ORIGINAL ARTICLE

LAPAROSCOPIC CHOLECYSTECTOMY: EXPERIENCE AT A TERTIARY LEVEL HOSPITAL

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Background: Cholecystectomy is the most frequently performed abdominal operation and currently laparoscopic cholecystectomy (LC) is considered gold standard being performed in 90% cases of symptomatic gallstones in USA since 1992. The aim of the study was to determine results obtained with LC at our setup. **Methods**: This observational case series study was conducted in department of General Surgery, Combined Military Hospital, Rawalpindi, from August 2009 to August 2011. The study participants were patients of both gender aged 14–75 years undergoing LC. Surgery was performed by consultant as well as resident surgeon. Demographic variables, intraoperative findings, mean operation time, hospital stay, conversion rate, morbidity and mortality were evaluated. Factors influencing rate of conversion were also studied. **Results:** A total of 504 patients were included. Mean age was 42.64 years (range 14–75 years) with a female: male ratio of 3.9:1.2. Comorbidities were found in 36.7% patients. Main indication of surgery was symptomatic cholelithiasis (78.57%). Mean operative time was 40.1±6.9 minutes which increased to 75.12±8.9 minutes in converted cases (*p*-value .000). Mean hospital stay was 1.89±1.1 days that significantly increased in converted cases (5.7±1.6 days) (*p*-value .000). Major surgical complications occurred in 3.17% patients. Common bile duct injury (CBDI) was found in 04 cases (0.79%). Conversion to laparotomy was required in 3.97% cases. Factors that influenced the rate of conversion included: age>60 years, acute cholecystitis, coexisting diseases, ASA grade III/IV and inexperienced surgeon (*p*-value .000). Total complication rate was 3.56%, morbidity being 3.17% and mortality 0.39%.**Conclusion:** Laparoscopic cholecystectomy offers shorter hospital stay and low morbidity/ mortality. The operative time is short and procedure is standard, safe and effective method both for uncomplicated and complicated cholelithiasis.

Keywords: Laproscopic, cholecystectomy, safety, complications, conversion, morbidity, mortality

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INTRODUCTION

Gallstone disease has a great impact on a surgeon's daily routine. Currently the prevalence rate of cholecystolithiasis varies from 10–15% in western countries and 3–4% in Asian populations.[1,2] The annual risk of developing complications requiring surgery is estimated to be 1–2% draining tremendous amount of hospital resources.[3] About 1 million new cases of the disease are diagnosed annually in USA and approximately 60,000 operations are performed every year.[4]

After initial experience of Muhe[5], Phillip Mouret performed first LC in 1987 in Europe.[6] National institute of Health consensus elected LC as the "gold standard" treatment for cholelithiasis in 1992 and since then LC has replaced open cholecystectomy (OC) as standard operation for symptomatic gallstone disease.[7] As the prevalence of the disease has increased, the number of patients undergoing LC has increased proportionally.[8] LC is a safe, effective procedure with well-known and definitive advantages over OC in 85% of the patients given the growing experience of surgeons worldwide, improving learning curve and ever changing technological advances in video laparoscopic interventions.[9]

There is overwhelming evidence that LC offers patients less pain, shorter hospital stay, minimal scarring and lower rate of morbidity and mortality (morbidity LC 4.8% vs. OC 18.7% $p<0.0001$ &mortality LC 2.8% vs. OC 4% $p<0.0001$).[10, 11] Sir Alfred Cusheri cheered first step in LC as beginning of new exciting era but rightly alerted surgeons to be cautious in order to avoid substantial morbidity.[12] Indeed LC has not only changed horizons of gallstone disease management but also changed the spectrum of complications.[13] Biliary morbidity is almost 3 times higher with LC.[14] The aim of the study was to determine results obtained with LC at our setup.

