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Laparoscopic Cholecystectomy in Patients with a History of Gastrectomy

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Abstract

Purpose. Previous gastrectomy has been considered a relative contraindication to laparoscopic cholecystectomy (LC). The aim of this study was to evaluate the safety and efficacy of LC in patients with a history of gastrectomy.

Methods. From a database of 1 104 consecutive patients with symptomatic gallstone disease, who underwent LC between April 1992 and January 2007, 51 (4.6%) had undergone previous gastrectomy: for gastric cancer ($n = 36$) or gastroduodenal ulcer ($n = 15$). We compared the operative time, blood loss, conversion rate, morbidity rate, diet resumption, and postoperative hospital stay between patients with, and those without, a history of gastrectomy.

Results. The incidence of common bile duct stones was significantly higher (33.3% vs 8.6%, $P < 0.001$) and operative time was significantly longer (111.2 min vs 77.9 min, $P < 0.001$) in the patients with a history of gastrectomy. There was no significant difference in operative time between the first-half and second-half periods. Conversion to an open cholecystectomy was required in two patients. There was no significant difference between the two groups in blood loss, conversion rate, morbidity rate, diet resumption, or postoperative hospital stay.

Conclusion. Laparoscopic cholecystectomy is a safe and effective treatment for symptomatic gallstone disease in patients with a history of gastrectomy, although previous gastrectomy is associated with an increased need for adhesiolysis and a longer operative time.

Key words Laparoscopic cholecystectomy · Previous surgery · Gastrectomy · Gallstone

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Introduction

Laparoscopic cholecystectomy (LC) leads to a more rapid improvement in quality of life than open cholecystectomy. Thus, LC has continued to gain widespread clinical acceptance, and it is now the standard procedure for benign diseases of the gallbladder; however, previous upper abdominal surgery has been reported as a relative contraindication to LC.[1–4] With increasing experience, many surgeons believe that LC is feasible for such patients. There are sporadic reports on the impact of previous abdominal surgery on the safety of LC;[5–7] yet patients who have undergone previous gastrectomy are precluded from LC in many hospitals. This is because adhesions are anticipated around the abdominal wall, the gallbladder, and its surrounding organs, which may prolong the operative time and increase the risk of organ injury associated with the dissection of adhesions. We evaluated the safety and efficacy of LC for symptomatic gallstone disease in patients with a history of gastrectomy.

Patients and Methods

Patients

Since 1992, a database has been maintained prospectively for all LC patients at the Department of Surgery, Iwate Medical University School of Medicine in Japan. Between April 1992 and January 2007, 1 104 consecutive patients underwent LC. All patients were informed about the risks of this procedure. Fifty-one (4.6%) of these patients underwent LC for symptomatic gallstone disease after previous gastrectomy. From 1992 to 1995, previous gastrectomy was a contraindication for LC in our hospital, so four patients were excluded for this reason. Since 1996, no patients have undergone open cholecystectomy as the first choice of operation. Analy-

sis of variance was used to compare operative time, blood loss, conversion rate, morbidity rate, diet resumption, and postoperative hospital stay between the patients with, and those without a history of gastrectomy.

Surgical Procedures

Laparoscopic cholecystectomy was performed by experienced endoscopic surgeons and trainees under their supervision, using a standard four-trocar technique. The position for insertion of the initial trocar is particularly important in patients with a history of gastrectomy. The initial trocar is inserted into the abdominal cavity just right of the umbilicus. If adhesions are found at the incision site, adhesiolysis is performed under direct vision, before insertion of the trocar. The peritoneal cavity is inspected and a second trocar is inserted into the right flank region. If the gastrectomy has been performed more than 1 year earlier, fibrous tissue is often present between the abdominal wall and the adhered organ, for which adhesiolysis can be performed easily. If the intestine is adhered firmly to the abdominal wall, the use of electrocautery for adhesiolysis involves the risk of delayed intestinal perforation from the heat. In those patients, it is safer to dissect the intestine together with a layer of the peritoneum. All of the patients who had undergone previous gastrectomy had some adhesions around the gallbladder. If there are severe adhesions to the duodenum, small intestine, or colon, the intestine should be dissected with the serosa of the gallbladder to prevent injury to the intestine. Because the bile duct may be displaced as a result of adhesions after gastrectomy, the cystic duct should not be divided until the common hepatic duct and common bile duct are clearly identified. If the cystic duct is difficult to identify, intraoperative cholangiography is performed. Black stones or calcium bilirubinate stones are common in patients with a history of gastrectomy, and the incidence of bile infection in the gallbladder is consequently high. For patients with bile contamination or those who have undergone intestinal adhesiolysis, an information drain is left in place.

