Conversion in laparoscopic cholecystectomy after gastric resection: a 15-year review

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Background: Gastrectomy or truncal vagotomy is known to increase the incidence of cholelithiasis. Many of these patients will become symptomatic, and the adhesions from their gastric resection may make laparoscopic cholecystectomy much more difficult.

Methods: We prospectively assessed the data for the 15-year cumulative laparoscopic cholecystectomy experience of 1 surgeon at a university teaching hospital with respect to conversion and postoperative outcomes, with particular attention to patients having had previous gastric resections.

Results: Patients with previous gastrectomies had similar operative times (mean 81.1, range 45–120 min), a higher conversion rate (64.2%) and a higher complication rate (35.7%) than those who had had other previous upper abdominal surgeries (mean 73.2, range 35–130 min, conversion 25% and complication 11.3%) and those without previous abdominal surgeries (mean 66.5, range 25–250 min, conversion 2.7% and complication 4.5%).

Conclusion: Preoperative knowledge of the increased conversion rate and increased morbidity will inform surgical planning for both the surgeon and the patient.

Contexte : On sait que la gastrectomie ou la vagotomie tronculaire accroît l'incidence de la cholélithiase. Beaucoup de ces patients deviendront symptomatiques et des adhérences consécutives à leur résection gastrique rendent beaucoup plus difficile la cholécystectomie par laparoscopie.

Méthodes : Nous avons évalué de façon prospective les données tirées de l'expérience cumulative de 15 ans de cholécystectomies par laparoscopie acquise par un chirurgien à un hôpital d'enseignement universitaire en ce qui a trait à la conversion et aux résultats postopératoires, en accordant une attention particulière aux patients qui avaient subi auparavant une résection gastrique.

Résultats : Chez les patients qui avaient subi auparavant une gastrectomie, la durée de l'intervention (moyenne de 81,1, intervalle de 45 à 120 min.) était semblable, le taux de conversion, plus élevé (64,2 %) et le taux de complications, plus élevé (35,7 %) que chez ceux qui avaient subi d'autres interventions chirurgicales au haut de l'abdomen (moyenne de 73,2, intervalle de 35 à 130 min., taux de conversion de 25 % et taux de complication de 11,3 %) et chez ceux qui n'avaient pas subi d'intervention chirurgicale à l'abdomen (moyenne de 66,5, intervalle de 22 à 250 min., taux de conversion de 2,7 % et taux de complication de 4,5 %).

Conclusion : La connaissance préopératoire du taux de conversion plus élevé et de la morbidité plus élevée éclairera la planification de l'intervention chirurgicale à la fois pour le chirurgien et pour le patient.

In the last 15 years, laparoscopic cholecystectomy has become the "gold standard" for patients with gallstone disease. Despite this, there is still a substantial number of patients who will require conversion to an open procedure. In particular, gastrectomy or truncal vagotomy is known to increase the incidence of cholelithiasis,[1,2] and the adhesions from this surgery may make the laparoscopic approach much more difficult. We assessed the 15-year cumulative laparoscopic cholecystectomy experience of 1 surgeon (H.S.) at a university teaching hospital with respect to conversion, paying particular attention to patients having had previous gastric resections.

METHODS

We collected demographic, operative and follow-up data prospectively for all laparoscopic cholecystectomies performed by a single surgeon (H.S.) at the Jewish General Hospital, a McGill University teaching hospital (Montréal, Que.), from his first case in 1990 through 2005. We collected data using the McGill laparoscopic surgery group database, which has been previously described.[3] The first 239 patients in this series were included in a study by Fried and colleagues.[4] The present study reviews 15 years of data to determine outcome differences for patients having had previous gastric surgeries compared with patients who had undergone upper abdominal surgeries for other reasons. The outcomes evaluated were the probability of conversion, duration of surgery (total time did not include anesthesia time), length of stay in hospital and complication rate. We performed univariate analysis using the χ^2 test to evaluate outcome differences between patients who had gastric resections and patients who had other upper abdominal surgeries. Year of surgeon experience with laparoscopic cholecystectomy, age, sex and whether the patient had an acute gallbladder or preoperative pancreatitis were the factors we evaluated for their predictive value of conversion to an open procedure using univariate analysis and subsequent multiple logistic regression.

RESULTS

From 1990 to 2005, the surgeon performed 1137 laparoscopic cholecystectomies. Fifty-eight patients had undergone upper abdominal surgeries and, of those, 14 patients had undergone previous gastric resections. Patient demographic data are summarized in Table 1, and the distribution of upper abdominal surgeries is shown in Table 2.

