

Original Research Article

Study of Problems & Complications During and After Laparoscopic Cholecystectomy

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Abstract: Nowadays, laparoscopic cholecystectomy is the procedure of choice for cholelithiasis and a part of general surgical practice. Benefits of this approach include shorter hospital stay, less pain, quicker return to normal activities and improved cosmetic outcome. This study was done to evaluate the problems & complications faced during and after laparoscopic cholecystectomy like adhesions, sessile gallbladder, thickened wall of gallbladder, bleeding, duodenal injury, cystic duct avulsion and miscellaneous causes such as equipment failure, unsuspected pathology or enterobiliary fistula. This study was conducted on 30 patients of gallbladder disease admitted for cholecystectomy in which laparoscopic cholecystectomy was attempted. All the patients were selected at random. In the end it was concluded that adhesions around gallbladder & thickened wall of the gallbladder were the most common problems encountered during this study and intra-operative bleeding & gallbladder wall rupture were the most common complications during surgery. Unforeseen problems like technical failure, due to problem in equipment, can happen during laparoscopic cholecystectomy. Wound infection & fever in the post-operative period were the commonest complications after surgery especially in those patients who had undergone conversion into open cholecystectomy because of intra-operative problems. No wound infection was encountered in cases that underwent successful laparoscopic cholecystectomy.

Keywords: Laparoscopic cholecystectomy, open cholecystectomy, sessile gallbladder, wound infection, adhesions, intra-operative bleeding

INTRODUCTION

Gall stone disease is known since long ago as far as the 5th century when Greek physician Trallianus wrote about gallstones [1]. The incidence of cholelithiasis in US is reported to be 10% [2]. In addition to these 2, 00, 00,000 people with documented cholelithiasis, another 8, 00,000 new cases are diagnosed annually [2] and 5, 00,000 cholecystectomies are being performed annually [3].

Dubious described cholecystectomy through a small incision [4]. However, the term minilap-cholecystectomy for this procedure was later on coined by Goco and Chambers in 1983 [5]. It has the advantage of decreased pain, early post-operative recovery and better cosmetic results [6]. However, a restricted access makes minilap-cholecystectomy a more difficult procedure.

But nowadays, laparoscopic cholecystectomy is the procedure of choice for cholelithiasis and a part of general surgical practice. Benefits of this approach include shorter hospital stay, less pain, quicker return to normal activities and improved cosmetic outcome [7]. However, it is associated with problems of high infrastructural and instrumental cost, a relatively higher complication rate because of learning curve [8] and an increased operative time [9].

Peters *et al*[10] reported difficult dissection secondary to inflammation or adhesions as the most common risk factors for intra-operative complications and the need for conversion into open cholecystectomy. Patients who were admitted to the emergency department, particularly if they were managed conservatively for a period of time and had a pre-operative diagnosis of acute cholecystitis were more likely to require conversion to open cholecystectomy.

Schrenk *et al*[11] found that pain and rigidity in the right upper abdomen, thickening of the gallbladder wall on pre-operative ultrasound, intra-operatively detected acute inflammation of the gallbladder and dense adhesions to the gallbladder or in Calot's triangle was the factors associated with high risk of problems during surgery and conversion to open cholecystectomy. Clinical findings of an acute cholecystitis associated with intra-operative dense scarring in Calot's triangle were the best factors predicting conversion from laparoscopic cholecystectomy to open cholecystectomy.

Throughout the recent history of modern surgery, it does not appear that any one particular general surgical technique has been so rapidly accepted into the mainstream of surgical practice as has laparoscopic cholecystectomy. This technique has become treatment of choice for uncomplicated gallstone disease [12]. The advantages of laparoscopic cholecystectomy are so striking that it is impossible to justify performing open procedure in cases which can be done laparoscopically. These advantages have been proved beyond doubt and have been proven in a number of clinical trials.

A few of the advantages are as follows:

1. Reduced post-operative pain.
2. Reduced hospital stay.
3. Early ambulation with associated advantages like low cardio-pulmonary complications, lower incidence of deep vein thrombosis.
4. Cosmetically better scar.
5. Early return to work.
6. Long term cost- effectiveness [13].

