ORIGINAL ARTICLE

Study of Complications of Laparoscopic Cholecystectomy at Teaching Institute

Abhinandan Kadiyal[1], Laxmi Naganur[2], Sainath Misal[3], Mrinali Sharma[4]

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Abstract

Introduction: The gold standard surgical procedure for treating cholelithiasis has been cholecystectomy. The situation with regard to surgical management of gallstones (GS) has significantly changed with the advent of laparoscopic cholecystectomy. This laparoscopic approach has several theoretical advantages, such as lower hospitalization and recovery costs, pain reduction, avoiding large incisions for better cosmetic results, and quicker return to work following surgery. Recent trials indicate a rise in occurrence of operative complications, particularly common bile duct (CBD) injury, despite early promising results. Laparoscopy use is further restricted by costly equipment, specialized training requirements, and a protracted learning curve.

Materials and methods: This study was done at MGM medical college and Hospital, Navi Mumbai, from August 2010 and September 2012. Fifty patients admitted in OPD and emergency department from the Department of Surgery fulfilling the inclusion and exclusion criteria were included in the study. After complete investigations and with written informed valid consent, patients were subjected to laparoscopic cholecystectomy. The duration of postoperative pain from the day of surgery including mild pain to severe pain and the number of postoperative days with postoperative pain and number of days of analgesia required were noted and documented for further comparison.

Results: Time taken for operation was significantly longer in the laparoscopic cholecystectomy group ($p < 0.001$). Postoperative stay is less and faster recovery requirement of analgesics is also less in laparoscopic cholecystectomy group of patients.

Conclusion: Laparoscopic procedure can be feasible in patients with acute cholecystitis with steep learning curve. Biliary duct injury is a common complication in laparoscopic procedure. Operating time is more in case of laparoscopic cholecystectomy group.

Keywords: Cholecystectomy, Cholelithiasis, Complications, Laparoscopic, Surgery.

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Introduction

In northern India, gallstones (GS) are a common occurrence. Gallstones were present in up to 16 and 29% of women over the ages of 40–49 and 50–59, respectively.[1] There are many more patients with asymptomatic GS than those with symptomatic gallstone disease (GSD). According to a number of studies done on dead people, the majority of GS are asymptomatic. Merely 14% of the individuals with GS had undergone cholecystectomy over a 10-year period in a study of 9,332 postmortem reports, suggesting that as many as 86% were asymptomatic.[2] Although, many different approaches of treating GS have been developed, they have not proven to be effective. Cholecystectomy has long been the preferred surgical procedure for treating cholelithiasis. The situation regarding the surgical care of cholelithiasis has significantly changed with the introduction of laparoscopic cholecystectomy. It has created new opportunities for gallstone management. The laparoscopic technique has several theoretical advantages, such as lower hospitalization and recovery costs, pain reduction, avoiding major incisions for better cosmetic results, and quicker return to work following surgery. Recent trials indicate a rise in the prevalence of operational complications, particularly common bile duct (CBD) damage, despite early positive outcomes. Laparoscopy utilization is further restricted by costly equipment, specialized training requirements, and a protracted learning curve. This has caused many people to reflect deeply and make multiple attempts to weigh the benefits and drawbacks of laparoscopic cholecystectomy.[3] Laparoscopic removal of the gallbladder has been reported to be somewhat contraindicated by prior abdominal surgery. The reason of this study was to precisely check how prior intra-abdominal surgery affected the safety and viability of laparoscopic cholecystectomy. The open conversion rates, duration of hospital stay, intraoperative and postoperative complications, and operating timeframes of 1,638 patients undergoing laparoscopic GB removal data were all analyzed. Of the 1,638 study participants, 473 (28.9%) had 58 upper and 415 lower abdominal surgeries in the past. The 262 individuals who had only had an appendectomy in the past were not included in the analysis. In patients who had undergone upper, lower, or no prior abdominal surgery, adhesions were discovered in 70.7, 58.8, and 2.1% of instances, respectively. Adhesiolysis was necessary in 78, 30,

[1,3,4]Department of Surgery, Dr. D.Y. Patil Medical College, Hospital & Research Institute, Kolhapur, Maharashtra, India

[2]Department of General Surgery, Dr. D.Y. Patil Hospital & Research Centre, Kolhapur, Maharashtra, India

Corresponding Author: Laxmi Naganur, Department of General Surgery, Dr. D.Y. Patil Hospital & Research Centre, Kolhapur, Maharashtra, India, Phone: +91 9449918274, e-mail: laxminaganur9@gmail.com

