OUTCOME OF LAPAROSCOPIC CHOLECYSTECTOMY PERFORMED BY SURGICAL RESIDENTS

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ABSTRACT

Objective: To evaluate the laparoscopic cholecystectomy (LC) performed by surgical residents in terms of frequency of bleeding, biliary injury and mean operating time.

Study Design: Descriptive study.

Place and Duration of Study: This study was conducted at the Department of General Surgery, Shaheed Zulfiqar Ali Bhutto Medical University (SZABMU), Pakistan Institute of Medical Sciences (PIMS) Islamabad, from Jan 2015 to Jun 2017.

Methodology: All laparoscopic cholecystectomies performed by fourth year resident were included by consecutive sampling. Variables like bleeding, biliary injuries, and total operating time were observed. Data was collected on a pre-designed proforma. SPSS version 22 was used for data entry and analysis.

Results: A total of 150 patients were included with mean age of 42.66 ± 12.27 years. There were 38 (25.33%) males and 112 (74.67%) females. During surgery, bleeding was noted in eight cases (5.3%) and cystic duct injury in one patient (0.66%). Seven patients (4.6%) had biliary collection postoperatively. The mean operative time was 40.52 ± 6.97 minutes. There was insignificant difference among all age groups for bleeding, biliary injury and mean operative time i.e. $p>0.05$. Similarly there was no significant difference between both genders for any complication and mean operative time i.e. $p>0.05$.

Conclusion: Laparoscopic cholecystectomy is a safe surgical procedure done by senior surgical residents and they can perform laparoscopic surgery with satisfactory results.

Keywords: Bile duct injury, Cholelithiasis, Laparoscopic cholecystectomy, Surgical resident.

INTRODUCTION

Laparoscopic surgery has become the established reality of the world and laparoscopic cholecystectomy (LC) has become one of the most common procedures performed by general surgeons worldwide[1].

Surgical trainees are one of the vital clinical force and their training is one of the basic factors in achieving good outcomes[2]. This fact highlights the importance of Laparoscopic surgery training of future surgeons; the surgical trainees. Laparoscopic surgical procedures are technically more difficult than open surgery and have long learning curve[3].

Therefore training of residents in laparoscopic surgery early in their training period is of vital importance. Laparoscopic surgery training has been incorporated in training programs around the globe and especially in developed countries. In America, Fundamentals of Laparoscopic Surgery certification course is mandatory for surgical residents and residents participate very early in hands-on training in laparoscopic surgery[4]. Literature review has shown that incorporation of Laparoscopic training in residency program is safe, but available data in South Asia is scarce[5].

Complications in the hands of surgical residents are reported in literatures such as bleeding (10.5%) and biliary injury (13%)[6]. Several studies showed total operating time in the hands of trainees as 57 minutes (range 33-97 min)[7,8]. Specific outcomes of LC performed by residents are not properly studied in our local context.

The aim of our study is to evaluate the outcomes of LC performed by surgical residents, so that feasibility and safety of laparoscopic cholecy-

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stectomy in hands of surgical trainees can be assessed and competency level can be enhanced by working under supervision of an experienced laparoscopic surgeon so that after residency, resident surgeon can be beneficial for the community in periphery at district level. The objective of the study is to evaluate the LC performed by surgical residents in terms of frequency of bleeding, biliary injury and mean operating time.

METHODOLOGY

This descriptive study of 150 patients was done at department of General Surgery, SZABMU, PIMS Islamabad, from January 2015 to June 2017, after taking approval from hospital ethics committee. All adult patients in American Society of Anesthesiologists (ASA) classification Grade 1 & Grade 2 with cholelithiasis who underwent LC by general surgery residents were included in the study. Patients with co-morbid like Diabetes Mellitus, Hypertension, acute pancreatitis, acute cholecystitis, Ischaemic heart disease and bleeding dis-orders were excluded. With informed and written consent, patients who meet the inclusion criteria were included. Laparoscopic cholecystectomy was done in all patients by fourth year surgical residents. Variables like bleeding, biliary injuries, and total operating time were calculated and observed. All the data was entered in a pre-designed proforma. Bias was controlled by exclusion criteria and brief counseling of the patients.

For data entry and evaluation, SPSS version 22 was used. Mean and standard deviation was calculated for numerical data such as age, total operating time and frequencies were be calculated for categorical data such as gender, bleeding and biliary injuries. Confounders like age of resident, gender of resident were controlled by stratification. Post stratification chi-square test was applied for qualitative variables and student t-test for quantitative variables. A *p*-values ≤0.05 was considered significant.