Gadacz *et al* [14] reported following indications and contraindications for laparoscopic cholecystectomy

Indications:

1. Cholelithiasis and biliary colic.
2. Symptomatic gallbladder polyps.
3. Resolved gallstone pancreatitis
4. Symptomatic chronic cholecystitis

Relative contraindications:

1. Acute cholecystitis
2. Prior upper abdominal operation.
3. Minor bleeding disorder
4. Common duct stones.

Absolute contraindications:

1. Acute cholangitis
2. Severe acute cholecystitis
3. Acute pancreatitis
4. Peritonitis
5. Portal hypertension

6. Pregnancy
7. Serious bleeding disorder
8. Morbid obesity

Dinkel *et al* [15] assessed the value of sonography in predicting intra-operative difficulties for patients undergoing laparoscopic cholecystectomy and in identifying indicators for conversion to open laparoscopic cholecystectomy. The study concluded on sonography wall thickness of >4mm is the most sensitive indicator of technical difficulties during laparoscopic cholecystectomy. Such difficulties may require conversion to laparotomy.

Verma *et al*[16] found adhesions to be among the common reason for complications during laparoscopic cholecystectomy and need to convert into open cholecystectomy. They also reported that dense adhesions in the porta hepatis were significantly more common in patients with single stone in the gallbladder.

AIMS AND OBJECTIVES

To study problems & complications faced during and after laparoscopic cholecystectomy like adhesions, sessile gallbladder, thickened wall of gallbladder, bleeding, duodenal injury, cystic duct avulsion and miscellaneous causes such as equipment failure, unsuspected pathology or enterobiliary fistula.

MATERIALS AND METHODS

The present study was conducted on 30 patients of gallbladder disease admitted for cholecystectomy in whom laparoscopic cholecystectomy was attempted. All the patients were selected at random.

Exclusion criteria

1. The patients with suspected CBD stones or dilated CBD on ultrasonography were excluded from the study.
2. The patients having clinical or USG diagnosis of suspected carcinoma gallbladder were not included.
3. The patients in whom laparoscopic cholecystectomy could not be performed due to various medical reasons like CHF, CAD, COPD, uncontrolled hypertension and uncontrolled diabetes were excluded from the study.

Detailed history of each patient was taken with special emphasis on age, sex, height, weight, symptoms of abdominal pain, nausea, vomiting, history of jaundice or pancreatitis and previous abdominal surgery. The mode of admission was also noted, distinguishing between elective and emergency admissions.

Thorough general physical, abdominal and systemic examination was carried out in all the patients.

Routine investigations e.g. Hb, BT, CT, FBS, Blood Urea, Serum Creatinine, urine complete examination, WBC Count and ECG were done in all cases.

Liver function tests like serum bilirubin, alkaline phosphatase, SGOT & SGPT were also carried out.

Special Investigations

Pre-operative ultrasonography was done in all the cases with special emphasis on gallbladder size, wall thickness, presence of single or multiple stones in the gallbladder and the condition of biliary passages, pancreas and liver.

Operative Technique

The operative procedure was performed under general anaesthesia in all the cases. A video monitor was used and placed on the right side of the patient. The patient was asked to empty the urinary bladder just before the operation.

The patient was placed in supine position. Whole of the abdomen and lower chest was cleaned and draped. Trendelenberg tilt was given to the table, head end being lowered by 10°.

A 1cm incision was made in the depth of umbilicus and a Veress needle introduced into the abdominal cavity downwards and backwards. The direction of the needle being about 10° towards the pelvis. About 5 ml of normal saline was introduced into the peritoneal cavity through the Veress needle which confirmed whether the needle was inside the peritoneal cavity or extraperitoneal. Veress needle was connected to the insufflators and carbon dioxide insufflated into the abdominal cavity until an intra-abdominal pressure of 10 mmHg was achieved. Generalized pneumoperitoneum was confirmed by percussion of whole of abdomen and obliteration of liver dullness.