MATERIAL AND METHODS

It was an observational case series study upholding 504 patients of both genders who underwent LC in CMH Rawalpindi from August 2009 to August 2011. Parameters like demographic variables, indication of LC, co-morbidities, associated extra biliary disease, pre-operative ultrasonography

(USG) or Endoscopic retrograde cholangiopancreatography (ERCP), surgical complications and rate and cause of conversion were noted on a structured pro forma from patients charts. All patients were admitted a day before surgery. Gall bladder disease was confirmed through history, physical examination, laboratory tests and USG. Choledocholithiasis was treated with pre-operative ERCP and sphincterotomy/stenting while gallstone pancreatitis was also treated with LC in the same admission after settlement of acute pancreatitis.

In all cases, surgical procedure was carried out under general anaesthesia. North American technique (with surgeon on the left of the patient and assistant on the right and patient inclined 30° degree to the left in anti-Tredenlenberg position) was followed. A Nasogastric (NG) tube was placed at the beginning of the procedure if deemed necessary. Second generation cephalosporin was administered at the time of induction. CO2 pneumo-peritoneum was created using Hassan's technique (pressure at 12–14 mmHg).[15] Visiport method was employed in patients with previous abdominal surgery. A 0° degree laparoscope introduced through infra-umbilical trocar (No. 1) and 3 operative trocar inserted in the epigastrium 12 mm (No. 2), right quadrant mid clavicular line 5 mm (No. 3) and anterior axillary line (No. 4) under video guidance.

A grasper forceps (reusable) was inserted through trocar No. 4 to grasp and withdraw gall bladder fundus towards right axilla. Second grasper (reusable) was introduced through trocar No. 3 to apply gentle rightward/lateral traction on infundibulum improving the exposure of calot's triangle. The CVS technique[16–18] was applied for dissection well above Ruvies sulcus using harmonic scalpel as energy source that coupled 3 effects acting synergistically: coagulation, cutting and cavitation.[19,20] Cystic duct and artery were secured separately using metallic clips. Large cystic duct was negotiated with Vicryl 1/0 using extracorporeal knot technique.[21,22] Fundus first technique was utilized in 04 cases based on clinical judgment.

The dissection of the gall bladder was done systematically with the help of ultrasonically activated harmonic scalpel. In case of liver bleed not amenable to harmonic scalpel, surgicel® was placed. The specimen was extracted through epigastric port (No. 2) utilizing various methods. Drainage was performed in cases of gall bladder perforation, bleed, acute cholecystitis and difficult dissection. Intra operative cholangiography (IOC) was not routinely performed although facilities were available.

Data were analysed using SPSS-16. Descriptive statistics were used for calculating the arithmetic mean and standard deviation (SD) of continous variables. Percentage and absolute frequency were used for categorical variables. A *p*-value<0.05 was taken as significant.

RESULTS

We performed 504 laparoscopic cholecystectomies. Mean age at presentation was 42.64 (range 14–75 years) with female: male ratio of 3.9:1.2. Co-morbidities were present in 36.7% of the patients. Symptomatic cholelithiasis was main indication (78.57%) followed by acute cholecystitis (15.48%). Average body mass index (BMI) of the patient was 28.23 (range 19–41). Seven patients (1.39%) were found to have other diseases during laparoscopic cholecystectomy (Table-1).

All patients underwent pre-operative USG (Table-3) while ERCP was performed in 10 patients (therapeutic splitting to treat CBD stones) and another 15 had CECT scan.

Mean operation time was 40.1±6.9 minutes which increased to 75.12±8.9 minutes in converted cases (*p*-value .000). Harmonic scalpel was used as energy source in majority of the cases (80.15%) and CVS technique followed in all. Twenty four patients underwent concomitant procedures along with laparoscopic procedure (Table-2).

Mean hospital stay was 1.89±1.1 days while in converted cases it was 5.7±1.6 days (*p*-value .000). Major surgical complications occurred in 16 patients (3.17%). Five patients were re-operated while rests were managed conservatively. CBDI was found in 4 cases (0.79%) three of which were diagnosed intra-operatively while one presented many months later with obstructive jaundice. Bile leakage occurred in 2 cases which were managed successfully with ERCP and stenting. Two patients died one with acute myocardial infarction and other with biliary peritonitis (mortality rate 0.4%) (Table-4).