RESULTS

A total of 150 patients were studied after selection by inclusion criteria. There were 38 (25.33%) males and 112 (74.67%) females; with male to female ratio being 1:2.95. The most common symptom was pain in right upper quadrant (RUQ) which was observed in 119 patients (79%). The demographic findings of the patients are shown in table-I.

There was no conversion to open cholecystectomy. Eight patients (5.3%) had bleeding peroperatively, two (1.33%) had bleeding from cystic artery that was clipped successfully while remaining 6 patients (4%) had bleeding from the liver bed which was managed by diathermy, pressure by gauze or placing surgicel. Othereight patients (5.3%) had biliary injury, one patient (0.66%) had cystic duct injury managed by clipping peroperatively, while 7 (4.6%) had postoperative biliary collection. Three were managed conservatively by keeping the drain until it stopped, three were managed by ultrasound guided aspiration and one by open drainage. The mean operative time of all cases was 40.52 ± 6.97 minutes. Minimum

Table-I: Demographic findings of patients.

Parameters	Mean values, n (%)	Range
Age	42.66 ± 12.27	25-70
Gender	38 males/112 females	
Symptoms		
Pain RUQ	119 (79%)	
Flatulence/Indigestion	45 (30%)	
Nausea/vomiting	41 (27.33%)	
H/O acute cholecystitis	38 (25.33%)	
H/O acute pancreatitis	15 (10%)	
Clinical Examination		
Normal	67 (44.66%)	
Tenderness RUQ	52 (34.66%)	

Table-II: Per-operative and postoperative complications.

	n	%
Per-operative		
Bleeding	08	5.3
Cystic duct injury	01	0.66
Postoperative		
Nausea vomiting	21	14
Biliary collection	07	4.6
Wound infection	12	08

time was 25 minutes while maximum time was 69 minutes (table-II).

Regarding age of the residents, 75 cases were operated by two age groups of surgical residents each of 30 and 31 years. In both groups, total 8 (5.3%) patients developed bleeding (4 cases in each group), which was highly insignificant difference (*p*-value=0.753). In 75 cases, who underwent surgery by resident of age 30 years, 6 (8%) patients had biliary injury while out of 75 cases, who underwent surgery by residents of age 31 years, 2 (2.7%) had biliary injury after surgery. That was again insignificant difference (*p*-value= 0.753).

The mean operative time required by the resident of age 30 years was 41.49 ± 6.03 minutes to complete the surgery, while the mean operative time required by the resident of age 31 years was 39.55 ± 7.72 minutes. There was insignificant difference found between both residents for operative time required to complete the surgery i.e., *p*-value=0.5.

Table-III: Difference found between both residents for operating time required to complete the surgery.

Age of Residents	Operating Time		
	n	Mean ± SD	
30	75	41.49 ± 6.03	t-test = 1.721
31	75	39.55 ± 7.72	*p*-value = 0.087

DISCUSSION

In patients with symptomatic cholelithiasis, laparoscopic cholecystectomy is the "gold standard" procedure[9]. It is now one of the most commonly performed procedures by general surgeons[10]. Training and the surgical team's experience are fundamental to the safety and success of complex surgical procedures, such as laparoscopic common bile duct exploration[2]. The implementation of laparoscopic cholecystectomy in Pakistan has been erratic and unregulated, with approximately one-third of surgeons being fully self-educated[11]. There is a risk of discrediting laparoscopic surgery if adequate steps are not taken to reassure the public[1,12].

The mean age of patients in this study was 42.66 ± 12.27 years (age range 25-70 years) which was consistent with another local study that reported 42.34 ± 12.13[13]. However Pariani *et al* and Jung *et al* reported the mean age of patients as 55 ± 12 and 53.8 ± 11.5 years respectively[14,15]. The possible reason is that worldwide there is increasing trend of the patients showing symptoms of gallbladder disease are younger than they ever were before[16]. Patients presented with cholelithiasis in Pakistan are younger as compared to the western world[17,18]. The male to female ratio was 1:2.95 in this study. Almost similar findings were documented in another study[13].

Complications reported in this study were consistent with other studies. Overall complication rate by surgical residents was 2.3% as reported by Jung *et al*[15] while Al-Najafi *et al* has reported a little higher than found in our study like bleeding in 10.5% cases, biliary injuries in 13% cases of laparoscopic cholecystectomy with mean operating time of 40 minutes[6].