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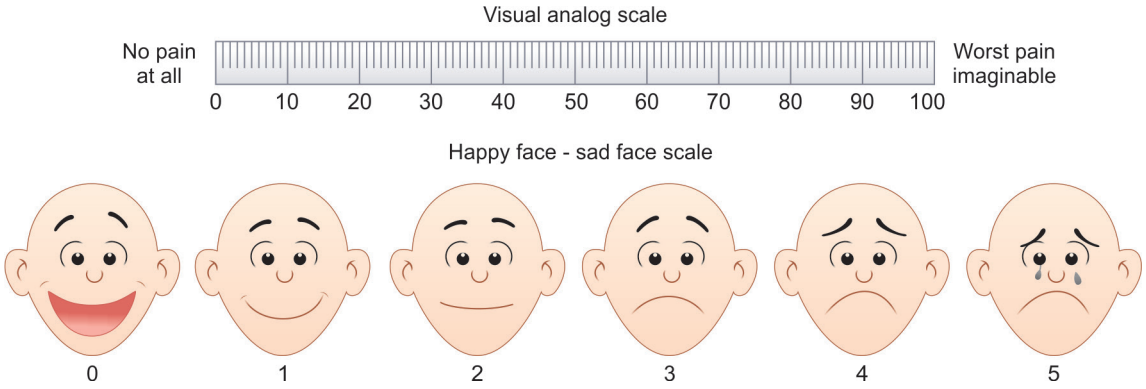

Fig. 1: Visual analog scale

and 0% of these cases, adhesiolysis was not the direct cause of any complications. Patients who had underwent lower abdominal surgery in the past and those who had not previously undergone abdominal surgery had shorter operating times, higher open conversion rates (19%), higher incidences of postoperative wound infections (5.2%), and longer postoperative stays (3.4 ± 2.1 days). The study's withdrawn conclusions indicated that a prior upper abdominal surgery has been associated with longer duration of stay following surgery, a higher open conversion rate, a longer need for adhesiolysis, a longer operating time, and a higher incidence of wound infection. Some studies also show that, upper abdominal surgery is also linked with characteristic changes in lung function which adds the risk of collapse of lower lobe. According to published research, the conversion rate for laparoscopic gallbladder removal in skilled hands can range from 3 to 15%. Generally, conversion rate is common in patients with acute cholecystitis because of dense adhesions and unclear or aberrant anatomy. Some investigators conducted studies to investigate the causes of conversion of laparoscopic cholecystectomy to open cholecystectomy procedure and found that inflammation was to be the main factor influencing conversion rate. In 7.8% of cases, intraoperative bile duct stones that had not been suspected were found. The most significant potential predisposing factor for the 401 bile leaks (BL) and 561 major bile duct injuries (BDI) that were documented was acute or chronic inflammation.

A new era of surgical treatment has begun with the recent surge in the use of laparoscopic and other minimal access surgeries, which is having a significant impact on surgical management.

Hence, the above study was conducted to study the complications of laparoscopic cholecystectomy at teaching institute.

Materials and Methods

Fifty patients with GS who got admitted to Hospital Navi Mumbai and MGM Medical College between August 2010 and September 2012 are included in the study. Before starting the study, the Institutional Ethical Committee granted all the required ethical permissions.

Inclusion Criteria

Patients with acute and chronic cholecystitis, asymptomatic GS, and asymptomatic GS in particular situations, such as diabetes and hemolytic anemia, who were willing to provide written consent for the procedure after being fully informed about the cost, the patient's co-morbidities, etc., were included in the inclusion criteria. Patients had were between the ages of 25 and 65.

Exclusion Criteria

Exclusions from the study included being <25 years old or >65 years old, having choledocholithiasis, or not being prepared to provide written consent for the procedure.

Several patients who had come to the hospital's EM Department complaining of severe abdominal pain were admitted. Patients with acute abdominal pain and a variety of dyspeptic symptoms from the emergency room and surgical outpatient department participated in a hospital-based study. A complete medical history was taken, along with an examination to rule out other possible causes of the patient's dyspepsia and acute abdominal pain. Basic blood investigations were also performed, including CBC, BSL, LFT, urine, blood urea, serum creatinine, chest X-ray, ECG, and USG. After the diagnosis of GSD was confirmed, the patients were chosen for the laparoscopic cholecystectomy procedure based on inclusion and exclusion criteria. Laparoscopic cholecystectomy cases that suffered intraoperative hemorrhage or damage to the CBD were turned into open surgery cases. The length of the procedure, the use of postoperative analgesics, intraoperative complications (such as CBD injury and intraoperative bleeding), and postoperative complications (such as surgical wound infection, surgical wound dehiscence, postoperative intra-abdominal infection, postoperative ileus, and postoperative pancreatitis pulmonary complications, such as lower lobe atelectasis, cardiac issues, and death) were all examined in relation to each patient. The visual analog scale (VAS) is used to measure and record the degree of postoperative pain (Fig. 1).

