

Laparoscopic Cholecystectomy in Jos: Prospects and Perspectives

Abstract

Laparoscopic cholecystectomy is now done in a lot more private and public hospital settings presently in low-income countries, particularly sub-Saharan Africa. Though it is not routinely done in these centres, the percentage of cholecystectomies done laparoscopically has increased over the years. Laparoscopic surgery services were introduced at our hospital in 2011 and this retrospective study reviews our outcomes with the procedure over a 6-year period. A total of 87 cholecystectomies were done in the period under review. Forty-eight (55.2%) were laparoscopic cholecystectomies, 30 (44.8%) were open cholecystectomies, and 9 (10.3%) were mini-laparotomy cholecystectomies. There were 32 (66.7%) women and 16 (33.3%) men who had laparoscopic cholecystectomy giving a male-to-female ratio of 1:2. The mean age of the patients was 41.0 years (SD = 14.3 years). The most common indication for laparoscopic cholecystectomy was calculous cholecystitis. The most common co-morbidity was hypertension in 23 (47.9%) patients, followed by sickle cell anaemia in 10 (20.8%) patients. The operating time ranged from 70 min to 120 min with a mean of 86.6 (SD = 14.5). There were three conversions and two intra-operative complications. Twenty-five patients (52.1%) were discharged within 24h, 16 (33.3%) within 48h and the rest (14.6%) were discharged later. The duration of surgery had a significant association with duration of hospital stay. There was 1 mortality in our study. Laparoscopic cholecystectomy offers unique advantages over open such as decreased length of hospital stay and reduced wound complications. Most of the cholecystectomies in our setting are now performed laparoscopically with a low conversion rate and low incidence of bile duct injuries. Patients with sickle cell disease constitute a significant percentage of patients requiring this procedure.

Keywords: Cholecystectomy, complications, laparoscopic

Introduction

Laparoscopic cholecystectomy has replaced open cholecystectomy as the gold standard for the treatment of symptomatic gall stones.^[1-4] Its proven advantages of short hospital stay, rapid return to full activity, minimal operative trauma, less post operative analgesia requirement and better cosmesis has resulted in its popularity amongst surgeons worldwide.^[5,6] In the early years of its use, there was an unacceptable high incidence of bile duct injury which reduced with growing experience all over the world.^[7-9]

Though laparoscopic cholecystectomy has been a routine procedure in high income countries for over three decades, there has been a rather slow introduction in low-income countries, particularly sub-Saharan Africa.^[10,11] Numerous authors have highlighted the challenges of performing

this technologically driven procedure in low-income countries to include; high cost of setting up and maintaining the tower, expensive training cost for personnel and shortage of consumable items.^[12]

In Nigeria, the practice has slowly evolved compared to north and south African countries.^[10,13] Several authors in Nigeria have confirmed that when performed by skilled personnel, the procedure is safe with a low morbidity profile.^[12,13] Laparoscopic cholecystectomy is now done in a lot more private and public centres presently. The percentage of cholecystectomies performed laparoscopically in these centres has increased over the years and over 50% of all cholecystectomies are now performed laparoscopically.^[13] However, many centres in Nigeria still offer only open cholecystectomy.^[10,13]

Laparoscopic surgery services were introduced at our Hospital in 2011 and majority of cholecystectomies are now done

**Alexander Femi Ale,
Solomon D. Peter,
Bashiru O. Ismaila,
Michael A. Misauno**

*Department of Surgery, Jos
University Teaching Hospital,
Jos, Plateau State, Nigeria*

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Address for correspondence:
Dr. Alexander Femi Ale,
Department of Surgery, Jos
University Teaching Hospital,
Jos, Plateau State 930241,
Nigeria.
E-mail: falexale@yahoo.com

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laparoscopically. We present our experience with this procedure over a 6-year period.

