IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 18, Issue 2 Ser. 1 (February. 2019), PP 34-50
www.iosrjournals.org

A Comparative Study of Laparoscopic Cholecystectomy in The Elderly And Young

Dr. Piyushkumar Agrawal[1], Dr.Angela B. Marak[2], Dr. Digbijoy Krishna Debbarma[3],Dr. Sreejith V[4], Dr. ResenRajan S Methikkalam[5],Dr. Y. Priyabarta Singh[6], Prof. S Ranita[7], ProfG. S. Moirangthem[8]

1-senior resident , department of general surgery,2-Assistant professor, department of general surgery, 3,4,5-junior resident, department of general surgery, 6- Assistant professor, department of radio diagnosis,7,8-professor, department of general surgery
Regional Institute of Medical Sciences, Imphal, Manipur
Corresponding Author: Dr. Angela B Marak.

Abstract:
Introduction: *Cholelithiasis is one of the most common diseases which requires surgical intervention and is frequently seen in females of both younger and elderly age group. As age increases, repeated attacks of cholecystitis can result in adhesions and chronic inflammatory changes in gall bladder. Laparoscopic cholecystectomy is the gold standard operation of the gall stone disease irrespective of age and is supported by many studies. Laparoscopic cholecystectomy causes less pain after surgery, shorter hospital stay, faster return to work and lower metabolic endocrine immune response to trauma. This procedure has been the gold standard for the last two decades in the general population. It has also demonstrated results superior to open cholecystectomy in elderly patients with symptomatic cholelithiasis in terms of morbidity and hospital stay. The goal of treatment for elderly is to provide them with best possible quality of life with the lowest physiological cost. Several retrospective studies have shown that most elderly patients undergoing laparoscopic cholecystectomy do well, but when compared with younger patients, the elderly have higher rates of conversion to open cholecystectomy, somewhat longer postoperative stays and more complications. Therefore, this study has been conducted to compare the outcome of laparoscopic cholecystectomy in the elderly and young patients.*
Materials and methods: *After obtaining the approval from the research ethics board of the institute, this observational (cross-sectional) study was conducted from October 2015 to September 2017. All 120 patients included underwent laparoscopic cholecystectomy after going through a thorough clinical, radiological and laboratory investigations to confirm the disease process. 120 patients were divided into two groups with 60 in each group, group I with age 20-50years and group II with age of 50-80 years. Chi square test and Fischers exact test were employed in the study.*
Results: *This study shows that laparoscopic cholecystectomy can be performed in any age group. It can also be performed safely in the elderly patients, although the operative time is slightly longer in view of relatively higher incidence of adhesions in and around the Calots triangle. Operative difficulty, rate of conversion, hospital stay and postoperative short term outcome are not influenced by the age of the patient.*
Conclusion: *Laparoscopic cholecystectomy should be considered and encouraged for any age group of patients with symptomatic cholelithiasis who are medically fit. Perioperative outcomes and rate of conversion to open cholecystectomy are not influenced by age and co morbidity but are influenced by the disease process itself, the anatomy of the Calots triangle and experience of the operating laparoscopic surgeon.*
Keywords: *Laparoscopic cholecystectomy, cholelithiasis, elderly, octogenarian.*

Date of Submission: 20-01-2019 Date of acceptance: 04-02-2019

I. Introduction

Cholecystectomy is one of the most common surgical procedure performed in the United States with over 600,000 procedures performed each year. In 1985, the first endoscopic cholecystectomy was performed by Eric Muhe of Boblingen, Germany. Since then laparoscopic cholecystectomy has been adopted around the world, and subsequently been recognized as the gold standard treatment for the gall stone disease.[1] The advantages of laparoscopic cholecystectomy (LC) over open cholecystectomy (OC) include earlier return of bowel function, less postoperative pain, improved cosmesis, shorter length of hospital stay, earlier return to full activity, and decreased overall cost.[2,]Patients with asymptomatic gallstones have less than 20% chance of ever developing symptoms, and the risks associated with prophylactic operation outweigh the potential benefit of surgery in most patients.[4] Prophylactic cholecystectomy for asymptomatic patients can be justified in certain circumstances, such as in patients with sickle cell disease, those undergoing open bariatric surgery, requiring long term total parenteral nutrition, or patients who are therapeutically immunosuppressed after solid organ transplantation. Patients with sickle cell disease often have hepatic or vaso-occlusive crisis that can be difficult to differentiate from acute cholecystitis.[5] Absolute contraindications to laparoscopic cholecystectomy include the inability to tolerate general anesthesia or laparotomy, refractory coagulopathy, diffuse peritonitis with hemodynamic compromise, cholangitis, and potentially curable gallbladder cancer. Pregnancy is a controversial relative contraindication to laparoscopic cholecystectomy but still it can be performed safely during pregnancy, but only with great care.[6] The most complications related to procedure are hemorrhage, bile duct injury, bile leaks, retained stones, pancreatitis, wound infections, and incisional hernias. Other potential complications are pneumoperitoneum related (gas embolism, vagal reaction, ventricular arrhythmias, or hypercarbia and acidosis) and trocar related (injuries to the abdominal wall, intra-abdominal organ or major blood vessels. Of all the potential complications, biliary injuries have received the most attention. A major bile duct injury of 0.20% in open cholecystectomy whereas 0.40% is reported in laparoscopic cholecystectomy.[7] Anatomic variability is common in the biliary tree and methods to reduce the incidence of bile duct injury includes routine cholangiography, identifying the boundaries of Calot's triangle (the boundaries of hepatocystic triangle of Calot's are cystic duct, cystic artery, and the common hepatic duct), and identifying the critical view of safety. To stay on the gall bladder while performing cholecystectomy is the most effective way to avoid injury to either the common bile duct (CBD) or right hepatic artery. If this is not easily accomplished due to acute cholecystitis or other abnormalities, consideration should be given to converting to an OC. Late conversion is often associated with bile duct injuries. The demonstration of potentially resectable carcinoma gallbladder (Ca GB) also dictates an open exploration.

Longer life expectancy together with a higher incidence of gallbladder stones (38%-53% in 80 years and older[8,9]) increasing in conjunction with increasing age has resulted in a greater number of elderly patients being operated for symptomatic gallbladder stones.[10] Elderly age group has a high incidence of complicated gallstone disease such as, acute cholecystitis, choledocholithiasis, and gallstone pancreatitis.[11] Limited functional reserves and the presence of associated chronic co morbidities increases the operative morbidity and mortality of these patients. Advanced age may be associated with increased postoperative complications and higher conversion rates.[12] Nowadays, the first choice of treatment for the removal of gallbladder in elderly patients is laparoscopic cholecystectomy, especially before the development of complications like acute cholecystitis or the formation of dense adhesion from chronic cholecystitis[13] but the safety of this procedure in old patients is still questioned in certain studies.[14,15,16] However, as life expectancy continues to increase, octogenarians are becoming a growing proportion of the population undergoing laparoscopic cholecystectomy. Therefore, the purpose of this study is to evaluate the outcomes of LC in elderly and younger patients.