Statistical Analysis

Data are expressed as mean ± standard deviation. Differences between the patients with a history of gastrectomy and those without a history of gastrectomy were compared using the Mann–Whitney *U*-test or χ^2 test with Yates' correction. $P < 0.05$ was considered significant.

Results

Patient Characteristics

The mean age of the patients with a history of gastrectomy was significantly higher than that of those without a history of gastrectomy, at 67.3 years vs 56.5 years, respectively ($P < 0.001$), and previous gastrectomy was more common in men. The incidence of common bile duct stones was four times greater in patients with, than in those without a history of gastrectomy, at 33.3% vs 8.6%, respectively ($P < 0.001$) (Table 1). Eight patients with common bile duct stones underwent endoscopic sphinctectomy, and the stones were removed preoperatively from all patients. The common bile duct stones were removed by laparoscopic choledocholithotomy with primary closure of choledochotomy (8), or open T-tube drainage (1), respectively in nine other patients.

Gastrectomy had been performed for gastric cancer in 70.6% of the patients. The types of gastrectomy were distal gastrectomy in 32 patients, total gastrectomy in 17, proximal gastrectomy in 1, and partial gastrectomy in 1. The mean period between gastrectomy and LC was 9.9 years (range, 6 months to 42 years); however, in six patients (11.8%) it was less than 1 year. Nine (17.7%) patients had a history of ileus after gastrectomy and two of these patients had undergone open repair of the obstruction (Table 2).

Operative Details and Clinical Outcomes

Adhesions to the abdominal wall were found in 35 (69%) patients, whereas adhesions to the gallbladder

Table 1. Patient characteristics

	Gastrectomy history ($n = 51$)	No gastrectomy history ($n = 1053$)	*P* value
Age (years)	67.3 ± 9.0	56.5 ± 14.2	<0.001
Male	34 (66.6)	514 (48.8)	0.169
Presence of CBD stones	17 (33.3)	91 (8.6)	<0.001

Values in parentheses are percentages
CBD, common bile duct

were found in every patient who had undergone gastrectomy. The organs adhered to the gallbladder were the greater omentum (49%), the colon (37%), the duodenum (31%), and the small intestine (26%). The mean operative time was significantly longer in the patients with, than in those without a history of gastrectomy (111.0 min vs 77.9 min; $P < 0.001$). Analysis of the mean operative time by year revealed no significant difference between LC in the first period (from April 1992 to March 1999; 115.9 min) and LC in the second period (from April 1999 to January 2007; 108 min; Table 3). There were no significant differences between these two groups in blood loss (26.4 ml vs 22.4 ml), conversion rate (3.9% vs 1.3%), morbidity rate (3.9% vs 1.3%), diet resumption (1.2 days vs 1.1 days), and length of postoperative hospital stay after 2001, when a clinical pathway was introduced (4.6 days vs 4.3 days). Morbidity occurred in two (3.9%) of the patients with a history of gastrectomy. Laparoscopic clipping was performed in one patient who had an injury in the posterior segment of the bile duct caused by adhesiolysis of Calot's triangle, and drainage was performed 1 day after LC in one patient who had bile leaks from the cystic duct. Otherwise, all patients had an uneventful postoperative course and overall mortality was nil. The bile infection rate in the gallbladder was significantly higher in the patients who had undergone gastrectomy (51.0% vs 21.7%, respectively) ($P < 0.001$), but there was no incidence of wound infection (Table 4). Conversion to an open cholecystectomy was required in two (3.9%) patients, who had a duodenal or gastric ulcer, because of severe cholecystitis and common bile duct stones, respectively (Table 5).