The day of surgery is considered as zero and the day of discharge is considered as last day of postoperative hospital stay. Data were collected and documented in Microsoft Excel worksheet for further reference of the study.

Results

Eight (16%) of the 50 patients had acute cholecystitis when they first arrived, but the majority of them had chronic cholecystitis when histopathology confirmed the diagnosis. Thirty-five patients (70%) had no symptoms and an ultrasonography revealed one or more gall bladder calculi. Seven patients, or 14%, had chronic cholecystitis. Under general anesthesia, all patients underwent elective surgeries (Table 1).

Table 1: Clinical presentation

Clinical presentation	*No. of patients*	*% of patients*
Asymptomatic	35	70
Acute cholecystitis	8	16
Chronic cholecystitis	7	14

Table 2: Operation duration

Type of operation	*Time duration (range) (Min)*	*Mean-operation time (Min)*	*Std deviation*
Laparoscopic gall bladder removal	50–175	103.98	34.8756

Table 3: Pain duration

Type of operation	*Pain duration in days (range)*	*Pain duration in days (mean)*	*Std deviation*
Laparoscopic GB removal	0–4	1.49	1.443

Table 4: Use of analgesics

Nature of surgery	*No. of days of analgesia required (Range)*	*Mean no of days analgesia required*	*Standard deviation*
Laparoscopic GB removal	0–4	1.49	1.443

Table 5: Postoperative hospital stay

Nature of operation	*Minimum postoperative hosp. stay (days)*	*Maximum postoperative hosp. stay (days)*	*Mean postoperative hospital stay (days)*	*Standard deviation*
Laparoscopic cholecystectomy	2	6	3.7	1.2495

The median (range) operating time for laparoscopic gallbladder removal was 50–175 minutes (mean = 103.98 min) (Table 2).

The pain duration for laparoscopic cholecystectomy was 0–4 days (mean = 1.5 days) (Table 3).

Number of days of analgesia required were 0–4 days (mean = 1.5 days) (Table 4).

The duration for postoperative hospital stay was, minimum for 2 days and maximum for 6 days (mean = 3.7) (Table 5).

"Unnecessary risks are avoided and laparotomy is performed in all cases in which the anatomy is unclear and complications which cannot be controlled laparoscopically," states the institutes policy with respect to indication for conversion. Out of the 50 patients who were initially scheduled for a laparoscopic cholecystectomy, three underwent an open cholecystectomy instead of a laparoscopic procedure (Table 6). One case of intraoperative hemorrhage and two cases of CBD injury resulted in the conversion of laparoscopic GB removal to open surgery. The remaining laparoscopic cholecystectomies went without incident.

Discussion

Fifty patients underwent laparoscopic surgery for our study. Due to CBD damage, 2 of the 50 lap cholecystectomies were changed to open procedures, and one case was altered due to intraoperative hemorrhage. Bile duct damage is rarely the cause of death in patients who undergo laparoscopic cholecystectomy, according to observations. The mortality rate in our series is zero.

In skilled hands, laparoscopic cholecystectomy conversion rates can range from 3 to 15%. With a 6% conversion rate in our series, only 2 cases—1 from intraoperative hemorrhage and 1 from CBD injury—were converted to open procedures. For open cholecystectomy, the incidence of bile duct damage ranges from 0.1 to 0.2%, while for laparoscopic cholecystectomy,[4–7] it ranges from 0.3 to 0.6%.[4,7–10] Dense adhesions in the upper abdomen and GB wall necrosis, which prohibits holding and retracting with a grasper, are the two most common causes of conversion. Most common factors for risk for conversion are males, obese pts, cholecystitis (after 48–72 hours of beginning of symptoms), and CBD stones. Complications including cystic artery injury, intraoperative bleeding, CBD injury, bowel injury, and others (such as gall bladder perforation, intraoperative bile leakage, trocar injury, cautery injury) are the main causes of the switch from laparoscopic to open surgery. Acute cholecystitis with adhesions, gangrenous gall bladder, empyema gall bladder, gall bladder cancer, liver tumors, choledochoduodenal fistula, intrahepatic gall bladder, and acute pancreatitis are among the operational findings. Most open conversions take place after a simple examination or a minimal dissection, and rather than being seen as a failure, the decision to convert should be seen as an indication of surgical maturity. Six Vecchio et al.[8] (1998) reported that the conversion rate was 2%.

According to Butt et al.,[9] Guraya et al.,[10] Southern Surgeons Club[11] and others, the conversion rate of the patients was discovered to be 4, 2.9, and 4.7%, respectively, in their respective studies. The conversion rate in our study was 6%.

