

# Laparoscopic Cholecystectomy in Patients With Previous Abdominal Surgery

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## ABSTRACT

**Background:** Laparoscopic cholecystectomy has become the treatment of choice for symptomatic gallstones. The potential risks have dissuaded some surgeons from using the laparoscopic procedure in patients with previous abdominal surgery. Therefore, we aimed to investigate the effect of previous abdominal surgery on the feasibility and safety of laparoscopic cholecystectomy.

**Methods:** This study included 600 well-documented patients with gallstones who underwent laparoscopic cholecystectomy at our surgical department between May 2000 and January 2004. The patients were classified into 3 groups: group 1, patients without a history of previous abdominal surgery (n=408); group 2, patients with a history of upper abdominal surgery (n=92); group 3, patients with a history of lower abdominal surgery (n=100). The data were collected and analyzed for open conversion rates, operative times, perioperative and postoperative complications, and hospital stay.

**Results:** Of the 600 study patients, 192 had undergone previous abdominal surgery (92 upper, 100 lower). Conversion rate, hospital stay, and complication rates were similar in each group. Mean operating time was the longest ( $57 \pm 9.8$  min) in patients with previous upper abdominal surgery ( $P < 0.05$ ). On the other hand, the operative time was similar in groups 1 and 3 ( $P > 0.05$ ).

**Conclusion:** Previous abdominal surgery is not a contraindication to safe laparoscopic cholecystectomy. However, previous upper abdominal surgery is associated with a prolonged operation time.

**Key Words:** Laparoscopic cholecystectomy, Intraabdominal adhesion.

## INTRODUCTION

Laparoscopic cholecystectomy (LC) decreases postoperative pain, allows earlier oral intake, shortens hospital stay, enhances earlier return to normal activity, and improves cosmesis over open cholecystectomy. LC is now accepted as the new gold standard for the treatment of symptomatic gallbladder disease.<sup>1-3</sup>

However, there is still a substantial proportion of patients in whom LC cannot be successfully performed and for whom conversion to open surgery is required. A number of relative contraindications, such as morbid obesity, previous upper abdominal surgery, and acute cholecystitis, have been proposed in determining whether a patient is a candidate for laparoscopic cholecystectomy.<sup>4,5</sup> With growth in experience, criteria for selecting patients for LC have been liberalized.<sup>5-7</sup>

This study specifically examined the effect of previous abdominal surgery on the feasibility and safety of laparoscopic cholecystectomy.

## PATIENTS AND METHODS

The study included 600 well-documented patients with gallstones (402 women, 198 men; age, 20 years to 80 years; mean age 44.5) who underwent LC at our surgical department between May 2000 and January 2004. The patients were classified into the following 3 groups: group 1, patients without a history of previous abdominal surgery (n=408); group 2, patients with a history of upper abdominal surgery (n=92) and group 3, patients with a history of lower abdominal surgery (n=100). The mean age and sex were similar in all groups ( $P > 0.05$ ). All patients underwent elective LC.

Strict selection criteria were applied. Patients with acute cholecystitis, current biliary pancreatitis, morbid obesity (BMI > 35), or common bile duct stones were not included in the study groups (Groups 1, 2, and 3) (42 patients were excluded). On the other hand, combining previous surgery with any of these exclusions might show a higher operation time or a higher rate of conversion. Thus, we also evaluated the excluded 42 patients with respect to the operation time, the conversion rate, and the postoperative hospital stay.

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The types of previous abdominal surgeries were also recorded (**Table 1**). Preoperative laboratory analysis of patients included white blood cell count, total serum bilirubin, alkaline phosphatase, aspartate transaminase, alanine transaminase, and amylase. Each was in normal ranges in all patients. Preoperative Endoscopic Retrograde Cholangiopancreatography (ERCP) was performed selectively based on preoperative clinical or laboratory indicators of common duct stones or dilated common duct on ultrasonography.

Residents and laparoscopic surgery fellows performed the operations under the supervision of senior surgeons with standard 4-port and 2-handed techniques. The standard Veress needle technique was used to enter the abdominal cavity in the patients without previous abdominal surgeries (group 1). The Hasson technique, which involves entering the abdominal cavity under direct vision through a larger incision in the navel skin, the fascia, and the peritoneum, was used for the patients with previous abdominal surgeries. A finger was introduced to remove adhesions and purse-