Twenty (3.97%) patients required conversion to laparotomy with female: male ratio 1.1: 0.9. Conversion resulted in an average operation time of 75.12±8.9 minutes (*p*-value .000) and average hospital stay of 5.7±1.6 days (*p*-value .000) (Table-5). Factors which influenced conversion included age >60 years, acute cholecystitis, co-existing diseases, ASA III/IV status and inexperienced surgeon. Causes of conversion are shown in Table-6.

Table-1: Demographic data of the patients

Serial No	Frequency	Percentage
Demographic variables		
Female: Male ratio	3.9:1.2	
Mean age (yrs)	42.64 (14–75)	
Concomitant disease		
Diabetes Mellitus	75	14.88
Hypertension	90	17.86
Ischemic heart disease	20	3.97
Respiratory disease	10	1.98
Surgeon		
Consultant	350	69.44
Resident	154	30.56
Associated extra biliary disease		
Para umbilical hernia	10	1.98
Liver cirrhosis	40	7.94
Surgical indication		
Symptomatic cholelithiasis	396	78.57
Acute cholecystitis	78	15.48
Choledocholithiasis	10	1.98
Pancreatitis	15	2.98
Other (gall bladder polyp)	5	0.99
Body Mass Index (BMI)	28.23 (19–41)	
ASA status		
I/II	450	89.28
III/IV	54	10.71
Diagnostic Work up		
Ultrasonography	504	100
CECT scan	15	2.98
ERCP	10	1.98
Incidental diagnosis		
Mass stomach	1	0.19
Peritoneal tuberculosis	2	0.4
Mass gall bladder	2	0.4
Mass portahepatis	2	0.4

Table-2: Intra-operative findings

Serial No	No	%
Surgical anatomy		
Multiple stone	234	46.42
Single stone	42	8.33
Bulging Hartmann's pouch	138	27.38
Dilated cystic duct	27	5.36
Acute cholecystitis	80	15.87
Contracted gall bladder	14	2.78
Sludge	24	4.76
Mucocoele	6	1.19
Empyema	4	0.79
Adhesions		
Gall bladder (fundus, body, Hartmann's pouch)	361	71.63
Calot's triangle	207	41.07
Anterior abdominal wall	6	1.19
Omentum/stomach	11	2.18
Bile leakage	79	15.67
Stone spillage	24	4.76
Mirrizi's syndrome	5	0.99
Gall gladder polyp	5	0.99
Instrument utilized		
Harmonic scalpel	404	80.16
Electrocautry	100	19.84
Technique		
CVS	500	99.2
Fundus first	4	0.8
Combined procedure		
Hepatic biopsy	13	2.57
Peritoneal biopsy	7	1.39
Umbilical hernia repair	4	0.8
Mean operation time	40.1±6.9 min	
Drainage	190	37.7

Table-3: USG findings of the patients who underwent Laparoscopic Cholecystectomy over a period of 2 years

USG Findings	No	Frequency
Multiple stones	328	65.07%
Single stone	54	10.71%
Acute cholecystitis	78	15.48%
Polyp gallbladder	5	0.99%
Dilated CBD	10	1.98%
Thickened/contracted gall bladder	19	3.77%
Distended gall bladder	3	0.59%
Sludge	7	1.39%

Table-4: Post-operative data of 504 patients who underwent laparoscopic cholecystectomy over a period of 2 years

Serial No	No	Results
Mean hospital stay		
LC	484	1.89±1.1 days
Converted cases	20	5.7±1.3 days(*p*-value.000)
Complications		
AMI	1	0.2%
Hemoperitoneum	3	0.59%
Bile leakage/coleperitoneum	2	0.4%
Intestinal obstruction/ perforation	1	0.2%
Intra-abdominal abscess	2	0.4%
CBDI	4	0.79%
Port site bleed	1	0.2%
Post-operative jaundice	1	0.2%
Vascular injury to liver bed	3	0.59%
Reoperation	5	0.99%
Total morbidity/mortality		
Morbidity	16	3.17%
Mortality	2	0.4%
Conversion	20	3.97%

Table-5: Comparison of demographic variables among patients, converted while undergoing laparoscopic cholecystectomy

