



A Study of Factors Influencing Postoperative Hospital Stay After Laparoscopic Cholecystectomy

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ABSTRACT

Backgrounds/Aims Laparoscopic cholecystectomy can reduce postoperative pain and recovery time. However, some patients experience prolonged postoperative hospital stay. We aimed to identify factors influencing the postoperative hospital stay after laparoscopic cholecystectomy.

Methods: Patients (n=336) undergoing laparoscopic cholecystectomy for gallbladder pathology in our hospital during last 3 years i.e. from 1st January 2012 to 31st December 2015 were studied based on their hospital records.

Results: The patient population median age was 52 years, and consisted of 32 emergency and 304 elective operations. A univariate analysis of perioperative factors revealed significant differences in operation time ($p<0.001$), perioperative transfusion ($p=0.006$), emergency operation ($p<0.001$), acute inflammation ($p<0.001$), and surgical site infection ($p=0.041$).

Conclusions: Operation time, emergency operation, patient age, and smoking influenced the postoperative hospital stay and should be the focus of efforts to reduce hospital stay after laparoscopic cholecystectomy.

KEYWORDS : Laparoscopic cholecystectomy, Hospital stay

INTRODUCTION

Laparoscopic cholecystectomy (LC) has been the treatment of choice for symptomatic gallstone disease since 1990.^{1,2} The main advantages of LC include less postoperative pain, shorter operation time, lower rate of postoperative complications and early ambulation leading to shorter hospital stay. In a study by Tsang et al.,³ independent predictive factors for delayed postoperative stay included age over 60 years, time for diet resumption greater than 8 hours, and oral analgesia intake of greater than two tablets. Operative findings of acute inflammation or postoperative complications did not have any influence on the length of hospital stay. Recently, Morimoto et al.⁴ reported that the American Society of Anesthesiologists (ASA) score and LC difficulty are the most predictive factors on length of hospital stay. Other studies have proposed advanced age and intraoperative complications as predictive risk factors.^{5,6,7} While an outpatient procedure is popular for LC, defining the indications and predictive factors associated with a delay in postoperative hospital stay is essential for maximizing the benefits of LC. However, there are few published articles on factors influencing the postoperative hospital stay after LC.^{3,4,8} This study aimed to identify influencing factors on postoperative hospital stay after LC based on retrospective analysis of data from multiple centers.

MATERIALS AND METHODS

The study was carried out in the department of surgery in a tertiary hospital from 1st January 2016 to 29th February, 2016. The records of the patients admitted in the hospital during last 3 years i.e. from 1st January 2012 to 31st December 2015 were studied. Demographic data and clinicopathologic parameters, as well as perioperative data, were gathered through a retrospective review of medical records.

Patient characteristics

The median age for all patients was 52 years (range: 14-85 years), and 141 (42%) were male and 195 (58%) female. Postoperative hospital day (POHD) was defined as the number of days from the day of operation (day 0) until hospital discharge. Patients were discharged when they were afebrile and mobile, solid food was well tolerated, and pain was adequately controlled by oral analgesia. Since POHD was not normally distributed, the median value of POHD was used to define prolonged postoperative hospital stay. Median POHD was 2 days (range: 0-18 days) and patients were divided into 2 groups. The early discharge (ED) group included patients discharged within 2 postoperative days and the late discharge (LD) group included patients discharged after more than 2 postoperative days. Possible influencing factors on POHD in the 2 groups were retrospectively analyzed.

RESULT

In this study, of the 336 laparoscopic cholecystectomy cases analyzed,

the ED group included 225 (67%) patients and the LD group included the remaining 111 (33%) patients. The median POHD for the ED group was 1 day (range: 0-2 days), and the median POHD for the LD group was 4 days (range: 3-18 days). The only postoperative mortality case was a 76-year-old woman.

Influencing factors on postoperative hospital stay length: Perioperative factors

Seven factors were analyzed as possible perioperative factors influencing the POHD. The average operation times of the ED and LD groups were 45 and 77 minutes, respectively, with significant difference ($p<0.001$). Other perioperative factors that differed significantly included perioperative transfusion ($p=0.006$), emergency operation ($p<0.001$), acute inflammation of the gallbladder ($p<0.001$), and surgical site infection ($p=0.041$).