II. Materials and Methods

- After obtaining the approval from the institutional ethics committee and written informed consent from all the participants, the observational (cross-sectional) study was undertaken for a period of two years from October 2015 to September 2017. All 120 patients who underwent laparoscopic cholecystectomy were divided into two groups. Group l with the age 20-50 years and groupll with age 50-80 years.

Inclusion Criteria:

Chronic cholecystitis

Symptomatic cholelithiasis
Asymptomatic cholelithiasis (Patient's wish)
Incidental cholecystectomy in patients undergoing procedures for other indications.

Exclusion Criteria:
Acute cholecystitis
Gall bladder cancer
Multiple abdominal surgeries
Obstructive jaundice
Dilated common bile duct
Acute pancreatitis
Multiple comorbidity
Common bile duct stones/ mass or patients requiring intraoperative cholangiogram / common bile duct exploration
Patients below ageof 20 years or more than 80 years will be excluded from the study.

Study variables:

Perioperative clinical characteristics:
Gender (male, female)
Age (20 to 80 years)
Comorbidity (diabetes, hypertension, cardiopulmonary disease, HBV, HCV, HIV)
Prior abdominal surgery
ASA score
USG findings (status of gall bladder disease)

Perioperative Outcome:
Intraoperative time in minutes
Conversion rate into open cholecystectomy
Intraoperative bleeding
Intraoperative bile leak
Intraoperative gall bladder perforation
Postoperative hospital stay in days
Complicated gall bladder disease

Factors responsible for conversion of laparoscopic cholecystectomy to open cholecystectomy:
Abnormal anatomy
Intraoperative bleeding
Adhesions due to prior surgery
Suspicion of cancer
Bile duct injury

Study tools:

Olympus VISERA ELITE Laparoscopic System Video Processor OTV-S190 system works at voltage of 100-240 V AC and frequency of 50/60 Hz, delivers vivid and true color reproduction, image noise reduction and improving image quality.

UHI-4 high flow insufflation unit with maximum flow rate of 45l per minute of carbon dioxide. OEV 262H is a 26" LCD monitor with full HD display, FLIP function (such as mirror and 180-degree rotation) and advanced image multiple enhancer.

Laparoscopic instruments consist of: a zero-degree laparoscope, working instruments, two 10 mm trocars, two 5 mm trocars, a veress needle, a suction instrument, a reducer, monopolar hook, bipolar diathermy forceps, Maryland dissecting forceps, graspers and GB aspirator and thunder beat.
10 mm telescope with mechanical compatibility to current generations of camera heads and light guide cables by Olympus.

Camera control unit with high quality image processing.
Xenon light source with 300W xenon lamp, automatic light control and narrow band image compatibility.
Camera head with improved ergonomic design.
LCD monitor with higher contrast.

Outcome measures:
Distribution of cholelithiasis in different age groups.
Association of gallstone disease with gender.
USG features of cholelithiasis in two groups studied.
Association of comorbidity with perioperative outcomes.
Rate of conversion of laparoscopic cholecystectomy to open cholecystectomy.
Distribution of intraoperative (IO) time in two groups.
Association of IO findings and postoperative complications.
Number of days in hospital stay.

Study group:120 patient who underwent laparoscopic cholecystectomy were divided into two groups: group l with age 20- 50 years and groupllwith age 50-80 years.

Control group: There was no control in this study.

Method of recruitment: Descriptive data were collected for the age, sex, etc. in the form of mean & SD and proportion & percentage during preoperative checkup. Operative time, bleeding episode, etc. were recorded during intraoperative and duration of hospital stay, postoperative wound infection, etc. were noted in postoperative periods. P value of <0.05 was taken as a significant.

Procedure: The study included all patients except those with conditions mentioned in the exclusion list. All the cases underwent a thorough clinical, laboratory investigations and radiological evaluation. These patients were divided into 2 groups on the basis of their age. Group I included patients of age 20-50 years whereas group II of age 50-80 years. Differences in the age group (group I and II) with respect to clinical characteristics such as age, gender, co morbidity or disease presentation, mean operative time, conversion rate, and the incidence of major postoperative complications were studied. The diagnosis of gallbladder disease was based on a combination of clinical, laboratory, and radiological findings. The most common imaging technique in use was ultrasonography. The diagnosis was further confirmed during surgical inspection and histopathology of gall bladder specimen. Patients were followed postoperatively for any complications arising thereof.
SPSS version 18 was used for data analysis.

Surgical Technique

In our setup we have used Olympus laparoscopic instruments and surgical devices for all the cases. The classical four port technique which includes- creation of pneumoperitoneum using carbon dioxide gas by direct trocar technique via sub umbilical/ supra umbilical region. A 10mm 0-degree laparoscope was inserted through the sub umbilical region as the first port site and peritoneal cavity inspected and the findings were noted then under direct vision two additional 5 mm ports were placed in right anterior axillary line between 12^{th} rib and iliac crest and in right subcostal area in mid clavicular line. The fourth working port was placed in midline of epigastrium below the xiphoid process. Pneumoperitoneum of 14 mm of Hg was kept in all the cases and was reduced in special cases if suggested by anesthetist. GB was retracted by using grasping forceps towards the right axilla and then calot's triangle was dissected and critical view of safety was identified with only two structures seen entering the Gall bladder. After confirming the position of CBD cystic artery was clipped and divided. Cystic duct was reconfirmed before clipping with elephant trunk like appearance of cystic duct with the GB and then clipped with 3 titanium clips of small and medium sizes depending on the size of cystic duct. GB was then dissected by using hook with monopolar cautery from the liver. Any bile/ blood spillage was thoroughly washed with saline and hemostasis was secured all the time. GB was removed from the epigastric port in all the cases and in some cases GB was opened extra peritoneally to remove calculi in order to make GB

removal easy. Any bleeding was adequately controlled by using monopolar/ bipolar electrocautery devices, like thunder beat or by using surgicel. In doubtful situations with suspicion of bile duct injury a Ryle's tube drain was kept in Morrison's pouch and follow up. Sub diaphragmatic spaces and pelvic cavity were inspected for any residual fluid collection and thorough suction was done. All the port site was reinspected with laparoscope after removal of trocars and gas was turned off. Port sites were sutured withsutures in 2 layers at umbilical and subxiphoid sites while in single layer at other sites. Postoperatively patients were given oxygen inhalation through facemask for 2 hours. Patients were mobilized on the same day by evening and allowed oral liquids on the same day of operation. Post operative day two patients were discharged in most of the cases and advised to follow up in opd after 1 week with histopathological report.