Characteristics	LC	OC	*p*-value
Demographic variables			
Total	484	20	
Female: male ratio	3.7:1.1	1.1:0.9	
Mean age (Yrs)	42.64 (14–75)	60 (55–70)	.000
Surgical indications			
Symptomatic gallstones	392	4	
Acute cholecystitis	65	13	
Biliary pancreatitis	12	3	.000
Co morbid			
Hypertension	82	8	
Diabetes mellitus	66	9	
Pancreatitis	12	3	
Choledocholithiasis	7	3	
Previous surgery	3	4	.000
ASA status			
I/II	448	2	
III/IV	36	18	.000
First operator			
Consultant	345	5	
Resident	139	15	.000
Mean operation time	40.1±6.9 min	75.12±8.9 min	.000
Mean hospital stay	1.89±1.1 days	5.7±1.6 days	.000

Table-6: Causes of conversion for laparoscopic cholecystectomy of 504 patients who underwent LC over a period of two years.

Causes	No	Percentage
Difficult anatomy		
Adhesions	6	30
Large fixed gall bladder	3	15
Doubtful anatomy	2	10
Bleed		
Cystic duct avulsion	1	5
Liver bleed	1	5
Mirrizi's s syndrome	5	25
Perforated gall bladder	2	10

DISCUSSION

LC is gold standard procedure for the management of symptomatic cholelithiasis which has rapidly replaced OC all around the world.[7] LC is safe as well as effective procedure with definitive well known advantages over OC in >85% of the patients considering the growing experience of surgeons worldwide, improved learning curve and tremendous advances in video laparoscopic technology.[9] Although juvenile, LC has progressively replaced OC in Pakistan surpassing major advances since its inception in this part of the world.

In this work, average surgical time of 42 minutes is considerably less when compared to most recent publications.[23–25] The value tends to decrease with experience, team work evolution and systemization of the procedure.[26] Reducing operative time decreases surgical trauma and anaesthetic drug use leading to less post-operative complications. Nevertheless, one should avoid hasty manoeuvres to prevent iatrogenic injuries. Mean hospital stay of 1.89±1 days is also comparable to statistics quoted worldwide.[24,27] Procedure was performed in the majority with the help of harmonic scalpel taking advantage of its three prong effects acting synergistically.[19,20] Although various techniques like infundibular[28], visual cholangiography[29] and dome down/ fundus first techniques[30] are in practice for dissection of the calot's triangle, we followed CVS technique[16–18,31] in all patients at our institute.

Rate of major surgical complications in our series was 3.17% comparable to other authors in literature.[26,32] One the most feared complication remains CBDI and an incidence of 0.2–1% is quoted worldwide.[33,34] In our study, rate of CBDI was 0.79% (total 4 cases). Three of them identified intra operatively (two managed with Roux-N-Y hepaticojejunostomy and one with suture repair over t tube) while one patient presented late with common hepatic duct stricture that was successfully managed with ERCP and stenting. A conversion rate of 3.97% was observed that is close to lower limit of the incidence quoted in literature (2–26.5%).[35–38]

Conversion should not be considered as a failure or complication rather it is a mean of preventing dreadful injuries.[39,40] Features associated with conversion included: age >60 years, acute cholecystitis, co morbidities, previous ERCP, lack of experience and ASA status III/IV. These factors confer to studies conducted worldwide.[39,41] Conversion leads to significant morbidity increasing mean operative time as well as mean hospital stay (*p*-value .000 in our series) which is also comparable to data present in literature.[35–38]

Morbidity was 3.17% and when added to mortality (0.39%), the frequency of complications was 3.56%. This was considerably lower than figures reported by several authors.[40,41] The vast majority of perioperative and post-operative complications were managed successfully. Mortality of LC was relatively low in our series (literature reports a mortality between 0–2%).[24,40,41] Taking preoperative measures is of utmost importance to prevent morbidity and mortality.

CONCLUSION

LC is safe, cost effective procedure with well-known definitive advantages over OC. It offers patients less pain, shorter hospital stay, minimal scarring and lower morbidity/mortality when performed cautiously in experienced hands. Anticipating risk factors and taking appropriate pre/ perioperative measures is of utmost importance to not only prevent grave complications but also pivotal in clinical decision making and counselling of the patients.

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