

ORIGINAL ARTICLE

CONVERSION OF LAPAROSCOPIC CHOLECYSTECTOMY INTO OPEN CHOLECYSTECTOMY: AN EXPERIENCE IN 300 CASES

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Background: Laparoscopic cholecystectomy is getting popularity in developing countries especially in Pakistan. Conversion from laparoscopic to open cholecystectomy is also common. This study intends to evaluate the causes of conversion from laparoscopic cholecystectomy to open cholecystectomy and to establish the efficacy and safety of the procedure. **Methods:** This descriptive case series was conducted in the department of General Surgery at Social Security Teaching Hospital Islamabad from November 2012 to October 2015. Patients of more than 20 years of age presenting in OPD with symptomatic gallstones were included in the study. Patients with dilated CBD (>8 mm in diameter), jaundice, acute cholecystitis, mass at porta hepatis and positive hepatitis B or C virology were excluded. **Results:** A total of 300 patients were included in the study; 262 (87.33%) were females and 38 (12.67 %) were males. Twenty-one (7%) patients were converted to open cholecystectomy. Most common cause of conversion was dense adhesions followed by obscure anatomy at Calot's triangle. Other common causes were bleeding, bile leakage, visceral injuries and instrument failure. In the first 100 cases, 10% patients were converted to open cholecystectomy followed by 6% in the next 100 cases. Only 5% patients were converted to open cholecystectomy in the last 100 cases. **Conclusion:** Most common cause of conversion from laparoscopic cholecystectomy to open cholecystectomy was dense adhesions followed by obscure anatomy at Calot's triangle.

Keywords: Laparoscopic Cholecystectomy, Complications, Laparoscopy, conversion.

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INTRODUCTION

Cholelithiasis is a major health problem not only in Pakistan but worldwide and cholecystectomy is the treatment of choice. Advancement of technology has revolutionized the field of surgery. Minimally invasive surgery is getting popularity day by day. Technologists are even working on the robots which can perform surgery through a single small hole in the human body. Till 1987 open cholecystectomy for gallbladder disease was the treatment of choice but now laparoscopic cholecystectomy is the gold standard.¹ At centres where laparoscopic surgery is available, open cholecystectomy has been almost replaced by laparoscopic cholecystectomy.² Laparoscopic cholecystectomy has reduced the unnecessary and un-required surgical trauma to the patient and there is no need to cut the abdominal wall and surgery is performed through small holes. It causes less pain and gives good cosmetic result. Patient recovery is quick and can go home earlier as compared to open cholecystectomy.³ Some centres perform laparoscopic cholecystectomy as day case surgery.⁴

Major complications are less frequent in laparoscopic cholecystectomy and are less than 5%.⁵ It is considered as a safe procedure not only in

elective surgery but also in emergency surgery as well. However in difficult cases sometimes it becomes necessary to convert laparoscopic cholecystectomy to open cholecystectomy in order to avoid major morbidity or mortality and as the only option to save the patient.⁶ The factors responsible for conversion may be three dimensional: patient related such as unclear anatomy, adhesions, excessive bleeding, or visceral trauma; surgeon related such as level of expertise; and equipment related such as electricity or equipment failure.⁷

In different studies about 1.5–19 % conversion rate has been reported.⁸ The conversion rate is strongly related to the experience of a surgeon, patient selection and quality of equipment. A decrease in complication rate has been reported in different studies.⁹ Laparoscopic surgeons should be trained in minimally invasive skill lab initially then under the supervision of a trained laparoscopic surgeon for some time as a steep learning curve still exists for this type of surgery especially in underdeveloped countries like Pakistan.¹⁰ Most of the laparoscopic iatrogenic injuries can be successfully avoided by the trained laparoscopic surgeon by appreciating their own limitations especially during the dissection of Calot's triangle before dividing the cystic artery

and cystic duct. Most surgeons after training can perform this procedure in a short time with a minimal conversion rate.¹¹

After the introduction of laparoscopic cholecystectomy various surgeons have conducted studies at their centres to evaluate different complications and conversion rate from laparoscopic cholecystectomy to open cholecystectomy in order to establish the factors due to which this procedure can be made safer and cost effective for the patients. The aim of this study is to determine the causes of conversions of laparoscopic cholecystectomy to open cholecystectomy in a teaching hospital.