Critical view of safety (only two structure seen entering the gall bladder)

Statistical Analysis:

At the end of the study the data collected from the study were tabularized and analyzed accordingly. Descriptive and inferential statistical analysis has been carried out in the present study. Results on continuous measurements are presented on mean ± SD (min-max) and results on categorical measurements are presented in number (%). Significance is assessed at 5 % level of significance. The following assumptions on data was made.

Assumptions:

1.Dependent variables should be normally distributed.

2.Samples drawn from the population should be random, and cases of the samples should be independent. Student t test (two tailed, independent) has been used to find the significance of study parameters on continuous scale between two groups (inter group analysis) on metric parameters.

Chi-square/ fisher exact test has been used to find the significance of study parameters on categorical scale between two or more groups, Non-parametric setting for qualitative data analysis. Fisher exact test used when cell samples are very small.

Significant figures

+ Suggestive significance (P value: $0.05<P<0.10$)

* Moderately significant (P value: $0.01<P \leq 0.05$)

** Strongly significant (P value: $P \leq 0.01$)

The Statistical software namely SPSS 18.0, and R environment ver.3.2.2 were used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables etc**.**

III. Results and Observations

Table 1: Age distribution of patients studied

Age in years	Group I	Group II	Total
20-30	24(40%)	0(0%)	24(20%)
31-40	17(28.3%)	0(0%)	17(14.2%)
41-50	19(31.7%)	0(0%)	18(15%)
51-60	0(0.0%)	36(60%)	37(30.8%)
61-70	0(0%)	20(33.3%)	20(16.7%)
71-80	0(0%)	4(6.7%)	4(3.3%)
Total	60(100%)	60(100%)	120(100%)
Mean ± SD	34.27±9.60	60.15±6.57	47.21±15.36

P<0.001**, Significant, Student t test

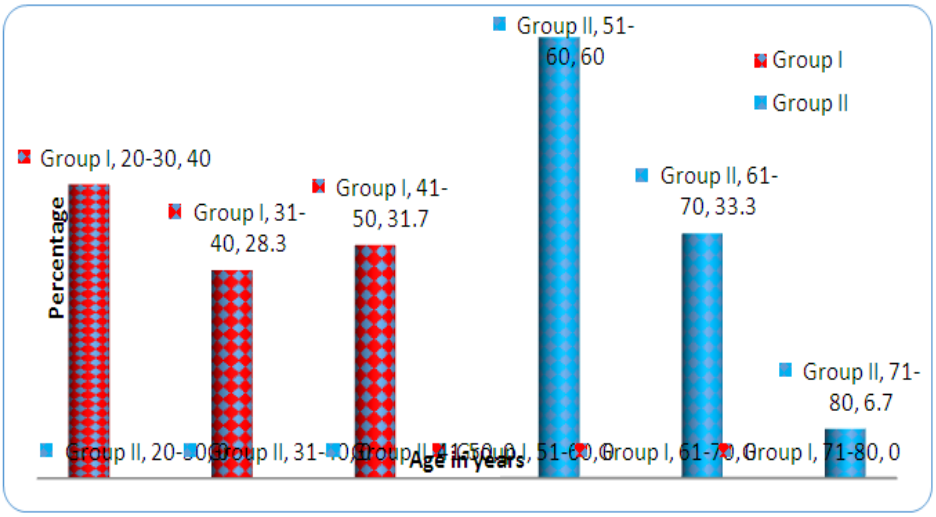

Figure 1: Age distribution of patients studied

Table 1 and Figure 1 shows age distribution of patients studied. In group I mean age of the patients was 34 and in group II 60 years and this finding is statistically significant in our study.

Table 2: Gender distribution of patients studied

Gender	Group I	Group II	Total
Female	51(85%)	57(95%)	108(90%)
Male	9(15%)	3(5%)	12(10%)
Total	60(100%)	60(100%)	120(100%)

P=0.068+, significant, chi-square test

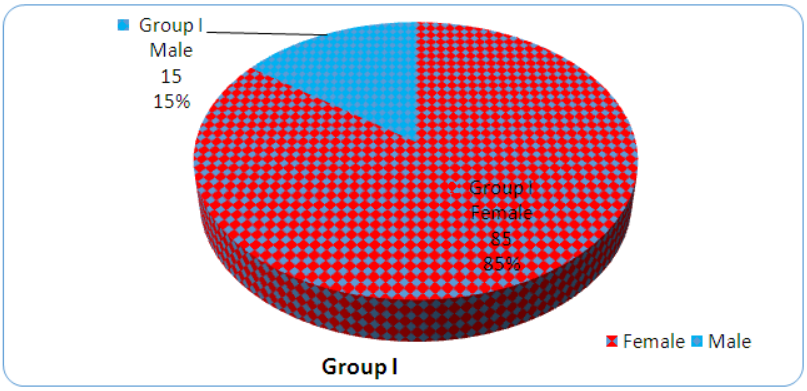

Figure 2.1: Gender distribution of patients studied in group I

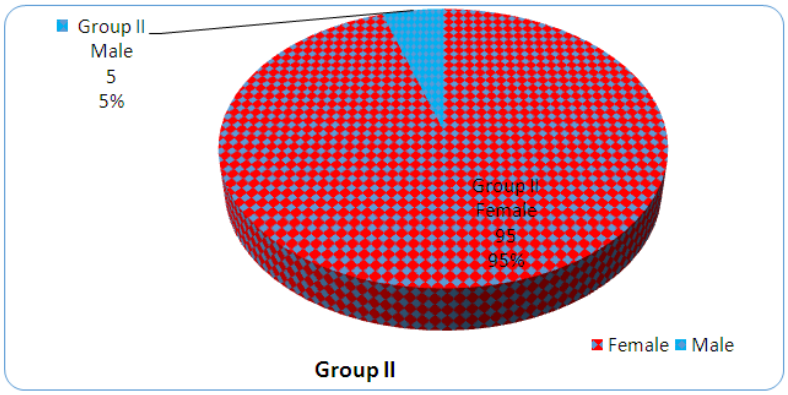

Figure 2.2: Gender distribution of patients studied in group II

Table 2 and Figure 2.1 % 2.2 shows gender distribution in this study. Majority of the patients were female i.e. 90% while only 10% patients were male. This reflects the incidence of gall stone disease which is seen more commonly in females.