**Table 1.**  
Types of Surgery in Patients With Previous Abdominal Surgery

Types of Previous Surgery	Patients in Groups 2 and 3 n (%)	Excluded Patients n (%)
<b>Upper abdominal surgery</b>	<b>92</b>	<b>9</b>
Gastrectomy (total or subtotal)	31 (33.7)*	5 (55.6)†
Simple suture with Graham patch (Perforated peptic ulcer)		
Laparoscopic	2 (2.2)	—
Open	11 (11.9)	1 (11.1)‡
Heller myotomy (Achalasia)	2 (2.2)	—
Antireflux procedures		
Laparoscopic	4 (4.3)	—
Open	6 (6.6)	—
Partial cystectomy, pericystectomy (Hydatid liver cyst)	10 (10.8)	—
Liver resections (Segmentectomy)	2 (2.2)	—
Splenectomy	8 (8.7)	1 (11.1)
Epigastric hernia	4 (4.3)	—
Vagotomy and drainage procedures	12 (13.1)	2 (22.2)
<b>Lower abdominal surgery</b>	<b>100</b>	<b>13</b>
Appendectomy		
Laparoscopic	7 (7)	—
Open	29 (29)	3 (23.1)
Sigmoid colon resection	8 (8)§	1 (7.7)
Transabdominal rectal prolapse procedures	2 (2)	—
Transabdominal gynecologic operations (Hysterectomy Oophorectomy, C/S, etc)	53 (53)	8 (61.5)
Transabdominal Urologic operations (Prostatectomy, etc)	1 (1)	1 (7.7)

\*Conversion to open required in 2 of 31 cases. The conversion was directly attributable to adhesions in 1 case.

†Conversion to open required in 2 of 5 cases. One of the conversions was directly attributable to adhesions.

‡Conversion to open required in this case. The conversion to open was directly attributable to adhesions in this case.

§Conversion to open required in 2 of 8 cases. The conversion was not directly attributable to adhesions in this case.

||Conversion to open required in 3 of 8 cases. No conversions to open were directly attributable to adhesions in these cases.

string suture was placed in the fascia to close the orifice around the cannula, which allows preservation of the pneumoperitoneum (groups 2 and 3). Once the peritoneal cavity was reached safely, only those adhesions that truly interfered with visualization of the area of interest were lysed. If, at any point during the operation, the surgeon thought that the patient would be better served by an open cholecystectomy, conversion to the open technique was performed. After entering the abdominal cavity, adhesions attached to the midline incision line and to associated intraperitoneal sites or organs were identified and graded for severity. Of the patients who had adhesions, the following 3-point grading system was used to define severity: grade 1, filmy thickness, avascular; grade 2, moderate thickness, limited vascularity; grade 3 dense thickness, well vascularized.<sup>8</sup> The electrocautery (Monopolar) and the scissors were used to divide the adhesions.

The operative times of patients in each group were compared. These data were not only affected by the conversion rates, but also indirectly showed the difficulty of the operations. Because of this, we compared the operative times of patients who underwent successful LC (converted patients excluded).

Conversion to open, operative time, postoperative hospital stay, and any operative or postoperative complications were evaluated. In addition, the factors contributing to the conversion from a laparoscopic to an open procedure were evaluated to determine the impact of the prior surgery on conversion.

**RESULTS**

The chi-square test was used for comparison of proportions. One-way analysis of variance (ANOVA) was used for comparison of means. Statistically,  $P < 0.05$  was considered significant. SPSS version 9.0 for Windows was used in statistical analyses.

The 3 groups were similar with respect to age and sex ( $P > 0.05$ ). Conversion to laparotomy was required in 13 (2.1%) patients (9 in group 1, 2 in group 2, and 2 in group 3). No statistically significant difference was noted among groups with respect to the conversion rate ( $P > 0.05$ ) (Table 2). The major causes of conversions were dense adhesions in Calot's triangle or an uncertain anatomy of the biliary tree. The causes of conversions are summarized in Table 3. Our study showed that one of the converted patients with upper abdominal surgery (supraumbilical midline incision) had had a previous gastrectomy. The conversion was directly attributable to adhesions. We found that one of the converted patients with lower abdominal surgery had had a sigmoid resection previously for sigmoid volvulus (subumbilical midline incision). The conversion was directly attributable to uncertain anatomy in this case. In the other patients (groups 2 and 3), conversion to an open procedure was performed because of failed pneumoperitoneum and dense adhesion in Calot's triangle respectively.

Adhesions were found in 90.2% (83 patients), 75% (75 patients), and 1.4% (6 patients) of patients, respectively, who had previous upper, lower, or no previous abdominal surgery. Adhesiolysis was required in 77.1% (64 of 83 patients), 13.3% (10 of 75 patients), and 0% of these

**Table 3.**  
Causes of Conversion to Open Cholecystectomy in Each Group

Cause	Group 1	Group 2	Group 3
Dense adhesion in Calot's triangle	4	1	1
Uncertain anatomy	2	—	1
Friable gallbladder	1	—	—
Failed pneumoperitoneum	1	1	—
Thick cystic duct	1	—	—

**Table 2.**  
Analysis of Patient Parameters

Group	Age (mean±SD)	Sex F/M (n)	Conversion (n, %)	Operating Time (mean min±SD)*	Mean Adhesion Score*	Postoperative Hospital Stay (mean days±SD)*	Perioperative Complication (n)	Postoperative Complications* (n, %)
1	44±6.1	272/136	9 (2.2)	33±8.21	0.1±0.4	1.4±0.53	0	13 (3.2)
2	45±2.5	62/30	2 (2.1)	57±9.81†	1.5±0.7	1.5±0.48	0	3 (3.3)
3	43±8.4	68/32	2 (2.0)	35±4.76	1.4±0.7	1.4±0.65	0	3 (3.0)

\*Converted patients were not included.