Veress needle was removed and 10mm trocar inserted through the umbilical port. The laparoscope with attached light source was inserted through this port and the abdominal cavity inspected. The first trocar entry was blind. However, all other trocar entries were

made under direct laparoscopic vision. After visualization of the peritoneal cavity, a second 10 mm trocar was inserted after raising head end of the table and 15° tilt to the left, in subxiphoid position, entering the abdominal cavity just to the right of the falciform ligament. Two 5mm ports were used to hold, retract and expose the gallbladder. The one in the anterior axillary line was used for holding the fundus and retracting the gallbladder. The port at mid clavicular line was used to hold the infundibulum and retracting it laterally and downwards so as to open the Calot's triangle and facilitate dissection.

Adhesions were dissected off the gallbladder and cystic duct and artery identified by removing the peritoneum overlying these structures. The cystic duct was isolated and clips were applied, two proximally, one distally and then the duct was divided between the clips. The cystic artery was clipped and divided in a similar manner. The infundibulum and neck of the gallbladder was elevated and gallbladder dissected from the bed using electrocautery. After ensuring haemostasis, the remaining attachments between the gallbladder and the liver were divided. The gall bladder was removed through the epigastric port. A drain, if required, was put in the Morrison's pouch and incisions closed with 2-0 ethilon.

Any intra-operative complications as well as chosen treatment were noted. The patients were evaluated post-operatively for pain and any complication such as wound infection, fever, intra-abdominal collection, jaundice and hernia and duration of hospital stay. The association of the predictors with the intra-operative findings/ complications/ difficulties and the final outcome was statistically analyzed.

OBSERVATIONS

The present study was conducted to evaluate the intra and post-operative problems & complications encountered during laparoscopic cholecystectomy. The study was conducted on 30 patients. All patients underwent clinical examination, relevant haematological and biochemical investigations and ultrasonographic investigation of hepatobiliary tract. The observations thus made were analyzed and recorded as follows:

Table 1: Cases of Acute Cholecystitis

Diagnosis	Number	%age
Acute cholecystitis absent	21	70%
Acute cholecystitis	9	30%
Total	30	100%

In the present study, 9 patients (30%) were admitted through emergency and were diagnosed to be suffering from acute cholecystitis. Twenty one (70%)

patients were admitted for routine elective laparoscopic cholecystectomy without any symptoms/ signs of acute cholecystitis.

Table 2: Intra-Operative Problems

S.No.	Intra-operative problems	No. of patients*	%age
1.	Dense adhesions	8	26.67
2.	Thick walled gallbladder	7	23.33
3.	Obscure anatomy in Calot's triangle	2	6.67
4.	Sessile gallbladder	1	3.33
5.	Technical failure	1	3.33

*the discrepancy in the total was due to overlapping of intra-operative findings

Intra-operatively dense adhesions were found in 8 patients (26.67%). Thick walled gallbladder was present in 7 patients (23.33%). Anatomy of Calot's triangle was obscure in two patients (6.67%) and there

was sessile gallbladder in one patient (3.33%). Technical failure due to mal-functioning of CO₂ insufflators occurred in 1 patient (3.33%).

Table 3: Intra-Operative Complications

Intra-Operative Complications	No. Of Patients	%Age
Bleeding from cystic artery	1	3.33%
Perforation of gallbladder with spillage of stones	1	3.33%

In one patient (3.33%) there was bleeding from cystic artery. However, it was possible to clip the artery in this case and conversion was not required. This was seen in case having dense adhesions at the Calot's triangle.

The perforation of gallbladder with spillage of stones occurred in one patient (3.33%). All the stones were taken out and peritoneal lavage was done. This happened in the case having sessile & thick-walled gallbladder.

Table 4: Post-Operative Complications

Post-Operative Complication	Total No. Of Patients	Percentage	Successful	Converted
Wound infection	3	10	-	3
Fever	3	10	1	2
Intra-abdominal collection	-	-	-	-
Mortality	-	-	-	-
Jaundice	-	-	-	-
Hernia	-	-	-	-

Wound infection

In our study, 3 patients (10%) developed wound infection with mild discharge in the post-operative period. All the three patients were those converted into open cholecystectomy during surgery because of intra-operative problems.