(table 1 comes here)

Influencing factors on postoperative hospital stay length: Patient factors

Patient variables were analyzed to determine factors that differed significantly between the ED and LD groups. Age ($p=0.012$), gender ($p=0.036$), diagnosis of diabetes mellitus ($p=0.011$), preoperative albumin level ($p=0.024$), smoking ($p=0.010$), and ASA score ($p=0.003$) were significantly different among the groups (table 2 comes here)

Risk factors for delayed postoperative hospital stay

Multivariate logistic regression analysis of all significant factors in the univariate analyses yielded 4 independent influencing factors. Emergency operation showed the highest odds ratio of 6.104 (95% confidence interval (CI): 2.293-16.250, $p<0.001$). Smoking was also an independent influencing factor with an odds ratio of 2.341 (95% CI: 1.129-4.853, $p=0.022$). Operation time ($p<0.001$) and age ($p=0.014$) were statistically significant factors that influenced POHD after LC with odds ratios of 1.030 (95% CI: 1.005-1.045) and 1.025 (95% CI: 1.005-1.045), respectively.

(table 3 comes here)

Perioperative transfusion, acute inflammation, SSI, gender, diabetes mellitus, albumin, and ASA scores failed to show significant differences in a multivariate analysis.

DISCUSSION

Improvements in LC and anesthetic techniques, together with increased familiarity with the procedure lead to progressively shorter hospital stays.² In a recent study by Morimoto et al.,⁴ ASA scores and LC difficulty were the most influential predictive risk factors for a longer hospital stay. In addition, LC in elderly patients is associated

with higher complications rates and longer hospital stays.^{8,10} Elderly patients are more likely to present with complicated cases of gallbladder disease, tend to present later than younger patients, and present with relatively benign symptoms that may conceal the severity of the case.¹¹ Our results confirmed that age and prolonged operation time are independent factors contributing to delayed hospital stays. However, our results also suggested that while acute cholecystitis and advanced health problems are significant risk factors in the univariate analysis, they are not independent risk factors for delayed hospital stays. Our results showed that previous abdominal operation history is not associated with delayed POHD.

In evaluating patient-related risk factors, diabetes mellitus, albumin level, and smoking were also analyzed. Patients with diabetes mellitus are known to have poorer surgical outcomes and higher rates of intraoperative complications.¹² While our results confirmed that more patients with diabetes mellitus belonged to the LD group, diabetes mellitus was not an independent influencing factor for POHD. Nevertheless, careful sugar control during the perioperative course should be considered for patients with diabetes mellitus. A significantly higher percentage of patients had lower preoperative albumin levels in the LD group, as compared to the ED group. Although, a lower level of albumin also failed to show significance as an independent factor, further investigation into the influence of nutritional state on POHD should be considered. Nutritional therapy or albumin replacement may be considered to reduce POHD for patients with lower preoperative albumin levels. Current smoking was found to be an independent influencing factor on delayed POHD. Since smoking is considered a risk factor for pulmonary complications and surgical site infection, patients should be advised to cease smoking prior to an elective surgery.

The limitations of this study included the bias inherent to the retrospective nature of the design and a lack of consensus on discharge criteria among the participating hospitals. Decisions on discharge were subject to surgeon preferences. This may have confounded the results; however, our results still concurred with previous findings from other studies.

Tables:

Table 1: Perioperative factors influencing on the length of postoperative hospital day (POHD).

		POHD≤2 days (n=225)	POHD>2 days (n=111)	p-value
Operation time, mean (range)		45 (14-190)	77 (16-371)	<0.001
Perioperative transfusion (n)	Yes	1(0.5%)	6(5.6%)	0.006
	No	216(99.5%)	102(94.4%)	
Emergency operation (n)	Yes	9(4%)	23(20.7%)	<0.001
	No	216(96%)	88(79.3%)	
Previous abdominal operation history(n)	Yes	36(16%)	20(18%)	0.782
	No	187(83.9%)	91(82%)	
Acute inflammation(n)	Yes	24(10.7%)	47(42.3%)	<0.001
	No	201(89.3%)	64(57.7%)	
Gallbladder stone(n)	Yes	61(27.1%)	31(28.2%)	0.837
	No	164(72.9%)	79(71.8%)	
Surgical site infection	Yes	2(0.9%)	5(4.6%)	0.041
	No	218(99.1%)	103(95.4%)	