MATERIAL AND METHODS

This descriptive case series was conducted in the department of General Surgery at Social Security Teaching Hospital Islamabad from November 2012 to October 2015. Approval of the study from the ethical committee of the hospital was taken. Patients of more than 20 years of age presenting in OPD with symptomatic gallstones were included in the study. Patients with choledocholithiasis or dilated common bile duct (CBD >8 mm in diameter), history of jaundice, history of previous abdominal or pelvic surgery, acute cholecystitis, malignancy or mass at porta hepatis and patients with positive hepatitis B or C virology were excluded. Patients were admitted through OPD one day before surgery for preoperative assessment. Full blood count, Blood Sugar Random, Liver Function Tests, Serum urea and creatinine, and Hepatitis B and C virology were carried out. Abdominal Ultrasound was performed in all patients and used as a tool for exclusion criteria done in every patient to confirm gallstones and to assess the common bile duct (CBD) diameter. Chest X-ray and ECG were done in patients above forty.

Informed consents were taken from patients. They were explained about the procedure of laparoscopic cholecystectomy, possible complications and possibility of conversion of laparoscopic cholecystectomy to open cholecystectomy. Standard four port technique was used to perform laparoscopic surgery. Pneumoperitoneum with carbon dioxide was created. Nasogastric suction was done only in those patients having gastric dilatation. Calot's triangle was exposed to identify the cystic artery and cystic duct and clamped with medium large liga clips separately. Gall bladder was separated from the liver by using monopolar diathermy and removed through the 10 mm epigastric port. Drain tube was placed in the sub-hepatic space in selected cases when irrigation and suction was required for bleeding and bile leakage from gall

bladder perforation. Drain was kept for 24 hours of procedure in most of cases and removed if there was no significant drain discharge.

All the complications during surgery or postoperatively was noted with special emphasis on the causes of conversion of laparoscopic cholecystectomy to open cholecystectomy. Most patients were discharged postoperatively on next day of surgery. Follow up of the patients was carried out in surgical OPD at one week, three weeks and six weeks intervals to see any complications. The data was collected on a *pro forma* and was analysed using SPSS 10 software.

RESULTS

Three hundred patients were included in the study. Out of the total, 262 (87.33%) were females and 38 (12.67 %) were males giving rise to a female to male ratio of 6.9:1. Ages ranged from 20 to 76 years with a mean of 42.69 years. Majority were in fourth (37.29%) and fifth (24.83%) decade of life.

Twenty-one (7%) patients were converted to open cholecystectomy. Among these 21 patients, 4 were males and 17 were females. (Table-1) Eight patients (2.67%) were converted to open cholecystectomy because of dense adhesions around gallbladder due to chronic cholecystitis which was the most common cause. In 5 patients (1.67%) conversion was made because it was difficult to identify the cystic duct, cystic artery and CBD at calot's triangle with laparoscope. Two patients (0.67%) were converted because of bleeding. In one patient liga clip was slipped from cystic artery and the other patient had got injury to the right hepatic artery. Both had started massive bleeding which made vision unclear. Two patients (0.67%) had injuries to duodenum and colon. Instrument failure was the cause in two patients (0.67%). One patient (0.33%) had CBD injury and in one patient bile leakage more than 500ml was found on the first postoperative day and exploration was done and liga clip of cystic duct was found slipped. (Table-2)

In the first 100 cases, ten percent patients were converted to open cholecystectomy followed by 6% in the next 100 cases. Five percent patients were converted to open cholecystectomy in the last 100 cases. Maximum cases (59.67%) were completed within 45–90 minutes.

Table-1: Frequency of complications in females and males

Gender	No. of patients	No. of Complications	%age of complications	p-value
Males	38	4	10.53%	0.1053
Females	262	17	6.49%	0.0649
Total	300	21	7%	0.0700

Table-2: Causes of conversion of laparoscopic cholecystectomy to open cholecystectomy (n=300)

Number of cases	1-100	101-200	201-300	300
Adhesions	4	2	2	8
Obscure anatomy at calot' triangle	2	2	1	5
Bleeding	1	1	0	2
Visceral injury (duodenum and colon)	1	1	-	2
Instrument failure	-	-	2	2
CBD injury	1	-	-	1
Bile leakage	1	-	-	1
Total	10	6	5	21

DISCUSSION

Most common surgery performed in a general surgical department is cholecystectomy. Now a day's laparoscopic cholecystectomy is the treatment of choice and is considered as gold standard for the treatment of cholelithiasis. Conversion from laparoscopic cholecystectomy to open cholecystectomy changes the outcome of the patient and results in longer postoperative hospital stay.¹² It is not the failure of the procedure but does affect the patient satisfaction. The conversion rate of laparoscopic cholecystectomy to open cholecystectomy mainly depends on the expertise of the laparoscopic surgeon, quality of equipment and the clarity in the anatomy at Calot's triangle which may be obscure because of multiple attacks of cholecystitis or previous upper abdominal surgery. However with the advancement in technology more sophisticated laparoscopic equipment and instruments with safety measures are available and surgeons are better trained, the conversion rate has been reduced. Even then conversion to open cholecystectomy in some cases remains unavoidable.¹³ Conversion should not be considered as a complication of laparoscopic cholecystectomy rather it should be considered earlier for the safety of the patient.¹⁴ Bleeding intraoperatively or postoperatively, bile leakage, gallbladder perforation, bile duct injury or visceral injuries are considered as true complications.¹⁵

