RATE AND REASONS OF CONVERSION OF LAPAROSCOPIC CHOLECYSTECTOMY TO OPEN CHOLECYSTECTOMY? A PROSPECTIVE ANALYSIS OF 450 CONSECUTIVE LAPAROSCOPIC CHOLECYSTECTOMIES

Muhammad Afzal, Shafqat Rehman*, Muhammad Amer Mian, Raees Ahmed*

Combined Military Hospital Lahore Pakistan, *Combined Military Hospital Kohat Pakistan,

ABSTRACT

Objective: To assess the rate and causes of conversion of laparoscopic to open cholecystectomy (OC) in 450 patients who underwent laparoscopic cholecystectomy (LC) by the same surgeon in tertiary care teaching hospitals.

Study Design: Descriptive study.

Place and Duration of Study: The study was conducted initially at Pakistan Navalship (PNS) Shifa, Karachi and later at Combined Military Hospital, Lahore from November 2009 to June 2013.

Material and Methods: All the patients of both genders and of any age group, undergoing LC for gall bladder pathology whether acute or chronic, acalculous or calculous were included in this study by convenient sampling. The exclusion criteria were choledocholithiasis, malignancy, and patients who willingly opted for open cholecystectomy. All the patients were operated by the same experienced laparoscopic surgeon. The number and sizes of the ports varied from patient to patient and was on the choice of the operating surgeon. A detailed proforma was filled which included the demographic data of the patients, indications for cholecystectomy, histories of previous abdominal surgery, their comorbidities (if any), operating time, intra-operative findings, complications, post-operative hospital stay and rate and reasons for conversion to open cholecystectomy (if required).

Results: Out of 450 consecutive patients for whom LC was attempted by a single surgeon, 7 patients (1.6%) were converted to OC. There were 380 female and 70 male patients (F: M ratio 5.4:1). Their mean age was 44.6 ± 13.5 years, ranging from 9-82 years. All patients who required conversion to OC were females. The mean operating time was 38.9 ± 16.2 minutes (range 15-120 minutes). The reasons for conversion included cystic artery bleeding[2], liver bed bleeding[1], common hepatic duct injury[1], cholecystoduodenal fistula[1], severe adhesions caused by tissue inflammation and fibrosis of Calot's triangle[1] and cystic duct avulsion[1].

Conclusion: The overall rate of conversion to OC was 1.6%. Laparoscopic cholecystectomy is a safe procedure with very little chances of conversion to open even in acute cases, when performed by an experienced surgeon.

Keywords: Complications, Conversion, Laparoscopic cholecystectomy.

INTRODUCTION

Gallstone disease is the commonest problem of the hepato-biliary system which requires either laparoscopic or open surgical intervention. After the first laparoscopic cholecystectomy (LC) by a German surgeon Med Erich Muhe in 1985, LC has become the gold standard treatment for the treatment of gallstones[1]. Today, as a minimally invasive procedure, LC offers a cure for symptomatic gallstones with its established advantages including less post-operative pain, earlier return of bowel function, less scarring, better cosmesis, shorter hospital stays, and early return to full activities and reduced total cost[2-4]. Due to increased surgical experience and technical innovations, majority of patients with acute cholecystitis, empyema of gallbladder, gangrenous gallbladder, obesity, and pregnancy, cirrhosis of liver and upper abdominal surgery are no more considered contraindicated for LC. However, in such potentially difficult LC conversion to open

Correspondence: Dr Muhammad Afzal, Dept of Surgery, CMH Peshawar, Pakistan (*Email: afzal_7@yahoo.com*)

surgery is indicated in certain cases. Conversion to open procedure should not be considered a complication or failure, but wise and necessary precaution by the surgeon to avoid undue risk to the patient. Conversion to open cholecystectomy (OC) is needed in 2.6%[5] to 5.2%[6] of elective and 12% to 37.5% of emergent procedures[7-9]. However the surgeon must also be facile with open biliary surgery in order to deal with complications related to peritoneal access, pneumoperitoneum, surgical exploration, thermo-coagulation and anesthesia during LC. Reasons for conversion to open surgery reported in literature include injury to bowel and major blood vessels, bleeding, avulsion of cystic duct, duodenal injury, cholecystoduodenal fistula, respiratory acidosis, dense adhesions at Calot's triangle, difficult and obscure anatomy, severe inflammation, injury to bile ducts, abnormal intraoperative cholangiogram, unsuspected pathology and equipment failure[10].

The aim of our study is to assess rate and reasons for conversion of LC to OC in our tertiary care teaching institutions.