The reported incidence varies from 0.04% to 0.5% of all laparoscopies[19,20]. Bleeding has been recorded in various series with an incidence of up to almost 10%[21]. Crolla *et al* reported that the bleeding occurred in 8% when surgery was performed by senior surgeon while surgeries done by the resident surgeon had bleeding in 21% which was much higher than ours[22]. Koulas *et al* reported that there were 0.67% cases who developed postoperative bleeding while none of the patients developed biliary injury[7]. In our study, we didn't had any case of postoperative bleeding, all patients with per-operative bleeding were managed accordingly.

In our study, the mean operative time of all cases was 40.52 ± 6.97 minutes (range 25-69 minutes). These results were comparable with results of various previous studies i.e. Al-Najafi reported the mean operating time of 40 minutes[6]. Memon *et al* also reported the mean operating time as 45 minutes for laparoscopic cholecystectomy performed by resident surgeons[23]. Koulas *et al* showed the mean operative time required by

trainees was 57 minutes (33-97)[7], while Souadka A from Morroco reported 77 ± 35 minutes for final year residents[24].

We stratified data in different age groups and it was observed that among 96 patients of age 25-45 years, 4 (4.2%) had bleeding and 5 (5.2%) patients had biliary injury; among 49 patients of age 46-65 years, 4 (8.1%) patients had bleeding and 3 (6.1%) patients had biliary injury while in groups of age >65 years, no patient developed bleeding or got biliary injury. But there was insignificant difference among all age groups for bleeding and biliary injury i.e. $p>0.05$.

Among different stratified age groups, it was observed that in cases of age 25-45 years, the mean duration of surgery was 40.07 ± 6.04 minutes, in patients of age 46-65 years, the mean duration of surgery was 41.47 ± 8.68 minutes and in patients of age >65 years, the mean duration of surgery was 39.80 ± 4.87 minutes. The difference was insignificant among all age groups for mean duration of surgery i.e. $p>0.05$.

We stratified data in two gender groups and it was observed that among 38 males, 2 (5.3%) patients developed bleeding and 1 (2.6%) patient had biliary injury while among 112 females, 6 (5.4%) patient developed bleeding and 7 (6.25%) patients had biliary injury. But there was insignificant difference between both genders for bleeding and biliary injury i.e. $p>0.05$. The mean duration required to operate male cases was 41.21 ± 7.60minutes while the mean duration of surgery required to operate female cases was 40.29 ± 6.76 minutes. The difference was insignificant between both genders for mean duration of surgery i.e. $p>0.05$.

In 75 cases, who underwent surgery by resident of age 30 years, 4 (5.3%) patients developed bleeding and 6 (8%) patients got biliary injury while out of 75 cases, who underwent surgery by resident of age 31 years, 4 (5.3%) cases developed bleeding and 2 (2.7%) cases got biliary injury after surgery. There was insignificant difference found between both residents for bleeding or biliary injury i.e. $p>0.05$. The mean operative time required by the resident of age 30 years was 41.49 ± 6.03 minutes to complete the surgery, while the mean operative time required by the resident of age 31 years was 39.55 ± 7.72 minutes to complete the surgery. There was insignificant difference found between both residents for operative time required to complete the surgery $p>0.05$. This helped in developing a conclusion that a 4th year resident is able to perform laparoscopic cholecystectomy confidently and independently as the chances of bleeding, biliary injury are low and he will take similar operative time as time duration required by a senior surgeon to perform laparoscopic surgery. Another study supported this argument that provided adequate training, supervision and patient selection, surgical residents are able to perform LC with results comparable to those of experienced surgeons[25].

For the acquisition of laparoscopic skills, a well-designed learning curve is essential: but there are certain risk factors that can influence surgical methods. Current learning curve literature in laparoscopic surgery established several learning curve components in video laparoscopic cholecystectomy that can measure the progress of general resident surgery as they learn and master LC measures regardless of patient type[25]. These components are establishment of pneumoperitoneom, insertion of trocars, lysis of adherences, dissection of Callot's triangle, clipping & cutting of cystic duct & artery, intraoperative cholangiography, retrieval of gall bladder and closure of wounds. Hence it is recommended that training of laparoscopic skills acquisition by videos and simulators should be incorporated in our training programmes for general surgery residents.

CONCLUSION

Laparoscopic surgery is a safe surgical procedure which can be done by 4th year residents of surgery and in future they can perform laparoscopic cholecystectomy safely.

CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

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