JSLS. 2011;15(2):174–8.
15. Park JW, Kim M, Lee SK. Appropriate hospital discharge timing after laparoscopic cholecystectomy: Comparison of post-operative day 1 vs Day 2 discharge protocol. J Minim Invasive Surg. 2019;22(2):69–74.
16. Dickinson KJ, Taswell JB, Allen MS, Blackmon SH, et al. Factors influencing length of stay after surgery for benign foregut disease. Eur J Cardiothorac Surg. 2016;50(1):124–9.
17. Zipple M, Slama E, Wilkie J, Kieninger A, et al. Factors influencing length of stay in cholecystectomy patients in a community hospital. Spartan Med Res J. 2017;2(2):6346.
18. Han IW, Lee HK, Park DJ, Choi YS, et al. Long-term patient-reported outcomes following laparoscopic cholecystectomy: A prospective multicenter observational study. Medicine (Baltimore). 2020;99(35): e21683.

ISSN (O): 2687-5365; ISSN (P): 2753-6556