Pus C/S swabs was taken from the wound and appropriate anti-biotics were given. The wounds healed by anti-biotics and removal of offending stitch.

Fever

3 patients (10%) developed fever in the immediate post-operative period. 2 of these were those converted into open cholecystectomy during surgery because of intra-operative problems while one patient had underwent a successful laparoscopic cholecystectomy.

Intra-abdominal collection

There was no case of post-operative intra-abdominal collection in our study.

Jaundice

There was no case of post-operative jaundice in our study.

Hernia

All the patients were followed up for 3 months and there was no case of incisional hernia in our study.

DISCUSSION

Laparoscopic cholecystectomy is the established treatment for symptomatic cholelithiasis [12]. It is associated with less painful post-operative course, a low analgesic requirement and a short hospital stay.

The current study was done to evaluate the intra-operative and post-operative problems & complications encountered during laparoscopic cholecystectomy in 30 patients presenting to the department of general surgery.

Intra-operative complications

Most common source of bleeding during laparoscopic cholecystectomy is injury to the cystic artery or its branches [17]. Other causes of bleeding could be from the gallbladder bed, liver capsule, inflamed gallbladder, hemorrhagic adhesions, injury to vessels (while first trocar insertion).

Peter's *et al* [10] reported that intra-operative complications occurred in 12 patients of their series of 746 patients.

In the present study there was bleeding from cystic artery in 1 patient (3.33%) which was clipped without the need for conversion.

The gallbladder wall may be punctured while using diathermy or scissors. Excessive traction on the gallbladder particularly by the forceps grasping the fundus may lead to tearing of the gallbladder. Rupture may occur during extraction particularly if it packed with stones. This complication can be avoided by minimum traction on the gallbladder; use of diathermy should be minimal; when extracting the gallbladder from the peritoneal cavity steady traction without excessive force should be applied. It is important to apply diathermy in correct plane between gallbladder and liver. Safe use of diathermy requires careful visualization of the tissue to be coagulated by the hook dissector described by Dunn and Watson, 1992 as "hook, look, cook". The use of monopolar cautery should be avoided in Calot's triangle because of important structures in the vicinity.

In the present study also, there was technical problem of gallbladder injury with spillage of the stones in one patient. These stones were retrieved by extraction with a grasping forceps and laparoscopic suction. The procedure was completed without conversion. Retrieval of spilled stones can be done by pressure ejection, laparoscopic hovering and use of retrieval bags [18].

The complications arising from dropped gallstones in laparoscopic cholecystectomy patients are subsequent abscesses and inflammatory masses containing gallstones or stone fragments [19].

Dulemba *et al*[20]reported that spilled stones floating free in the peritoneal cavity may migrate to the pelvic area and become embedded there in the cul-de-sac, causing a severe reaction. Due to the subsequent

inflammatory reaction, the fertility may be adversely affected in a female.

Post-operative complications

Wound infection

In our study, 3 patients (10%) developed wound infection with mild discharge in the post-operative period. All the 3 patients who developed wound infections were those converted into open cholecystectomy during surgery because of intra-operative problems.

Williams *et al*[23]reported wound infection rates of 0.5% in successfully performed laparoscopic cholecystectomies and infection rate of 3.6% in patients requiring conversion.

Similarly, Taragarona *et al*[24] concluded that small biological impact induced by laparoscopy is followed by a greater preservation of the immune response as compared to the open procedure, thus lowering the incidence of infectious complications.

Fever

Three patients (10%) developed fever in the immediate post-operative period. Two of these patients were those who were converted to open cholecystectomy because of intra-operative problems while one patient had successfully undergone laparoscopic cholecystectomy. 1 of the patients of acute cholecystitis undergoing laparoscopic cholecystectomy developed fever in the immediate post-operative period which remained only for 1 day. The fever was associated with wound infection in both the cases of open cholecystectomy. The fever got relieved by giving anti-pyretics and appropriate treatment of the wound infection.