MATERIAL AND METHODS

This descriptive study included first 450 consecutive LC performed by a single consultant surgeon at Pakistan Naval Ship (PNS) Shifa, Karachi and later on at Combined Military Hospital Lahore, both tertiary care teaching hospitals from November 2009 to May 2013. Selection of patients for LC was based upon clinical diagnosis, laboratory investigations such as white blood cell count (WBC) and liver function tests (LFTs) ultrasound examination findings, co morbidities and pre-anaesthesia assessment. All patients with symptomatic gallstones, acute calculous or acalculous cholecystitis, empyema gallbladder, mucocele of gallbladder, gallstone pancreatitis and polyps of gallbladder were included. Exclusion criteria was patients with choledocholithiasis, malignancy, perforation of gallbladder with abscess formation, previous upper abdominal surgery, severe cardiopulmonary disease and patients who willingly opted for OC. LC not performed due to equipment failure and those performed by other surgeons at these centers were also excluded. LC was performed by American approach in which surgeon stands to the left of the patient. Pneumoperitoneum was created by closed method using Veress needle or open technique. Number, size and position of placement of trocars varied from patient to patient depending upon the choice of surgeon according to the situation. Majority of LC were performed by 3 port technique and 4th port was used optionally if required. Energy source used was only monopolar diathermy. The data was collected prospectively which included sex, age, clinical diagnosis, co- morbidities, previous history of abdominal surgeries, concomitant disease, number of trocars placement, type of port placement, operative diagnosis, operative time, reasons for conversion, postoperative hospital stay and complications. Follow up was done up to 30 days. All patients were asked to report in case any complication occurred. Data was analyzed by Statistical Package for Social Sciences (SPSS) version 15.0. Descriptive statistics were used to describe data.

RESULTS

During the study which spanned over a period of three years and seven months first consecutive 450 LC by a single laparoscopic surgeon at tertiary care teaching hospitals were included. The mean age was 44.5 ± 13.6 years (range 9-82).

There were 380 (84.4%) females and 70 (15.6%) males (female to male ratio was 5.4:1). All seven conversions to open surgery were seen in female patients.

Depending upon the preoperative diagnosis and laparoscopic findings, patients had diagnosis of biliary colic/ chronic cholecystitis 69.8% (n=314), acute calculous cholecystitis 22.2% (n=100), empyema gallbladder 6.9% (n=31), acute acalculous cholecystitis 0.2% (n=1), gallstone pancreatitis 0.4% (n=2), mucocele of gallbladder 0.2% (n=1), and polyps of gallbladder 0.2% (n=1) (fig-1). Post-operatively, two patients were diagnosed as carcinoma of gallbladder on histopathological examination. Out of seven

conversions, 3 patients had diagnosis of biliary colic /chronic cholecystitis and 2 patients were acute calculous cholecystitis. One patient had diagnosis of gallstone pancreatitis and another patient was of empyema gallbladder that turned out to have cholecystoduodenal fistula. Co-morbidities were hypertension, diabetes mellitus, ischemic heart disease, hypothyroidism and hyperthyroidism.

History of previous lower abdominal surgery mainly due to gynecological problems was present in 50 (11%) female patients and 5 (1.1%) male patients. No conversion to open cholecystectomy was required in these cases. Pneumoperitoneum was established by closed method using Veress needle in 395 (87.8%) cases and open method in 55 (12.2%) patients. There was no conversion needed during

5 (1.1%) patients. Size of trocars used was 3mm, 5mm and 10mm depending upon the choice of the surgeon and intraoperative condition of gallbladder. No conversion was required due to intraoperative trocar related complications in this study.

The operating time from skin incision for insertion of Veress needle or open technique for creating pneumoperitoneum and closure of skin wound ranged from 15 to 120 minutes. The mean operating time was 38.8 ± 16.2 minutes.

In the attempted 450 LC, 443 (98.4%) cases were successfully completed. The conversion of LC to OC was required in 7 (1.6%) cases. The conversion rate for acute cholecystitis was 2.25% vs. 0.95% for biliary colic/chronic cholecystitis. The reasons for conversion in this series are given in table-2. Reasons for

Table-1: Rate of Conversion in LC.

Study	Number of Patients	Conversion (%)	Mortality (%)	Complications (%)	Bile Duct Injuries (%)
Cuschieri, et al. (1991)	1236	3.6	0.00	1.6	0.3
Larson, et al[1992]	1983	4.5	0.10	2.1	0.3
Croce, et al[1994]	6865	3.1	0.06	2.5	0.3
Newman, et al[1995]	1525	2.2	0.26	4.1	0.0
Soper, et al[1998]	1165	2.1	0.10	2.7	0.2
Kama et al[2001]	1000	4.8	-	-	-
Hasaniah et al[2002]	2750	3.8		-	-
Mufti et al[2007]	60	5	-	-	-
Bakos et al[2008]	1535	5.7	-	-	-
Current Study [2014]	450	1.6	0.2	-	0.2

Table-2: Causes of conversion.