Subjects and Methods

This is a retrospective study of patients who had laparoscopic cholecystectomy over a 6-year period, from July 2016 to July 2022 at our hospital. The study was approved by the Research and Ethics committee of the hospital. Data was obtained from the surgical theatre procedure register and medical records department of the hospital. The exclusion criterion was any patient who underwent any other laparoscopic procedure at the same sitting as this was likely to affect the duration of surgery and other perioperative parameters being analysed. The patients were counselled on the procedure and the possibility of a conversion discussed with each patient, after which an informed consent was obtained. Each patient had perioperative prophylactic antibiotics consisting of one gram of Ceftriaxone and 500mg of Metronidazole. A Nasogastric tube was passed in all cases and removed at the end of the operation. The American technique using four ports was employed for all patients under general anaesthesia. Pneumoperitoneum was achieved using the open technique via the umbilical port. The second 10mm port is inserted under direct vision in the midline in the epigastrium. Two 5mm ports are also introduced, one in the right mid-clavicular line and the other in the right mid-axillary line. The Calot's triangle is displayed by traction on the gall bladder fundus and the Hartmann's pouch. The Calot's triangle is then carefully dissected and the isolated cystic duct and artery are clipped after a critical view of safety is achieved. The gall bladder is then dissected from its bed using a diathermy hook and then extracted through the umbilical port without retrieval bags. All operations were performed by the same set of surgeons who had been trained for the procedure. Data of all patients were captured and analysed using the SPSS version 23 (IBM Corp 2015. IBM SPSS Statistics for Windows, Version 23.0. IBM Corp, Armonk, NY). Categorical data were expressed in frequency and percentages while age and duration of surgery were expressed in mean and standard deviation after fulfilling the assumptions of normality. However, duration of symptoms demonstrated skewness with a *P* value of less than 0.05 on application of Kolmogorov–Smirnov test, hence median and interquartile range were used as its summary indices.

The study was focused on patient demographics, indications for surgery, duration of symptoms, American society of anesthesiologists (ASA) physical status, duration of surgery, length of hospital stay and intra and post op complications.

Results

Of a total of 87 cholecystectomies in the period under review, 48 (55.2%) were laparoscopic cholecystectomies, 30 (44.8%) were open cholecystectomies and nine (10.3%) were mini laparotomy cholecystectomies. One patient who had another laparoscopic procedure at the same sitting as

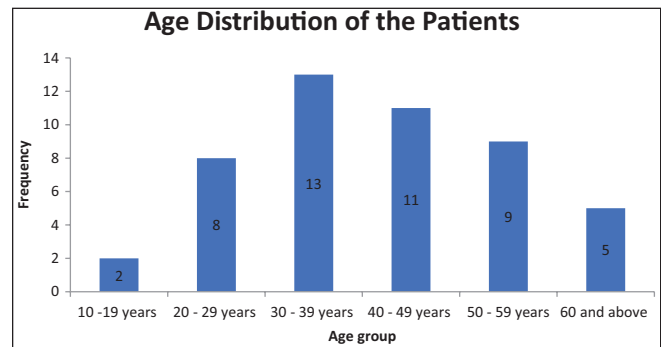


Figure 1: Age distribution by decade

laparoscopic cholecystectomy was excluded. There were 32 (66.7%) women and 16 (33.3%) men who had laparoscopic cholecystectomy giving a male-to-female ratio of 1:2. The mean age of the patients was 41.0 years (SD = 14.3 years). The ages ranged from 12 years to 70 years. The peak decade of presentation was the fourth decade. Figure 1 shows the age distribution of the patients. The median duration of symptoms was 4 months with an interquartile range of 1–12 months. The co-morbidities, ASA class and indication for surgery are as shown in Table 1. The most common indication for laparoscopic cholecystectomy was calculous cholecystitis. This diagnosis of calculous cholecystitis was made in patients who complained of pain in the presence of right hypochondrial tenderness on examination and an ultrasound confirmation of gall stones. A diagnosis of symptomatic gall stones was made if there was no tenderness on examination and the patient only complained of pain. None of the patients had asymptomatic gall stones. The most common co-morbidity was hypertension in 23 (47.9%) patients, followed by sickle cell anaemia in 10 (20.8%) patients. Most of the patients were classified as ASA 2. The operating time ranged from 70min to 120min with a mean of 86.6 (SD = 14.5). Table 2 shows the outcomes of the procedure. There were three conversions to open cholecystectomy. Two were due to dense adhesions in the Calot's triangle and the third was due to uncontrollable bleeding from the cystic artery. There were two intra-operative complications, one was bleeding from the cystic artery which resulted in a conversion to open and the other was a common bile duct laceration which was noted post operatively when the patient presented with biliary peritonitis. The patient with the common bile duct injury had a laparotomy and choledochojunostomy on the 5th post op day and was discharged on postop day 14. Twenty-five patients (52.1%) were discharged within 24h, 16 (33.3%) within 48h and the rest (14.6%) were discharged later. For analysis of duration of hospital stay, patients were categorised into two groups: those who were discharged within 24h and those discharged after 24h. When we compared the means of both groups in relation to duration of surgery using the independent *t*-test, there was statistical significance as shown in Table 3 and therefore duration of surgery had a significant association with duration of hospital stay. There was however no statistically significant