Table 3: Gall stone disease (USG finding) distribution in two groups of patient studied

Complicated GB	Group I	Group II	Total
No	50(83.3%)	54(90%)	104(86.7%)
Yes	10(16.7%)	6(10%)	16(13.3%)
Total	60(100%)	60(100%)	120(100%)

P=0.283, Not significant, chi-square test

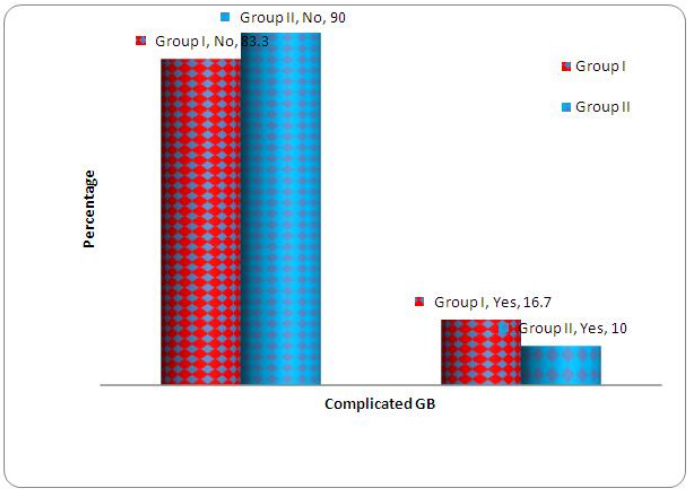

Figure 3: Gall stone disease (USG finding) distribution in two groups of patient studied

Table 3 and Figure 3 shows distribution of gall stone disease in both group. In our study we had complicated GB disease in total of 16 patients and was more common in younger patients 16.7 % in group I than 10% in group II and this finding was not significant.

Table 4: Comorbidity distribution in two groups of patients studied

Comorbidity	Group I (n=60)	Group II (n=60)	Total (n=120)
No	57(95%)	47(78.3%)	104(86.7%)
Yes	3(5%)	13(21.7%)	16(13.3%)
● DM	1(1.7%)	4(6.7%)	5(4.2%)
● HTN	0(0%)	4(6.7%)	4(3.3%)
● Cardiopulmonary	0(0%)	4(6.7%)	4(3.3%)
● Goiter	0(0%)	1(1.7%)	1(0.8%)
● HBV	1(1.7%)	0(0%)	1(0.8%)

• HIV on ART	1(1.7%)	0(0%)	1(0.8%)

P=0.007**, significant, chi-square test

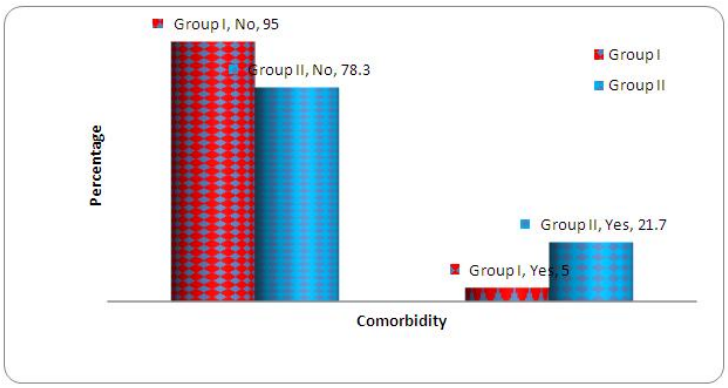

Figure 4: Comorbidity distribution in two groups of patients studied

Table 4 and Figure 4 shows distribution of comorbidity in both groups. In our study elderly patients had more number of comorbidity (21.7%) than younger age groups (5%) which was statistically significant. In group II 4 patient had DM, hypertension and cardiopulmonary diseases each. One patient in group I had HIV and was on ART while one patient had HBV infection, universal precaution was taken intraoperatively in these two cases. One patient in group II had asymptomatic goiter.

Table 5: ASA score distribution in two groups of patients studied

ASA score	Group I	Group II	Total
0	3(5%)	0(0%)	3(2.5%)
1	53(88.3%)	14(23.3%)	67(55.8%)
2	4(6.7%)	41(68.3%)	45(37.5%)
3	0(0%)	5(8.3%)	5(4.2%)
Total	60(100%)	60(100%)	120(100%)

P<0.001**, significant, fisher exact test

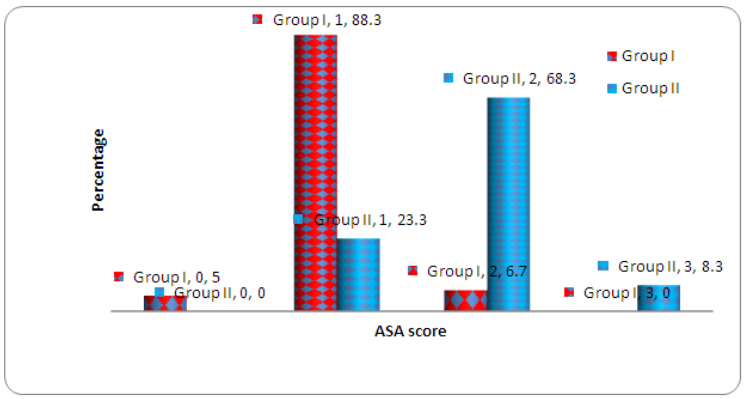

Figure 5: ASA score distribution in two groups of patients studied

Table 5 and Figure 5 shows distribution of ASA score. In our study majority of the patients (88.3%) in younger age group had ASA score of 1 while in elderly age (group II) 68.3% of the patients had ASA score of 2 and this finding is statistically significant. Thus, elderly patients were the ones who benefitted more from laparoscopic surgery.