Causes of conversion	Frequency	Percent
Cystic artery bleeding	2	0.44
Liver bed bleed/clot	1	0.22
Cholecystoduodenal fistula	1	0.22
Adhesions/difficult anatomy	1	0.22
Cystic duct avulsion	1	0.22
CHD injury	1	0.22
Total	7	1.55

establishing pneumoperitoneum.

For LC, 3 port technique was used in 379 (84.2%) patients and 4th port was used optionally in 66 (14.7%) cases. Single incision laparoscopic cholecystectomy was performed in

conversion to open surgery included bleeding from avulsion of cystic artery (n=2), difficulty in controlling oozing of blood from liver bed (n=1), cholecystoduodenal fistula (n=1), adhesions/difficult anatomy at Calot's triangle

(n=1), cystic duct avulsion (n=1) and common hepatic duct injury (n=1). Out of these 7 conversions, 5 occurred during the learning curve of initial 100 cases (conversion rate 5 %) while in next 350 cases only 2 conversions were required (conversion rate 0.57). Mean hospital stay was 1.18 ± 0 .99 days (range 1-20 days). One patient died on 3rd post-operative day due to myocardial infarction (mortality rate 0.2%).

DISCUSSION

Laparoscopic cholecystectomy is a common procedure and currently is estimated that more than 90% of cholecystectomies are performed by laparoscopic approach. After the first endoscopic cholecystectomy performed by Mühe of Böblingen, Germany, in 1985, and first LC in North America on June 22, 1988 by J. Barry McKernan the LC has rapidly become the new standard therapy for gallstone disease throughout the world[11]. In 1992, the National Institutes of Health (NIH) Consensus Development Conference concluded that that LC "provides a safe and effective treatment for most patients with symptomatic gallstones"[12]. With advances in laparoscopic surgery and experience of surgeons conversion rates are decreasing day by day. A comparison of conversion rates of large series of LC is given in table-1. Several risk factors are identified for conversion of LC to OC which are divided into surgeon-specific factors, patient and disease-specific factors and equipment failure. Surgeon specific factors include training, experience, skills and judgment of surgeon while patient and disease-related factors include male gender, obesity, old age (>65), prior abdominal surgery, acute cholecystitis, choledocholithiasis, anomalous anatomy and dense adhesions. Elective conversion is preferable to enforced conversion because of serious iatrogenic injuries. The conversion rate to OC remains approximately 5–30% in most series.

In our study the mean age was 44.5 + 13.6 years (range 9-82). Daradkeh reported mean age of 47.2 years[13], whereas Shamim et al 41.25 ± 12 years[14]. Ibrahim et al[15] and Brodsky et al[16] had identified age> 60 years as a significant risk factor for conversions. In contrast all conversion in our study occurred in patients below 60 years of age.

In this study all conversions were seen in female patients which is in contrast to other studies. Shamim et al[14] reported 16.45% conversion rate in males vs 5.09% in females. Brodsky et al[16] , and Al Salamah[17] also found male gender as a most significant determinant for conversion to OC. LC is a safe procedure in patients with acute cholecystitis, however, the rate of conversion remains higher when compared with patients having chronic cholecystitis[15]. The reported conversion rates for acute cholecystitis range from 12% to 37.5%[7-9]. However, conversion rate further increases up to 40% for acute gangrenous cholecystitis[18]. In our study, the conversion rate for acute cholecystitis was 2.25% vs. 0.95% for chronic cholecystitis. The main risk factor associated with conversion was failure to identify the Calot's triangle in most of the studies. In order to reduce conversion rates in acute cholecystitis now laparoscopic surgeons are drifting towards partial laparoscopic cholecystectomy[19] or laparoscopic tube cholecystostomy followed by an interval laparoscopic cholecystectomy[20] instead of conversion to OC. Wallace et al[21] has introduced a policy of no conversion at all. In his study he performed 161 LC safely without conversion to open except in one case of carcinoma gall bladder.

Surgeon related factors like training, experience, skill and judgment greatly influence the outcomes of LC. Leu et al[22] have shown conversion rate of up to 17% during initial learning curve which decreased to 4% when surgical experience reached to 400-500 cases. In our study conversion rate was 5 % during learning curve which decreased to 0.57 % with experience of the surgeon.

CONCLUSION

LC should be accepted as the gold standard management for all forms of gall stone disease and with experience the complication and conversion rate is very low. Our conversion rate is far lesser than most reported in national and international literature.

CONFLICT OF INTEREST

The authors of this study reported no conflict of interest.

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