Table 2: Patient factors influencing on the length of postoperative hospital day (POHD)

		POHD≤2 days (n=225)	POHD>2 days (n=111)	p-value
BMI (mean)		25.3±15.2	24.2±3.2	0.618
Age (years)	<65	180(80%)	75(67.6%)	0.012
	≥65	45(20%)	36(32.4%)	
Gender (n)	Male	85(37.8%)	56(50.5%)	0.036
	Female	140(62.2%)	55(49.5%)	
Diabetes mellitus(n)	Yes	22(10%)	22(20.2%)	0.011
	No	198(90%)	87(79.8%)	

Albumin(n)	<3g/dl	4(1.8%)	8(7.3%)	0.024
	≥3g/dl	218(98.2%)	102(92.7%)	
Smoking(n)	Yes	25(11.2%)	25(22.5%)	0.010
	No	199(88.8%)	86(77.5%)	
ASA score(n)	1	122(54.2%)	40(36%)	0.003
	2	87(38.7%)	63(56.8%)	
	3	16(7.1%)	7(6.3%)	
	4	0	1(0.9%)	

Table 3: Multivariate logistic regression analysis of influencing factors on length of postoperative hospital stay

	p-value	Odds ratio	95% CI
Operation time	<0.001	1.030	1.005-1.045
Emergency operation	<0.001	6.104	2.293-16.250
Age	0.014	1.025	1.005-1.045
Smoking	0.022	2.341	1.129-4.853

References

- McMahon AJ, Fischbacher CM, Frame SH, MacLeod MC. Impact of laparoscopic cholecystectomy: a population-based study. *Lancet*. 2000;356:1632-1637.
- Shea JA, Berlin JA, Bachwich DR, Staroscik RN, Malet PF, McGuckin M, et al. Indications for and outcomes of cholecystectomy: a comparison of the pre and postlaparoscopic eras. *Ann Surg*. 1998;227:343-350.
- Tsang YY, Poon CM, Lee KW, Leong HT. Predictive factors of long hospital stay after laparoscopic cholecystectomy. *Asian J Surg*. 2007;30:23-28.
- Morimoto Y, Mizuno H, Akamaru Y, Yasumasa K, Noro H, Kono E, et al. Predicting prolonged hospital stay after laparoscopic cholecystectomy. *Asian J Endosc Surg*. 2015;8:289-295.
- Choi JB, Lim JH, Kim SH, Lee SY, Lee SJ, Kim KS. Feasible factors to reduce hospital days after laparoscopic cholecystectomy. *J Minim Invasive Surg*. 2014;17:80-84.
- Lee SR, Shin JH. Clinical study of delayed discharge after laparoscopic-cholecystectomy. *J Korean Soc Endosc Laparosc Surg*. 2010;13:11-16.
- Robinson TN, Biffi WL, Moore EE, Heimbach JK, Calkins CM, Burch JM. Predicting failure of outpatient laparoscopic cholecystectomy. *Am J Surg*. 2002;184:515-518.
- Cheng SP, Chang YC, Liu CL, Yang TL, Jeng KS, Lee JJ, et al. Factors associated with prolonged stay after laparoscopic cholecystectomy in elderly patients. *Surg Endosc*. 2008;22:1283-1289.
- Keus F, de Jong JA, Gooszen HG, van Laarhoven CJ. Laparoscopic versus open cholecystectomy for patients with symptomatic cholelithiasis. *Cochrane Database Syst Rev*. 2006;(4):CD006231.
- Sauerland S, Agresta F, Bergamaschi R, Borzellino G, Budzynski A, Champault G, et al. Laparoscopy for abdominal emergencies: evidence-based guidelines of the European Association for Endoscopic Surgery. *Surg Endosc*. 2006;20:14-29.
- Morrow DJ, Thompson J, Wilson SE. Acute cholecystitis in the elderly: a surgical emergency. *Arch Surg*. 1978;113:1149-1152.
- Gelbard R, Karamanos E, Teixeira PG, Beale E, Talving P, Inaba K, et al. Effect of delaying same-admission cholecystectomy on outcomes in patients with diabetes. *Br J Surg*. 2014;101:74-78.