Table 1: Demographic and clinical parameters of the patients

Characteristics	Frequency	Percentage
Sex		
Female	32	66.7
Male	16	33.3
Total	48	100
ASA status		
1	4	8.3
2	40	83.3
3	4	8.3
Total	48	100
Diagnosis		
Acute calculous cholecystitis	7	14.6
Calculous cholecystitis	21	43.8
Empyema of the gall bladder	2	4.2
Gall bladder polyp	3	6.3
Symptomatic gall stone	15	31.3
Total	48	100
Comorbidity		
Present	36	75
Absent	12	25
Total	48	100
Type of comorbidity		
Epilepsy	1	2.1
Hypertension	16	33.3
Hypertension and chronic kidney disease	1	2.1
Hypertension and diabetes mellitus	5	10.4
Retroviral disease	1	2.1
Retroviral disease & hypertension	1	2.1
Retroviral disease & diabetes mellitus	10	2.1
Sickle cell disease	36	20.8
Total		100

relationship between duration of symptoms and duration of surgery as shown in Table 4. There was one mortality in our study which was a patient with sickle cell disease who died within 24h of surgery from a sickle cell disease crisis. There was no wound related complication or other morbidity.

Discussion

The percentage of cholecystectomies done laparoscopically has continued to increase in facilities where this service is available because of its obvious advantages. In our study, laparoscopic cholecystectomy accounted for 55.2% of all cholecystectomies done in the period under review. This is similar to reports from centres in Nigeria which show that over half of cholecystectomies are now done laparoscopically.^[13] However, reports from the US show that over 90% of cholecystectomies are done laparoscopically.^[14,15] The lower percentage in our centre and other centres in Nigeria could be attributed to the fact that laparoscopic surgery is expensive, the expertise is not readily available in every centre and even when expertise is available, there is lack of functional equipment and instruments. Additionally

Table 2: Perioperative outcomes

Characteristics	Frequency	Percentage
Complications		
Present	2	4.2
Absent	46	95.8
Total	48	100
Type of complications		
Bile duct injury	1	50
Bleeding from cystic artery	1	50
Total	2	100
Conversion to open surgery		
No	45	93.8
Yes	3	6.3
Total	48	100
Indication for conversion		
Dense adhesions in Calot's triangle	2	75
Bleeding from cystic artery	1	25
Total	3	100
Duration of post operative stay		
24 h	25	52.1
48 h	16	33.3
>48 h	6	12.5
	Mean ± SD	
Age	41.0 ± 14.3 years	
Duration of surgery	86.6 ± 14.5 Minutes	
Duration of symptoms	Median (IQR) 4 (1–12) months	

SD: standard deviation, IQR: interquartile range

in our centre, we do not offer laparoscopic surgery for patients who require common bile duct exploration due to lack of equipment.

The volume of cases over the study period was low, similar to reports from other centres in Africa.^[10,13] This contrasts with findings in Europe, North and South America and Asia which show higher number of cases per time. This may be reflective of the relative rarity of gall stones in the African population.

Majority (66.7%) of the patients were women which is in tandem with other studies around the world and reflects the higher incidence of gall bladder diseases in women.^[16,17] Our male-to-female ratio of 1:2 is however low compared to these reports. This may be due to the larger proportion of male sickle cell disease patients in our study.

The mean age of patients in our study was similar to findings in studies from within and outside Nigeria.^[15,18,19] The fourth decade being the most common decade of presentation in our study resonates with these studies.