Table 6: Surgery distribution in two groups of patients studied

Surgery	Group I	Group II	Total
LC	60(100%)	59(98.3%)	119(99.2%)
LC to Open	0(0%)	1(1.7%)	1(0.8%)
Total	60(100%)	60(100%)	120(100%)

P=0.315, Not significant, Fisher Exact test

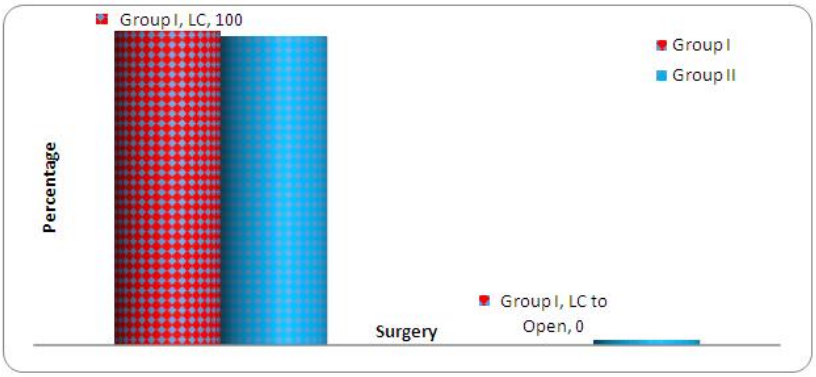

Figure 6: Surgery distribution in two groups of patients studied

Table 6 and Figure 6 shows distribution of surgical procedure performed in both the groups. Only one patient i.e. 1.7% in group II required conversion to open surgery, none of the patient in group I needed conversion. Rate of conversion in our study is statistically not significant in both the groups.

Table 7: IO time (minutes) distribution in two groups of patients studied

IO time (minutes)	Group I	Group II	Total
<20	7(11.7%)	0(0%)	7(5.8%)
20-40	44(73.3%)	47(78.3%)	91(75.8%)
>40	9(15%)	13(21.7%)	22(18.3%)
Total	60(100%)	60(100%)	120(100%)

P=0.020*, significant, Fisher Exact test

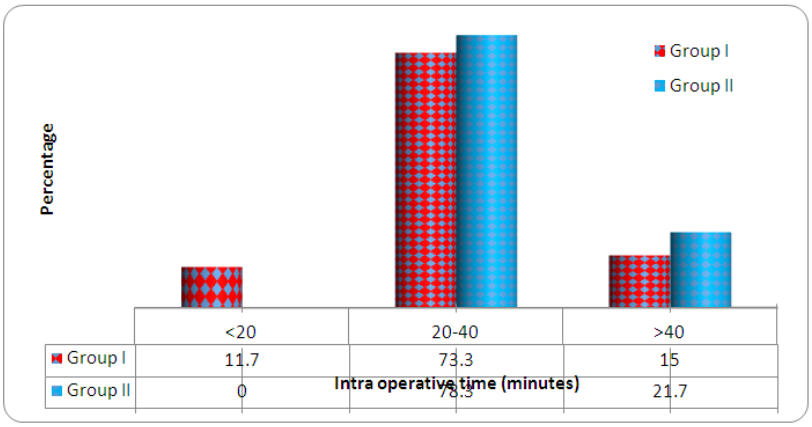

Figure 7: IO time (minutes) distribution in two groups of patients studied

Table 7 and Figure 7 compares operative time in minutes both the groups. In our study majority of the cases IO time was less than 40 minutes due to surgeries being done by a single experienced laparoscopic surgeon. In group I total 85% of the patient surgery was completed within 40 minutes while in group II 78.3% of the cases took less than 40 minutes and this finding is statistically significant.

Table 8: IO finding distribution in two groups of patients studied

IO finding	Group I	Group II	Total
Calot's- 1 not clear	4(6.6%)	8(24.3%)	12(10.0%)
2 clear	44(73.3%)	33(55%)	77(64.2%)
3 adhesions	2(3.3%)	9(15%)	11(9.2%)
Contracted GB	2(3.3%)	1(1.7%)	3(2.4%)
Mirizzi type I	2(3.3%)	1(1.7%)	3(2.4%)
Anterior Right hepatic artery	2(3.3%)	1(1.7%)	3(2.4%)
Difficult pneumoperitoneum	1(1.7%)	1(1.7%)	2(1.7%)
Short cystic duct	2(3.3%)	1(1.7%)	3(2.4%)
Intrahepatic GB	1(1.7%)	5(8.3%)	6(5%)
Total	60(100%)	60(100%)	120(100%)

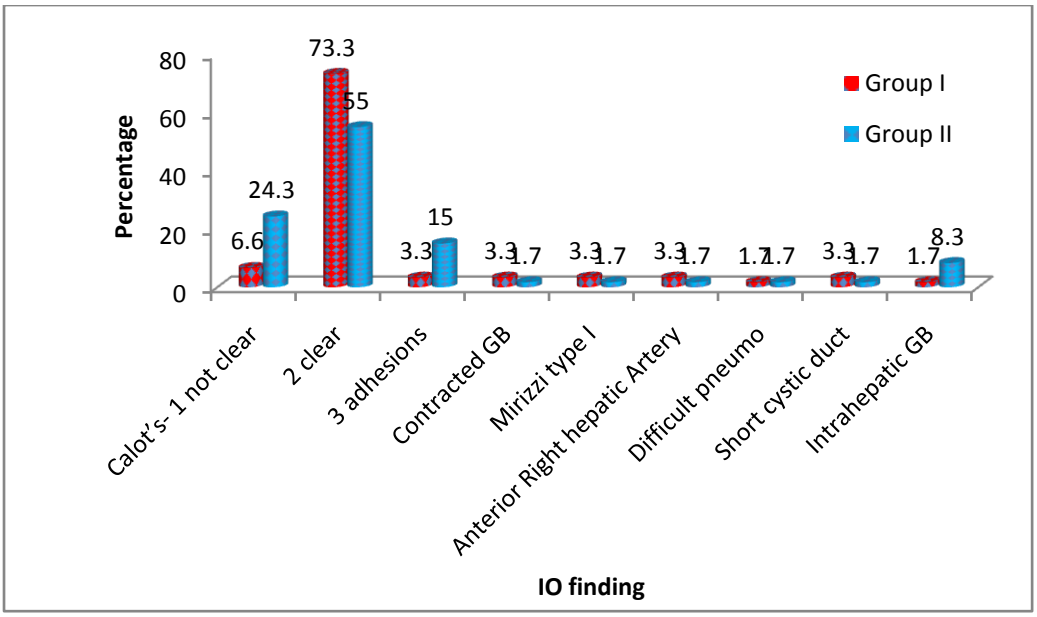

Figure 8: IO finding distribution in two groups of patients studied

Table 8 and Figure 8 shows distribution of intraoperative findings in two groups studied. We encountered 64.2% of the patient with clear anatomy at calot's triangle while in 10% of the cases it was not clear and 9.2% had adhesions at calot's triangle. In 3 patients (2 in group I and 1 in group II) GB was chronically inflamed and contracted while in 1 patient in group I and 5 patients in group II it was intrahepatic. We encountered 3 patients with type I Mirizzi syndrome and 3 patients with short cystic duct. In 2 patients in group I and in 1 patient in group II we found anterior right hepatic artery and pneumoperitoneum was difficult in 1case in each group.