In this study conversion rate is 7% which is similar with various national and international studies. In most of the recent studies reported conversion rates vary between 1.5-19%.^{8,16} Conversion rate is low in developed countries as compared to developing countries. This is because of easy availability of latest laparoscopes and better training of surgeons in the developed countries as compared to underdeveloped countries. It is also seen that with increase in experience of a surgeon in laparoscopic surgery, conversion rate decreases in the skilled phase of surgery as compared to the learning curve. Mattioli *et al* in his study, reported a decrease

in conversion rate from 10% (learning curve) to 2.8% (skill curve).¹⁷ Shamim reported the conversion rate from 9% during the learning curve, to 6.3% during the skill curve. This trend was also observed in our study, conversion rate was ten percent in first 100 cases which was reduced to five percent in the last 100 cases.

In local literature most common cause of conversion was seen adhesions around the gall bladder. Adhesions made dissection difficult although in most of the cases adhesions were separated with careful dissection with the help of cautery. In the national studies Pervaiz reported 2.38% and Tanveer reported 1.78% conversions because of adhesions.^{18,19} In our study adhesions (2.67%) were the most common cause which is consistent with most of the local studies however in majority of the international studies the reported rate is low comparatively and it is second or third commonest cause followed by acute cholecystitis. This is probably due to the fact that in majority of local studies, cases of acute cholecystitis were not included in the studies. Le VH reported conversion because of adhesions in 0.71% patients.²⁰

In our study, obscure anatomy (1.67%) at Calot's triangle was the second most common cause of conversion of laparoscopic cholecystectomy to open cholecystectomy which is similar with national and international studies. Bleeding is also observed a cause of conversion. The increase in the use of harmonic scalpel or ligasure has reduced the incidence of bleeding. However in developing countries where laparoscopic surgery is still performed with refurbished laparoscope, the facility of ligasure is not frequently available and they rely on liga clips for controlling the bleeders. Sometimes application of liga clip is not successful resulting in massive bleeding and making vision more difficult. Then the only option left for haemostasis is to convert the procedure into open cholecystectomy. In our study bleeding is observed in 0.67% patients which is similar with other studies. Nizam, Tanveer and Volkan reported 0.65%, 0.39% and 0.27% conversion rates in their studies because of bleeding.^{15,19,21}

Visceral injuries are also observed as complications of laparoscopic surgery sometimes resulting in conversion to open cholecystectomy. Development of safety trocars and insertion of trocars under vision has reduced the visceral injuries. Most of the injuries are repaired with laparoscopic suturing. In our study duodenum and colon injuries are observed in 0.67%, CBD injury in 0.33% and bile leakage in 0.33% which is similar with most of the national and international studies. Nizam, Tanveer

and Volkan reported 0.65%, 0.59% and 0.12% respectively.^{15,19,21}

Instrument failure as a cause of conversion to open cholecystectomy is not observed in the developed countries now a day however in the initial era of laparoscopic surgery there are some cases reported in the literature.¹⁸ However conversion to open laparoscopic surgery is still reported in the local literature as high as reported by Pervaiz in his study up to 2.94%. The most common causes of these conversions are use of refurbished laparoscope, lack of backup support and failure of power supply. Memon reported 0.16% conversions because of equipment failure. In our study 0.67% cases were converted to open. Nizam also reported equipment failure during laparoscopic surgery but backup support and replacement of instruments avoided the conversion.^{16,21}

CONCLUSION

Most common cause of conversion from laparoscopic cholecystectomy to open cholecystectomy was dense adhesions followed by obscure anatomy at Calot's triangle. With the increase in experience of a surgeon in laparoscopic surgery, the rate of complications and conversion from laparoscopic cholecystectomy to open cholecystectomy has been reduced. However in difficult situations, a surgeon should seek consultation from a senior colleague and if it is not available then the decision to convert to open procedure should be made earlier for the safety of the patient.

AUTHOR'S CONTRIBUTION

TR: Conception and design, analysis and interpretation of the data. AN: Drafting of the article: Statistical expertise. UF: Critical revision of the article for important intellectual content, final approval and guarantor of the article. MI: Collection and assembly of data. NB: Collection and assembly of data.

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