The mean operative time for laparoscopic surgery in our study was 103.98 minutes, which is a significantly longer period of time. Laparoscopic surgery has a lengthy learning curve, which could account for this noticeable discrepancy. The above table shows the comparison of laparoscopic cholecystectomy times between the investigators' studies. Between 0 and 4 days following a laparoscopic cholecystectomy, analgesics were found to be required (mean number of days: 1.5 days). For the purpose of relieving shoulder tip pain resulting from diaphragmatic irritation brought on by C02 pneumoperitoneum, the pts in the lap group needed analgesic medication after operation (Table 7).

The decreased hospital stay associated with laparoscopic cholecystectomy shows one of its main benefits. In this series, we encounter a mean postoperative hospital stay for laparoscopic cholecystectomy which is of 3.7 days. The data can be compared with those of other published series in Table 8. Faster recovery and decreased postoperative stay decreased the cost but higher OT expenses and costly equipment's raised overall total cost.

Complications

The current series found that the rate of complications following laparoscopic cholecystectomy was 24% (with 3% occurring intraoperatively and 9% occurring postoperatively). In a Toronto

Table 6: Complication encountered during procedure

Complications	*Laparoscopic cholecystectomy*
Wound infection	3
Bleeding intraoperatively	1
Burst abdomen	0
Abdominal infection	0
CBD injury	2
Acute pancreatitis	1
Post-op ileus	3
Respiratory problems	2
Heart problems	0
Death	0

Table 7: Operative times between various series

Series	*Mean operative time open cholecystectomy (min)*	*Mean operative time laparoscopic cholecystectomy (min)*
CH Chau et al.[12]	84.8	92.2
Lujan et al.[13]	77	88
Gupta et al.[14]	41.89	66.28
Our study	70	103.98

Table 8: Compares hospitalization period of different published studies

Series	*Laparoscopic cholecystectomy*
CH Chau et al.[12]	7.1 days
Lujan et al.[13]	3.3 days

group study, Barkun JS et al.[15] also noted that there were noticeably fewer complications with laparoscopic cholecystectomy than with open cholecystectomy. Laparoscopic surgery may have a higher risk of morbidity and death for older patients, most of them have decreased cardiopulmonary reserves.[16] Theoretically, lap cholecystectomy may exacerbate cardiac issues because of the intra-abdominal pressure and head-up position, which can cause blood to pool in the legs, decreased venous return, hypotension, and a higher risk of venous thrombosis.

When inhaled gas pressure is increased, carbon dioxide (CO_2) can directly affect the heart and lungs. Desmet reported that the blood's absorption of the injected CO_2 resulted in elevated arterial pCO_2 and decreased pH: Arrhythmia was caused by the elevated pCO_2, usually in patients having laparoscopic surgery. Longer recovery times are one potential drawback of laparoscopic cholecystectomy acute cholecystitis cases.[14] The question of whether the extended operating and anesthetic times have any effects has been raised. First, the availability of cutting-edge laparoscopic instruments and the surgeon's experience determine how long a procedure takes. The second factor is the surgeons' growing laparoscopic surgical experience.[17]

Bleeding at the trocar site, bleeding from the liver bed, spilled GS, biliary leaks, bile duct injury, late postoperative strictures, and bowel injury are a few of the frequent side effects of laparoscopic cholecystectomy. Two cases in the group undergoing laparoscopic cholecystectomy were linked to bile duct damage, which was discovered during the procedure and required open surgery to perform a biliary bypass. Another issue with laparoscopic cholecystectomy in acute cholecystitis cases is bile duct damage. Injuries to the bile duct occur 0.3–0.6% of the time following laparoscopic cholecystectomy.[16–19] Early studies reported a higher incidence of CBD injury in cases of acute cholecystitis.[5,20] Mistaking the CBD for the cystic duct is the very frequent cause of significant bile duct damage. The CBD is put at risk when the cystic duct becomes edematous, shortened, and occurs in close proximity to it due to acute cholecystitis. But with more understanding and practice, the risk of serious bile duct damage during a laparoscopic cholecystectomy for acute cholecystitis is not significantly higher than it is for elective surgery.[21]

Conclusion

Although laparoscopic procedures have a high learning curve, they can be useful for patients with acute cholecystitis. Therefore, in order to lower the number of complications, all residents in a teaching institute are recommended to undergo specialized training in laparoscopic surgery, which includes simulation training. Biliary duct injury is a common side effect of laparoscopic procedures, primarily due to misidentification of the CBD as the cystic duct. Because of their high learning curve, the group having laparoscopic cholecystectomy had longer operating times.

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Orcid

Abhinandan Kadiyal https://orcid.org/0000-0002-8218-6667

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