Table 9: Aberrant anatomy distribution in two groups of patients studied

Aberrant anatomy	Group I	Group II	Total
No	50(83.3%)	57(95%)	107(89.2%)
Yes	10(16.7%)	3(5%)	13(10.8%)

Total	60(100%)	60(100%)	120(100%)

P=0.040*, significant, chi-square test

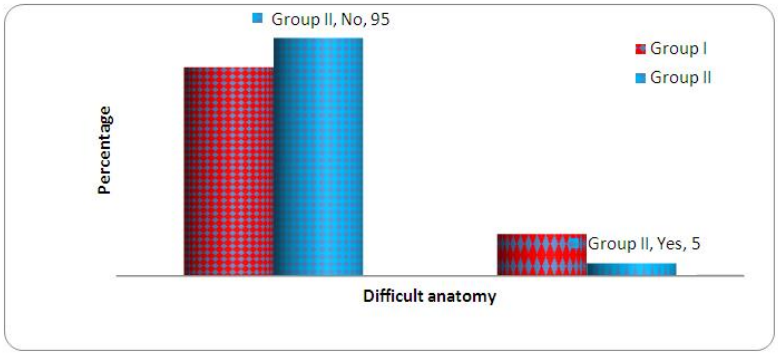

Figure 9: Aberrant anatomy distribution in two groups of patients studied

Table 9 and Figure 9 shows distribution of anatomical abnormality in calot's triangle. In our study we have found that younger patients had more aberrant anatomy at calot's triangle, i.e., 16.7% in group I compared to 5% cases in group II which was statistically significant and could be the reason for bile duct injury seen more in younger patients. Fewer/no episode of repeated cholecystitis in younger patients which is more frequent in elderly patients helped us in identifying anatomical abnormality intraoperatively.

Table 10: Distribution of IO bleeding/Adhesion due to prior Surgery/CBD injury/ Ca GB in two groups

	Group I (n=60)	**Group II (n=60)**	**Total (n=120)**	**P value**
IO bleeding				
● No	55(91.6%)	52(86.7%)	107(89.16%)	0.243
● Yes	5(8.4%)	8(13.3%)	13(10.84%)	
Adhesion due to prior Surgery				
● No	60(100%)	60(100%)	120(100%)	1.000
● Yes	0(0%)	0(0%)	0(0%)	
CBD injury				
● No	59(98.3%)	60(100%)	119(99.2%)	1.000
● Yes	1(1.7%)	0(0%)	1(0.83%)	
Ca GB				
● No	60(100%)	60(100%)	120(100.0%)	1.000
No	0(0%)	0(0%)	0(0.0%)	

Chi-Square test/ fisher exact test

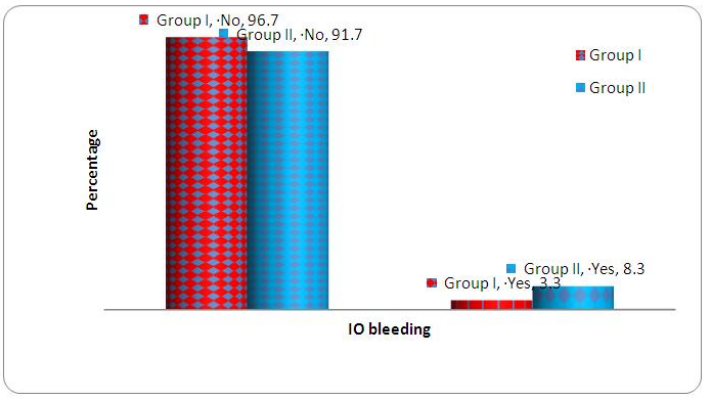

Figure 10.1: IO bleeding distribution in both groups

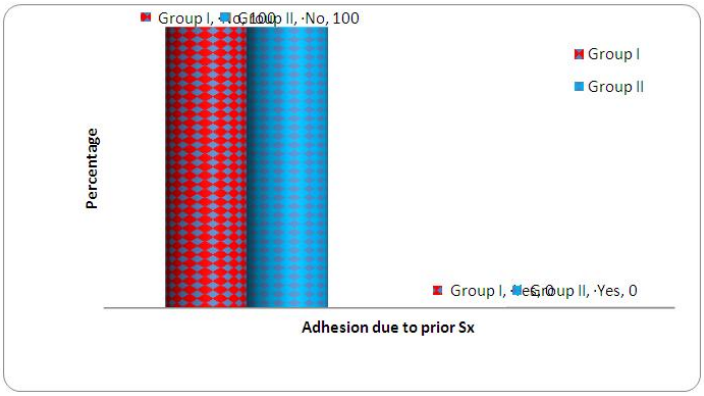

Figure 10.2 Distribution of adhesion due to previous surgery in both groups

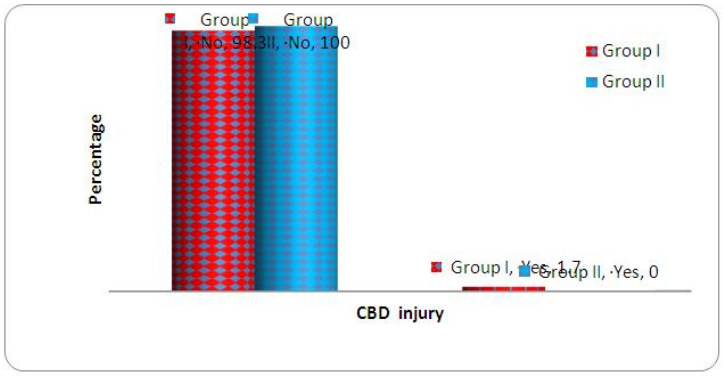

Figure 10.3: Distribution of CBD injury in both groups

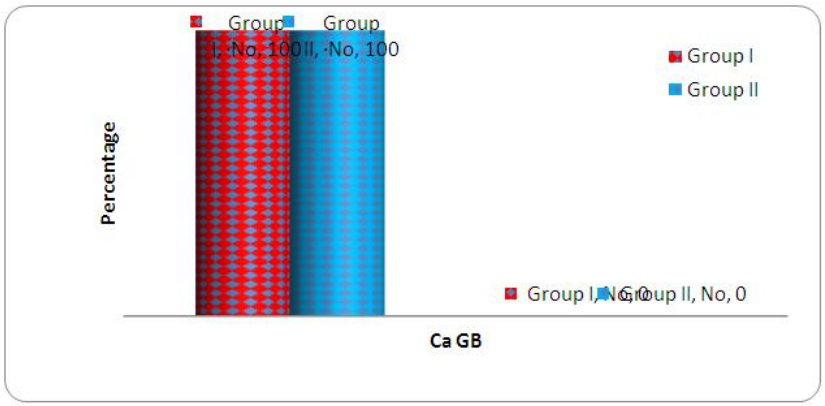

Figure 10.4: Ca GB distribution in both groups

Table 10 and Figure 10.1 to 10.4 shows distribution pattern of IO bleeding/Adhesion due to prior Surgery/bile duct injury/ Ca GB in both groups. In group I intraoperative bleeding was present in 3.3% patients and in group II 5.8% which is related to unclear calot's triangle in elderly patients. Only 1 patient had bile duct injury in group I due to lateral thermal injury which was managed with tube drain and that subsided subsequently. In Group II there were no bile duct injury. There was no malignancy reported in any cases in both the group