Table 2. Clinical characteristics of the patients with a history of gastrectomy

	No. of patients ($n = 51$)
Previous diseases	
Gastric cancer	36 (70.6)
Gastric ulcer	9 (17.6)
Duodenal ulcer	6 (11.8)
Previous operations	
Distal gastrectomy	32 (62.7)
Total gastrectomy	17 (33.3)
Proximal gastrectomy	1 (2.0)
Partial gastrectomy	1 (2.0)
History of ileus	9 (17.7)

Values in parentheses are percentages

Discussion

According to the results of a survey on endoscopic surgery conducted by the Japan Society of Endoscopic Surgery (JSES), LC accounted for 80% of all cholecystectomies performed in 2005, indicating that LC is the standard surgical procedure for benign diseases of the gallbladder. The responses to the question of whether LC is an option for patients who have undergone previous upper abdominal surgery were as follows: "depending on patient's status" (54%), "it is usually indicated" (28%), and "it is contraindicated" (18%). Thus, the indications for LC varied among hospitals. In our series, LC was indicated for every incidence of benign gallbladder disease requiring cholecystectomy.[8] We performed laparoscopic exploration in all patients with cholelithia-

Table 3. Operative times for patients with a history of gastrectomy (April 1992–March 1999 vs April 1999–March 2007)

	April 1992–March 1999 ($n = 23$)	April 1999–March 2007 ($n = 28$)	P value
Operative time (min)	115.9 ± 78.0	108 ± 63.6	0.480

Table 4. Operative details and clinical outcomes

	Gastrectomy history ($n = 51$)	No gastrectomy history ($n = 1053$)	P value
Operative time (min)	111.0 ± 68.9	77.9 ± 42.0	<0.001
Blood loss (ml)	26.4 ± 58.2	22.4 ± 59.4	0.827
Diet resumption (days)	1.2 ± 1.0	1.1 ± 0.5	0.441
Postoperative stay (days)	4.6 ± 2.2	4.3 ± 2.0	0.828
Conversion	2 (3.9)	15 (1.4)	0.168
Morbidity	2 (3.9)	14 (1.3)	0.168
Bile infection in GB	26 (51.0)	228 (21.7)	<0.001

Values in parentheses are percentages

Table 5. Reasons for conversion to open cholecystectomy

	Gastrectomy history ($n = 51$)	No gastrectomy history ($n = 1053$)
Severe cholecystitis	1 (1.9)	3 (0.3)
Severe adhesions	0	3 (0.3)
Bile duct injury	0	4 (0.4)
Common bile duct stones	1 (1.9)	4 (0.4)
Gallbladder cancer	0	1 (0.1)

Values in parentheses are percentages

sis before deciding on whether to convert to an open cholecystectomy. The mean operative time was significantly longer, and the bile infection rate in the gallbladder was higher in patients with, than in those without a history of gastrectomy in this series. If patients have undergone previous gastrectomy, it may be assumed that inserting a laparoscope will be difficult because of adhesions; however, we were able to insert a laparoscope in all of our patients by an open method via a trocar placed to the right of the umbilicus, as described in Patients and Methods. Sixteen (31.4%) of the 51 patients with a history of gastrectomy did not have adhesions to the abdominal wall; a proportion much lower than anticipated. In contrast, adhesions to the gallbladder were present in every patient, and all required adhesiolysis. Kumar[9] recommended a subxiphoid approach because adhesions here primarily involve the liver, and intestinal adhesions are not usually present at this site. The mean operative time for LC in patients with a history of gastrectomy was reported as 150 min by Miyajima et al.[10] and as 154 min by Kwon et al.[11] In our series, it was 111 min, without a significant difference between the first period (April 1992 to March 1999) and the second period (April 1999 to January 2007). The operative time for LC in patients who had undergone previous gastrectomy was longer than that in routine LC because of the adhesiolysis in these patients, even after surgeons became skilled in the technique.

A higher rate of conversion to an open cholecystectomy was noted in patients with, than in those without a history of upper abdominal surgery (5.3%–25% vs 2.9%–5.4%).[10–15] Conversion is not a complication, but we had a low conversion rate of 3.9% in our series. Kwon et al.[5] reported a 14% incidence of morbidities associated with LC in patients with a history of gastrectomy. Although there were no significant differences in morbidity between the patients with, and those without a history of gastrectomy in our series, the rate was higher in those with a history of gastrectomy. The number of conversions was two in the first-period, but none in the second-period, which we attributed to improved technical skills. No significant difference was found in morbidity rates between the first and second periods (4.3% vs 3.6%; $P = 0.891$). There was no decrease in the morbidity rate following improvement in technical skills, although it was lower in our series than in other reports.