†One way-ANOVA,  $P < 0.05$ .

patients, respectively. No statistically significant difference was noted between group 2 and group 3 with respect to the mean adhesion grades ( $P>0.05$ ). The lowest adhesion grade was found in group 1 ( $P<0.05$ ). No complications occurred that were directly attributable to adhesiolysis.

Patients with previous upper abdominal surgery had the longest mean operative time ( $57\pm 9.8$  min) ( $P<0.05$ ). On the other hand, the operative time was similar in groups 1 and 3. The mean postoperative hospital stay in group 1 was  $1.5\pm 0.48$  days. This was similar to that in the other groups ( $P>0.05$ ).

No operative complications occurred in any of the groups. However, 18 patients had postoperative complications [wound infections,<sup>4</sup> retained common bile duct stone,<sup>1</sup> trocar-site bleeding,<sup>1</sup> subphrenic abscess,<sup>1</sup> urinary tract infection,<sup>3</sup> urinary retention,<sup>2</sup> postoperative nausea/vomiting,<sup>2</sup> pulmonary embolism,<sup>1</sup> prolonged ileus,<sup>2</sup> urinary retention,<sup>2</sup> atelectasis<sup>1</sup>]. The complication rates among groups were not statistically different ( $P>0.05$ ). The number and type of complications in the groups are summarized in **Table 4**.

Conversion to the open procedure was performed in 9 (21.4%) of 42 excluded patients. The mean operative time, mean hospital stay, and perioperative and postoperative complication rates were also high in these patients (**Table 5**).

**DISCUSSION**

Clear benefits of LC have rendered it the procedure of choice for symptomatic cholelithiasis. A number of abso-

lute or relative contraindications have been cited in regard to laparoscopic cholecystectomy. Previous upper abdominal surgery has been listed as a concern because of adhesion formation, which causes bowel or other abdominal structures to adhere to the undersurface of the abdominal wall. The potential for bowel injury during trocar placement or difficulty in visualization of the hepatobiliary structures has dissuaded some surgeons from using the laparoscopic procedure in patients with previous abdominal surgery.<sup>9-11</sup> On the other hand, the chance of unwanted "surprises," such as dense adhesions, awaiting the surgeon during LC are the same as those encountered during open cholecystectomy. In our series, 192 patients had undergone previous abdominal surgery. In this study, our conversion rate was 2.0% in patients with previous abdominal surgery. The rate of conversion to open cholecystectomy and the complication rate were virtually identical to those found in the patients without prior surgery. This observation is consistent with reports in previous published works.<sup>6,12-15</sup>

We believe that open insertion of the umbilical ports minimizes the risk of organ injury and allows adhesiolysis in patients with previous abdominal surgery. Once the peritoneal cavity has been reached safely, the presence and extent of any adhesions will become apparent. The surgeon must resist the common tendency to excessively eliminate adhesions. Only those adhesions that truly interfere with visualization of the area of interest or would prevent the placement of subsequent cannulas under vision should be lysed. In this study, adhesions were found in 90.2%, 75%, and 1.4% of patients, respectively, who had previous upper, lower, or no previous abdominal surgery, with adhesiolysis required, respectively, in 77.1%, 13.3%, and 0% of these cases. No complications were directly attributable to adhesiolysis. In our opinion, the majority of adhesions from prior abdominal surgery do not alter the anatomy of the abdominal right upper quadrant and do not negatively impact the performance of a successful laparoscopic cholecystectomy. Our overall laparoscopic success rate in patients with previous abdominal surgery was 98%. It was 97.8% in patients without previous abdominal surgery. However, patients who had undergone abdominal surgery had increased difficulty during LC in terms of adhesions in the upper abdomen. But no statistically significant difference was noted in LC success rates between patients with previous upper or lower abdominal surgery in our study. We believe that with increased experience, surgeons will overcome this difficulty. In university hospitals, however, institutional experience is more important than the surgeon's experience because

**Table 4.**

Number and Type of Complications in Each Group

Complications	Group 1	Group 2	Group 3
Wound infection	3	—	1
Retained Common bile duct stone	—	1	—
Trocar-site bleeding	1	—	—
Pulmonary embolism	—	1	—
Subphrenic abscess	—	1	—
Urinary tract infection	2	—	1
Prolonged ileus	1	—	1
Urinary retention	2	—	—
Postoperative nausea/vomiting	2	—	—
Atelectasis	1	—	—