Table 11: IO complication (GB perforation) distribution in both groups

	Group I (n=60)	**Group II (n=60)**	**Total (n=120)**	**P value**
GB perforation				
• No	59(98.3%)	57(95%)	116(96.7%)	0.619

• Yes	1(1.7%)	3(5%)	4(3.3%)	

Chi-Square test/fisher exact test

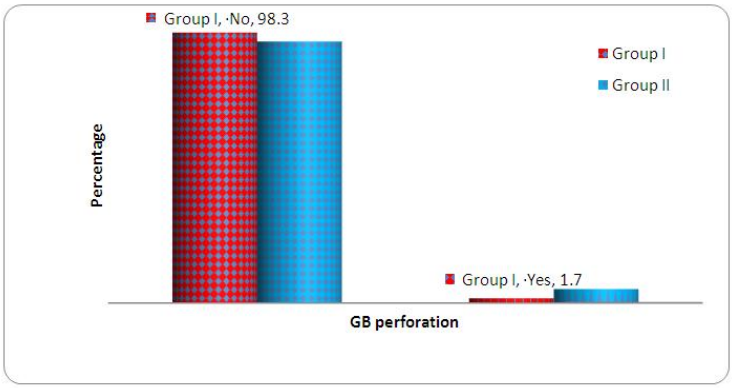

Figure 11: IO complication (GB perforation) distribution in both groups

Table 11 and Figure 11 shows distribution of intraoperative complication. In our study total 4 cases GB was perforated intraoperatively leading to bile spillage in peritoneal cavity and increasing the IO time and hospital stay but there was no increase in morbidity.

Table 12: IO complication (Intrabdominal fluid distribution) in two groups of patients studied

Intrabdominal fluid	Group I (n=60)	Group II (n=60)	Total (n=120)
No	55(91.7%)	52(86.7%)	107(89.2%)
Yes	5(8.3%)	8(13.3%)	13(10.8%)
• Bleed from calot's	2(3.3%)	4(6.7%)	6(5%)
• Bile from GB	2(3.3%)	2(3.3%)	4(3.3%)
• Bleed from omentum	0(0%)	1(1.7%)	1(0.8%)
• Bleed from Liver	1(1.7%)	0(0%)	1(0.8%)
• Mucus from GB	0(0%)	1(1.7%)	1(0.8%)

P=0.378, Not significant, chi-square test

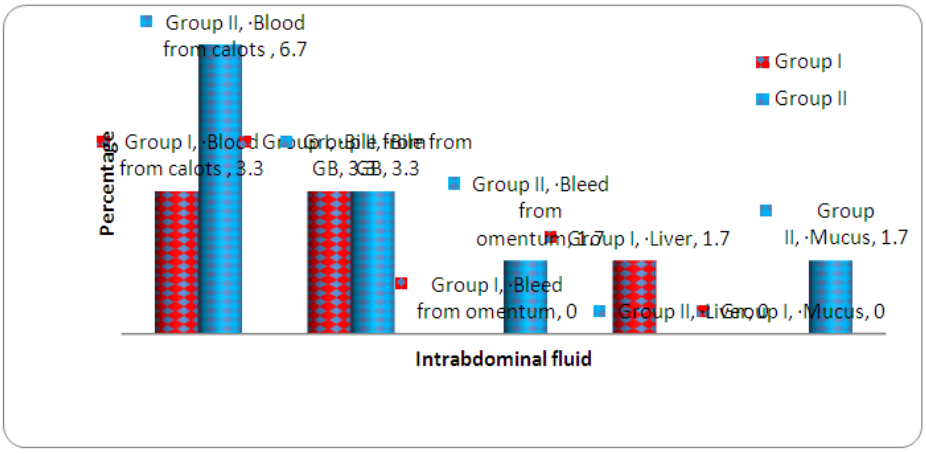

Figure 12: IO complication (Intrabdominal fluid distribution) in two groups of patients studied

Table 12 and Figure 12 shows distribution of intraabdominal fluid intraoperatively. Intraabdominal fluid was compared in two groups and was present in 5 patients in group I while 8 patients in group II. 3 patients in group I had bleeding IO while in 4 patients in group II. Bile was present in 3 patients in group I and 2 patients in group II and these findings were statistically not significant.

Table 13: Post-operative complication (port site infection and sub umbilical hernia) distribution in two groups of patients studied

	Group I (n=60)	Group II (n=60)	Total (n=120)	P value
Port site infection				
● No	60(100%)	59(100%)	120(100%)	1.000
● Yes	0(0%)	0(0%)	0(0%)	
Sub umbilical hernia				
● No	60(100%)	60(100%)	120(100%)	1.000
● Yes	0(0%)	0(0%)	0(0%)	