The mean overall duration of surgery was 66.5 (range 25–250) minutes. The mean duration for patients who had undergone previous upper abdominal surgeries was 73.2 (range 35–130) minutes, which was significantly longer than for patients with no previous upper abdominal surgeries (p = 0.002). However, the duration of surgery for those patients who had undergone previous gastrectomies (81.1, range 45–120 min) was not significantly different than that for patients who had undergogne other upper abdominal surgeries.

The mean overall length of stay in hospital was 0.7 (range 0–70) days; most surgeries were performed on a day surgery outpatient basis. The mean length of stay in hospital was not significantly different among the groups.

The overall conversion rate was 7.7%. As reported in the initial evaluation of the McGill laparoscopic surgery group database by Fried and colleagues,[4] factors that were found to be predictive of conversion to open cholecystectomy were older age (odds ratio [OR] 1.04, 95% confidence interval [CI] 1.02–1.06), acute cholecystitis (OR 3.27, 95% CI 1.97–5.44) and previous upper abdominal surgery (OR 5.99, 95% CI 3.10–11.54). Female sex was found to be a protective factor (OR 0.61, 95% CI 0.37–0.99).

The conversion rate for patients with previous upper abdominal surgeries was significantly higher than for patients with no previous upper abdominal surgeries (25% v. 2.7%, $\chi^2_1 = 69.11$, $p = 0.001$). In addition, the conversion rate for patients with previous gastrectomies was also significantly higher than for patients with previous upper abdominal surgeries (64.2% v. 25%, $\chi^2_1 = 7.36$, $p = 0.010$).

The overall percentage of patients with complications was 5.2%, and the complication rate for patients with no previous upper abdominal surgeries was 4.5%; however, the percentage of patients with complications and previous upper abdominal surgeries was significantly higher at 11% ($\chi^2_1 = 4.36$, $p = 0.048$). Patients with previous gastrectomies had the highest rate of complications at 35.7%, significantly higher than that for patients with previous upper abdominal surgeries ($\chi^2_1 = 4.2$, $p = 0.047$). In addition, conversion was associated with a higher complication rate (15% v. 4.2%, $\chi^2_1 = 22.78$, $p = 0.001$). One patient who had no surgical history and was converted died of complications secondary to a duodenal ulcer, whereas the other death occurred in a patient with a previous gastric resection

Table 1. Demographic characteristics of patients who had laparoscopic cholecystectomies at the Jewish General Hospital between 1990 and 2005

Characteristic	Group; no. (%)*		
	Overall, n = 1137	Previous upper abdominal surgery, n = 44	Previous gastric surgery, n = 14
Age, mean (range) yr	51.5 (7–89)	60.2 (29–89)	60.6 (35–76)
Male sex	328 (29.0)	23 (52.0)	8 (57.0)
Acute	30 (2.6)	11 (24.0)	2 (15.0)
Pancreatitis	39 (3.4)	3 (6.6)	—

*Unless otherwise indicated.

Table 2. Distribution of previous upper abdominal surgeries

Type of previous surgery	No. (%)
Gastric*	17 (29.0)
Colon	9 (15.5)
Ventral hernia	5 (8.6)
Small bowel	7 (12.0)
Spleen	4 (6.8)
Nephrectomy	3 (5.2)
Abdominal aortic aneurysm	2 (1.7)
Shunts/tubes	3 (5.2)
Esophagus	4 (6.8)
Unknown	4 (6.8)

*Comprising 2 total gastrectomy, 11 subtotal gastrectomy, 1 gastric bypass, 1 highly selective vagotomy (excluded from analysis), 1 infant pyloromyotomy (excluded), 1 Graham patch (excluded).

who underwent a laparoscopic cholecystectomy. They experienced postoperative pancreatitis and a cystic duct leak and died of complications secondary to perforation of the duodenum during endoscopic retrograde cholangiopancreatography (ERCP). Table 3 lists the types and overall frequency of complications.

Discussion

Following gastrectomy, the incidence of gallstone formation has been reported to be between 13% and 42%, depending on the type of gastrectomy, whether a truncal vagotomy was performed and on the duration of follow-up.[1,2,5–8] The mechanism of stone formation is thought to be related to division of the hepatic branch of the vagus nerve, which plays a role in the tonicity of the gallbladder.[1,6] In addition, the type of gastric reconstruction may influence gallstone formation, as the passage of food through the duodenum with its release of cholecystokinin, stimulates gallbladder motility. Thus there is likely a complex interaction between nerve input and hormonal secretion in cholelithiasis postgastrectomy. Many of these patients will become symptomatic.