With the widespread use of LC, the indications for endoscopic surgery have expanded to include various fields, but at the same time, litigation involving endoscopic surgery has increased. Informed consent is essential because LC for patients with a history of gastrectomy requires a high degree of technical skill considering the need for adhesiolysis; thus, it must always be performed by, or under the supervision of a skilled endoscopic surgeon. Our study showed the several advantages of LC in patients with or without a history of gastrectomy.

In conclusion, previous gastrectomy is not a contraindication to safe LC, but it is associated with an increased need for adhesiolysis, and a longer operative time. In the hands of an experienced surgical team, LC is the therapeutic procedure of choice for gallstone disease in patients with a history of gastrectomy.

References

1. Perissat J, Collet D, Belliard R. Gallstones: laparoscopic treatment — cholecystectomy, cholecystomy, and lithotripsy. Surg Endosc 1990;4:1–5.
2. Schirmer BD, Edge ST, Dix J, Hyser MJ, Hanks JB, Jones RS. Laparoscopic cholecystectomy. Treatment of choice for symptomatic cholelithiasis. Ann Surg 1991;213:665–76.
3. Hutchinson CH, Traverso LW, Lee FT. Laparoscopic cholecystectomy. Do preoperative factors predict the need to convert to open? Surg Endosc 1994;8:875–80.
4. Frazee RC, Roberts JW, Symmonds R, Suyder SK, Hendricks J, Smith R. What are the contraindications for laparoscopic cholecystectomy? Am J Surg 1992;164:491–5.
5. Wongworawat MD, Aitken DR, Robles AE, Garberoglio C. The impact of prior intraabdominal surgery on laparoscopic cholecystectomy. Am Surg 1994;60:763–6.
6. Yu SC, Chen SC, Wang SM, Wei TC. Is previous abdominal surgery a contraindication to laparoscopic cholecystectomy? J Laparoendosc Surg 1994;4:31–5.
7. Diez J, Delbence R, Ferreres A. The feasibility of laparoscopic cholecystectomy in patients with previous abdominal surgery. HPB Surg 1998;10:353–6.

8. Sasaki A, Asahi H, Shimada Y, Kawamura H, Nakajima J, Saito K. Laparoscopic cholecystectomy (in Japanese). Syujyutsu (Jpn J Operation) 2004;58:1009–14.
9. Kumar SS. Laparoscopic cholecystectomy in the densely scarred abdomen. Am Surg 1998;64:1094–6.
10. Miyajima N, Kasugai H, Morita H, Takahashi K, Takahashi S, Doyohshita K. Laparoscopic cholecystectomy in patients with previous gastrectomy (in Japanese). Nihon Naishikyogeka Gakkaizasshi (JSES) 2000;5:225–8.
11. Kwon AH, Inui H, Imamura A, Kaibori M, Kamiyama Y. Laparoscopic cholecystectomy and choledocholithotomy in patients with a previous gastrectomy. J Am Coll Surg 2001;193:614–9.
12. Akyurek N, Salman B, Irkorucu O, Tascilar O, Yuksel O, Sare M, et al. Laparoscopic cholecystectomy in patients with previous abdominal surgery. JSLS 2005;9:178–83.
13. Jorgensen JO, Hunt DR. Laparoscopic cholecystectomy. A prospective analysis of the potential causes of failure. Surg Laparosc Endosc 1993;3:49–53.
14. Karayiannakis AJ, Polychronidis A, Perente S, Botaitis S, Simopoulos C. Laparoscopic cholecystectomy in patients with previous upper or lower abdominal surgery. Surg Endosc 2004;18:97–101.
15. Miller K, Holbling N, Hutter J, Junger W, Moritz E, Speil T. Laparoscopic cholecystectomy for patients who have had previous abdominal surgery. Surg Endosc 1993;7:400–3.