Post-operative pain

Mechanism of pain

Factors that may influence the degree of pain after laparoscopic cholecystectomy include the volume of residual gas, the type of gas used for pneumo-peritoneum, the pressure created by the pneumo-peritoneum and the temperature of insufflated gas [21]. The length of operation and volume of insufflated gas may be a more important factor than the duration of exposure. The rate of insufflation of carbon dioxide also influences the incidence of post-operative shoulder tip pain with lower rates of insufflations resulting in lower rates of shoulder tip pain. Another mechanism may be the formation of intra-peritoneal carbonic acid from carbon dioxide [22]. Thus, the origin of pain after laparoscopic cholecystectomy is multifactorial, with pain arising from the incision sites, the pneumo-peritoneum and the cholecystectomy.

David [7] concluded that benefits of laparoscopic cholecystectomy include shorter hospital stay, less pain, quicker return to normal activities and improved cosmetic outcome.

In the present study, 2 patients had severe pain post-operatively and they were cases who required conversion to open cholecystectomy because of intra-operative problems. However, these results were found to be statistically non-significant. This may be due to the small sample size with which the present study was undertaken.

Intra-abdominal collection

There was no case of post-operative intra-abdominal collection in our study. This was due to routine aseptic precautions taken during surgery.

Mortality

There was no mortality during the operation or in the post-operative period in our study.

Jaundice

There was no case of post-operative jaundice in our study.

Hernia

All the patients were followed up for 3 months and there was no case of incisional hernia in our study.

Duration of hospital stay

In the present study, the patients undergoing conversion into open cholecystectomy had mean hospital stay of 9.50 ± 1.37 days which was greater than mean hospital stay of patients who underwent successful laparoscopic cholecystectomy (3.29 ± 1.23 days). This difference in hospital stay was found to be statistically highly significant. The increased hospital stay in patients requiring conversion may be due to increased incidence of wound infection, increased paralytic ileus and tendency of the patients to get discharged after stitches were removed. 50% of the patients in the study had a hospital stay ≤ 3 days. All these patients had successfully undergone laparoscopic cholecystectomies.

Similarly, Porte and DeVries [25] reported that mean hospital stay after laparoscopic cholecystectomy was 3 days as compared to 7 days for those who required conversion to open cholecystectomy.

SUMMARY AND CONCLUSIONS

This study was carried on 30 patients who required laparoscopic cholecystectomy. Aim was to study the intra and post-operative problems & complications during surgery.

In the end it was concluded that:

1. Adhesions of the gallbladder, with surrounding tissues, was the most common intra-operative problem.
2. Other intra-operative problems were:
 - i) Thick-walled gallbladder.
 - ii) Obscure anatomy in the Calot's triangle
 - iii) Sessile gallbladder
 - iv) Technical failure (Due to malfunctioning of the CO₂ insufflator)
3. Bleeding from the cystic artery was the most common complication.
4. Rupture of gall bladder during surgery because of thickened gallbladder wall was the other common complication.
5. In post-operative period wound infection was the most common complication. It occurred in those who had to undergo conversion into open cholecystectomy because of intra-operative problems. No wound infection was encountered in cases that underwent successful laparoscopic cholecystectomy.
6. Other main post-operative complication was fever and this also was more common in patients who had to undergo conversion to open cholecystectomy because of intra-operative problems.
7. Hospital stay was significantly higher in patients who had to undergo conversion to open cholecystectomy.

So, it is concluded that adhesions around gallbladder & thickened wall of the gallbladder were the most common problems encountered during this study and intra-operative bleeding & gallbladder wall rupture were the most common complications during surgery. Unforeseen problems like technical failure, due to problem in equipment, can happen during laparoscopic cholecystectomy. Wound infection & fever in the post-operative period were the commonest complications after surgery, especially in those patients, who had undergone conversion into open cholecystectomy because of intra-operative problems.

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