Calculous cholecystitis was the most common indication for laparoscopic cholecystectomy in our study which is similar to many studies;^[14] however, in some studies the presence of symptomatic gall stones was the most common indication.^[15,20]

Table 3: Mean duration of surgery by duration of hospital stay

Parameter	Mean ± SD	Mean difference	95% conf int	t test	P-value
Duration of hospital stay					
<24 h	83.8 ± 13.6	16.02	-1.89 to 30.15	2.285	0.027
>24 h	99.9 ± 31.9				

Table 4: Mean duration of surgery by duration of symptoms

Parameter	Mean ± SD	Mean difference	95% conf int	t test	P-value
Duration of symptoms					
≤4 months	83.8 ± 13.6	4.95	3.64	1.163	0.251
5 months and above	88.8 ± 14.5				

We had an unusually high comorbidity rate of 75% which was higher than that reported from studies in Nigeria and other parts of the world.^[13,15] This is partly as a result of the high percentage of sickle cell disease patients (20.8%) in our study. Patients with sickle cell disease, due to chronic haemolysis are predisposed to formation of black pigment stones and this genetic disease is prevalent in the Asian and African sub region. In our study, hypertension was the most common comorbidity (47.9%) and is one of the most common comorbidities associated with gall stones in many studies.^[13,20] A study showed diabetes mellitus to be also quite common.^[20]

Laparoscopic cholecystectomy is associated with a steep learning curve and it has been shown that the mean duration of surgery decreases as the surgical team becomes more proficient. The operating time in our study ranged from 70 min to 120 min with a mean of 86.6 min which is comparable to that reported by Ayandipo *et al.*^[13] but longer than that reported by Sajid *et al.*^[15] Our mean duration of operation however decreased in the second half of the study as we gained experience with the procedure.

We had a conversion rate of 6.3% which is within the reported conversion rates from high volume centres of between 4% and 7%^[21] and conversion rates tend to be generally higher when surgery is done on patients with acute cholecystitis.^[22,23] The reasons for the conversions are listed in Table 2. The foremost reason for conversion in our study was dense adhesions in the Calot's triangle which resulted in a distorted anatomy and precluded further safe dissection laparoscopically. Dense adhesions are a common reason for conversion^[18,24,25] and could result from prior upper abdominal surgeries or repeated episodes of cholecystitis which was the case in our study. Bleeding is one of the frequent complications during laparoscopic cholecystectomy and a common reason for conversion. Clinically significant bleeding occurs in 0.5% of laparoscopic cholecystectomies.^[11] Factors contributing to operative site bleeding include inadequate exposure, acute inflammation, portal hypertension, adhesions, coagulopathy and rough technique. The origin of the bleeding is diverse but most commonly includes the cystic artery and minor accessory

vessels of the gall bladder fossa. Sometimes the origin is not immediately apparent and a conversion to open is inevitable. In our series, the origin of the bleeding from the cystic artery was not immediately apparent and could not be controlled necessitating a conversion.

Bile duct injuries during laparoscopic cholecystectomies range from 0.5% to 1.4% and are a potential life-threatening complication of the procedure.^[26] Studies have shown bile duct injuries to be relatively higher in laparoscopic cholecystectomies than in open and in the past was the initial hesitation to performing the technique.^[27] Bile duct injuries could be recognised intraoperatively or suspected post operatively when the patients present with biliary peritonitis, a biloma or bile leakage if a drain was placed. The diagnosis can be confirmed with an endoscopic retrograde cholangiopancreatography and treated via a sphincterotomy or managed via an open procedure during which a repair or biliary-enteric anastomosis is done. Our single incidence of bile duct injury was suspected post operatively when the patient presented with peritonitis and an abdominal ultrasound revealed increased intraabdominal fluid. A subsequent ultrasound-guided aspiration revealed bile-stained fluid and the diagnosis of a common bile duct injury was made at laparotomy.

Wound complications are generally less in laparoscopic cholecystectomy compared to open and include wound sepsis, dehiscence and late incisional hernia. Wound infection at the umbilical port site may be more common when the gall bladder is removed without retrieval bags.^[11] There was no wound-related complication in our study.

The short hospital stay together with rapid recovery associated with laparoscopic surgery is one of the attractions to this technique. This is particularly important in low-income countries with limited bed space. The average hospital stay in our study was 1.96 day and most patients were discharged within 24 h. This is comparable to a study from Pakistan^[17] and more recently laparoscopic cholecystectomy is being performed as an outpatient procedure.^[28] There was an association between duration of surgery and duration of hospital stay, with the duration of hospital stay increasing beyond 24 h as the duration of surgery increased. This may be not be unconnected with the fact that prolonged surgery

is usually associated with extensive tissue dissection and delayed recovery.

Despite our limitations, our outcomes with laparoscopic cholecystectomy are comparable to results from high volume centres.

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Conflicts of interest

There are no conflicts of interest.

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