Laparoscopic cholecystectomy has become the "gold standard" for the treatment of symptomatic cholelithiasis owing to its attendant benefits regarding the patient's recovery and its economic benefits to society.[9,10] However, there remains the potential for conversion from a laparoscopic to an open procedure. This conversion rate has been reported in the literature with a high degree of variability, ranging from 0% to 20%.[11] This variability is reflective of surgeon experience (including patient selection) and patient-specific risk factors often cited in the literature, including male sex, older age, acute cholecystitis and previous upper abdominal surgery.[4,11–14]

Table 3. Type and frequency of complications

Complication	Overall, *n* = 59/1137	Previous upper abdominal surgery, *n* = 5/44	Previous gastric surgery, *n* = 5/14
Urinary retention	10	2	—
Hematoma	8	—	1
Abscess	3	—	—
Cystic duct leak	7	—	1
CBD injury	1	—	—
Retained stone	4	1	1
Lost stone in peritoneal cavity	6	1	—
Wound infection	3	—	—
Cardiac ischemia	3	—	—
Bleeding	6	1	—
Pancreatitis (post-ERCP)	5	—	1
Vascular injury	1	—	1
Ulcer	2	—	—
Mortality	2	—	1

CBD = common bile duct; ERCP = endoscopic retrograde cholangiopancreatography.

In our series, we noted a preponderance of male patients in the previous upper abdominal surgery and previous gastric resection groups (52% and 57%, respectively). In addition, male sex is often cited as a risk factor for conversion to the open procedure.[4,12,14] We found that men had a 13.7% rate of conversion compared with 5.3% for women; however, the reason why men have a higher conversion rate is unclear. We postulate that the incidence of gastric resection (especially before the widespread use of proton pump inhibitors) and upper abdominal surgery is higher in male patients, thus increasing the potential of conversion during laparoscopic cholecystectomy.

The incidence of postoperative adhesions to the abdominal wall can range from 20% to 100%, depending on the type of surgery and number of operations.[15,16] Previous reports cite conversion rates of 0%–25% for patients with previous upper abdominal surgeries,[4,11–13,15–19] whereas for patients with previous gastric resections this rate can approach 50%.[17,20] For this reason, in the early phase of patient selection, previous gastric resection was thought to be a relative contraindication to laparoscopic cholecystectomy. In our study, the conversion rate in patients with previous upper abdominal surgeries was 24%, and that for patients with previous gastric resections was 64.3%. Dense adhesions may make access to the upper abdomen impossible or distort the biliary anatomy substantially.[21] However, with increasing experience of the surgeon, these difficulties are not always insurmountable. In patients with suspected dense adhesions, an open technique should be the access method of choice, rather than a blind Veress needle, with direct visualization and palpation of a clear space either at the umbilicus or in the epigastrium. We believe that an open approach to peritoneal access is the safest approach in all patients,[22] but feel that surgeons who adhere to a Veress needle technique would be prudent to consider the open technique in this group of patients. In patients with restricted access owing to adhesions at the umbilical site, a second incision in the epigastrium could be enlarged to admit a finger into the peritoneal cavity. This finger could then be swept to bluntly dissect off the adhesions of the anterior abdominal wall to access the right upper quadrant. If unsuccessful, the epigastric incision could be lengthened for conversion. Access at the Palmer point (below the ribs in the midclavicular line) has also been described,[20] but could be risky in patients with previous upper abdominal surgeries. No technique is without risk; however, the single vascular injury in our series was as a result of a puncture of the iliac artery with a 15 blade while obtaining access using an open technique in a very thin woman. Subsequently, the access technique was modified to grasp the fascia and elevate the anterior abdominal wall before incising the fascia to reduce the recurrence of this injury. The single common bile duct injury occurred in a patient with no surgical history undergoing a laparoscopic cholecystectomy for acute cholecystitis. The injury occurred at the common

bile duct–cystic duct junction and was recognized intraoperatively; the procedure was converted for repair over a T-tube. The patient had no long-term sequelae of this injury.

We feel the high complication rates for patients with previous upper abdominal surgeries and gastrectomies (11%, 35.7%) and the high conversion rates to the open procedure (15%) is reflective of the increased difficulty of the cases and the indication for conversion. For example, the single death in the previous gastrectomy group (patient not converted) was secondary to an iatrogenically perforated duodenal stump during a postoperative ERCP for pancreatitis and cystic duct leak.

In conclusion, previous upper abdominal surgery should not be considered a contraindication to the laparoscopic approach, as the benefits of laparoscopic cholecystectomy warrant an attempt in most patients. However, when a difficult cholecystectomy is anticipated, preoperative knowledge of the increased likelihood of conversion and increased morbidity for patients with previous gastrectomies will inform surgical planning for both the surgeon and the patient.

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