**Table 5.**  
Analysis of Excluded Patients

Excluded Patients	n	Laparoscopic Cholecystectomy	Conversion n (%)	Mean Operation Time (min)*	Mean Adhesion Score*	Postoperative Hospital Stay*	Perioperative Complications n (%)*	Postoperative Complication n (%)*
Group 1	20	17	3 (15.0)	60.5±6.75	1.7±0.84	2.2±1.1	—	1 (5.9)
Acute cholecystitis	10	10	—	56.3±4.83	1.9±0.73	1.6±0.5	—	—
Biliary pancreatitis	3	2	1 (33.33)	68.5±0.70	2.5±0.70	3.0±0.0	—	1 (50.0)†
CBD stone	4	3	1 (20.0)	65.0±5.56	0.6±0.57	4.0±1.0	—	—
Morbid obesity	3	2	1 (33.3)	67.0±2.82	1.5±0.70	2.5±0.7	—	—
Group 2	9	6	3 (33.3)	68.8±7.3	2.6±0.5	5.1±2.4	2 (33.3)	1 (16.6)
Acute cholecystitis	4	2	2 (22.2)	59.5±0.70	2.5±0.7	6.5±4.9	1 (50.0)‡	1 (50.0)†
Biliary pancreatitis	3	2	1 (11.1)	73.5±2.12	3.0±0.0	4.5±0.7	1 (50.0)§	—
CBD stone	2	2	—	73.5±0.70	2.5±0.7	4.5±0.7	—	—
Morbid obesity	—	—	—	—	—	—	—	—
Group 3	13	10	3 (23.0)	63.3±5.94	2.4±0.6	2.8±1.2	1 (10.0)	1 (10.0)
Acute cholecystitis	5	4	1 (20.0)	56.7±1.70	2.0±0.8	1.7±0.5	—	—
Biliary pancreatitis	3	2	1 (33.3)	70.0±1.41	3.0±0.0	4.5±0.7	1 (50.0)	—
CBD stone	2	2	—	67.0±1.41	2.5±0.7	3.5±0.7	—	—
Morbid obesity	3	2	1 (33.3)	66.0±1.41	2.5±0.7	2.5±0.7	—	1 (50.0)¶

\*Converted patients were not included.

†Both patients had wound infection.

‡Bile duct injury occurred and was managed with nasobiliary drainage.

§Gallbladder perforation and spillage of gallstones occurred. The patient had no further complication after a follow-up of 12 months.

||Gallbladder bed bleeding occurred and self-limited. Reoperation not required in this case.

¶The patient had atelectasis.

inexperienced surgeons perform operations under the supervision of more experienced surgeons, and these reflect the institutional experience. Active participation of faculty members in the operating theater may have enhanced the learning experience.<sup>4,14-16</sup>

The number of complications was similar among groups. However, the nature of complications in patients with previous upper abdominal surgery compared with that in the other groups was more severe. The cases of pulmonary embolism and subphrenic abscess are likely explained by the fact that patients with previous upper abdominal surgery had long operative times and were most likely to have bacterial contamination.

In this study, operative time was longer in patients with previous upper abdominal surgery. Longer operative times are likely associated with an increased need for adhesiolysis. However, most of the patients with previous lower abdominal surgery were female, and most of the

previous operations were gynecologic operations in this group. Therefore, the majority of adhesions from prior lower abdominal surgery were in the pelvic region and did not negatively impact the performance and operation.

Recent studies<sup>4,6,10,13,14</sup> revealed that acute cholecystitis, pancreatitis, morbid obesity, and common bile duct (CBD) stones were the factors that might cause conversion to an open procedure and affect the hospital stay, operative time, and perioperative and postoperative complication rates. We excluded such cases in each group to determine the correct and objective probability of conversion to an open procedure in patients with previous abdominal surgery. The main purpose of this selection was to homogenize the groups. If we had included these patients, conditions like pancreatitis, acute cholecystitis, morbid obesity, and CBD stones would have affected the conversion rate, the operation time, the perioperative complications, and the hospital stay. We found that the

operative time, conversion rate, perioperative complication rate, and postoperative hospital stay of these excluded patients were increased (**Table 5**). When excluded patients were evaluated, combining previous upper abdominal surgery with any of these exclusions showed an increase in the perioperative complication rate, the mean operative time, and the mean postoperative hospital stay time ( $P < 0.05$ ).

## CONCLUSION

Based on our study, LC can be performed safely in patients with previous upper or lower abdominal surgery, if they do not have such conditions as acute cholecystitis, pancreatitis, CBD stones, and morbid obesity.

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