Chi-Square test/fisher exact test

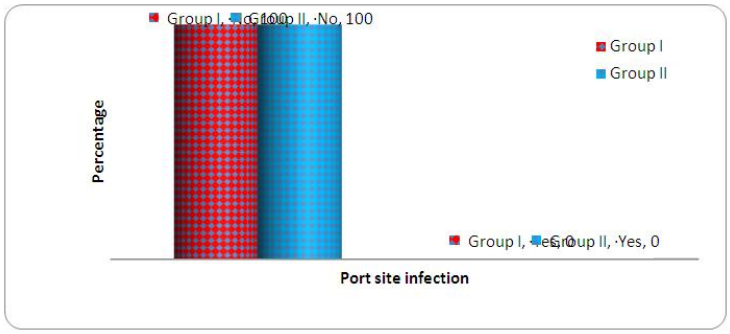

Figure 13.1: Port site infection distribution in two groups of patients studied

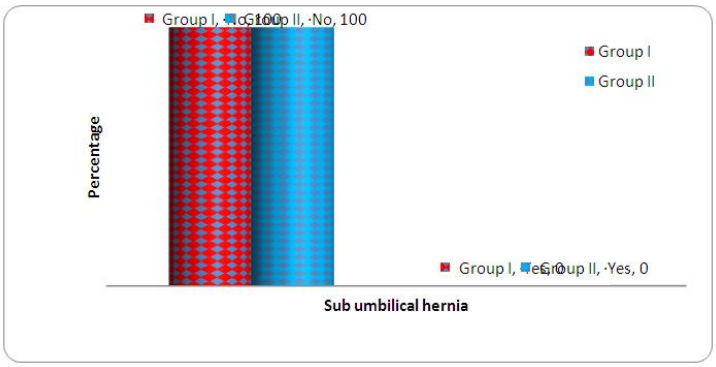

Figure 13.2 Sub umbilical hernia distribution in two groups of patients studied

Table 13 and Figure 13.1 and 13.2 shows distribution of port site infection and sub umbilical hernia in both groups. In our study we did not encounter any port site infection and sub umbilical hernia postoperatively.

Table 14: Hospital stay (days) distribution in two groups of patients studied

Hospital stay (days)	Group I	Group II	Total
0	1(1.7%)	0(0%)	1(0.8%)
1-3	54(90%)	57(95%)	111(92.5%)
4-5	3(5%)	3(5%)	6(5%)
>5	2(3.3%)	0(0%)	2(1.7%)
Total	60(100%)	60(100%)	120(100%)

P=0.519, Not significant, fisher exact test

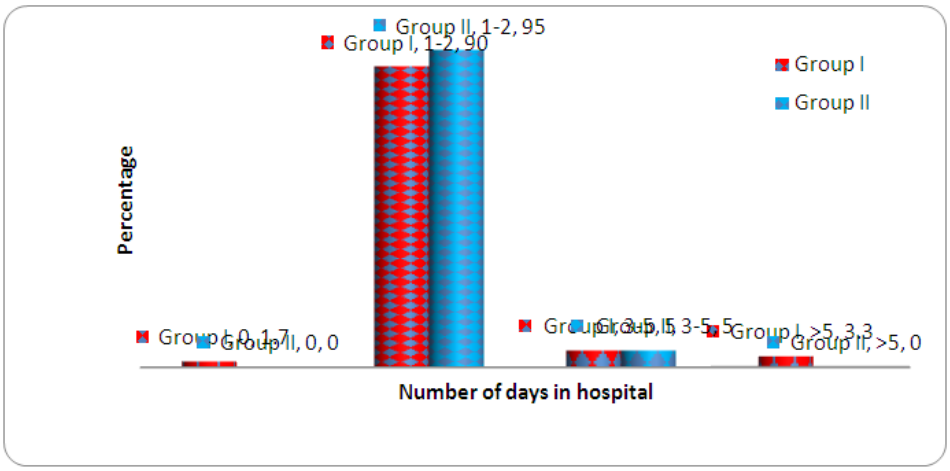

Figure 14: Hospital stay (days) in two groups of patients studied

Table 14 and Figure 14 shows distribution of number of days of hospital stay in both groups. In our study majority of the patients (92.5%) were discharged within 3 days of LC while only 1.7% of the patients had prolong hospital stay of more than 5 days and 5% were discharged within 4 to 5 days.

Table 15: Comparison of age, intraoperative (IO) time (min) and hospital stay (days) in two groups studied

	Group I	Group II	Total	P value
Age in years	34.27±9.60	60.15±6.57	47.21±15.36	<0.001**
IO time (minutes)	31.18±12.07	36.37±9.01	33.78±10.92	0.009**
Hospital stay (days)	2.63±2.18	2.93±1.19	2.78±1.75	0.351

Student t test

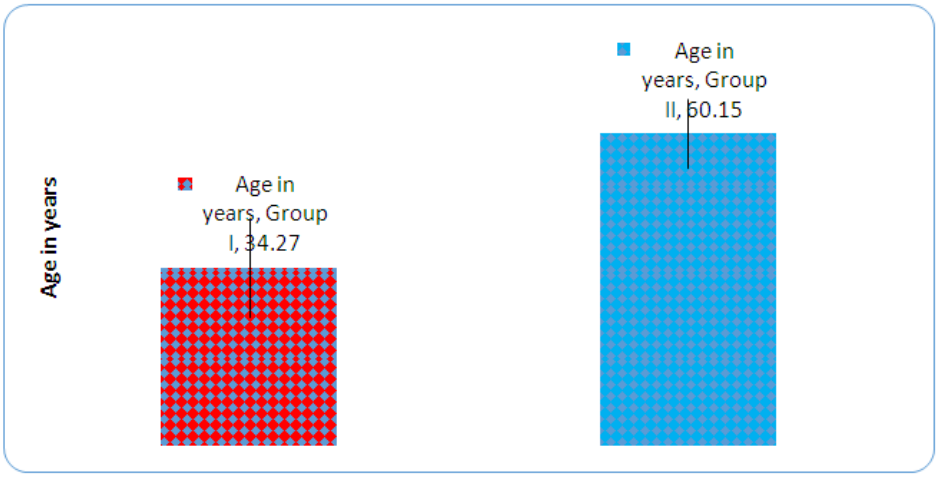

Figure 15.1 Comparison of age in two groups studied

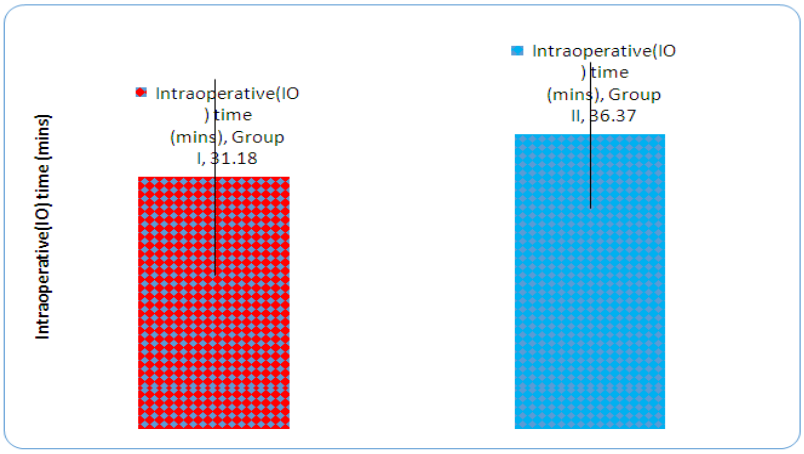

Figure 15.2: Comparison of IO timein two groups studied

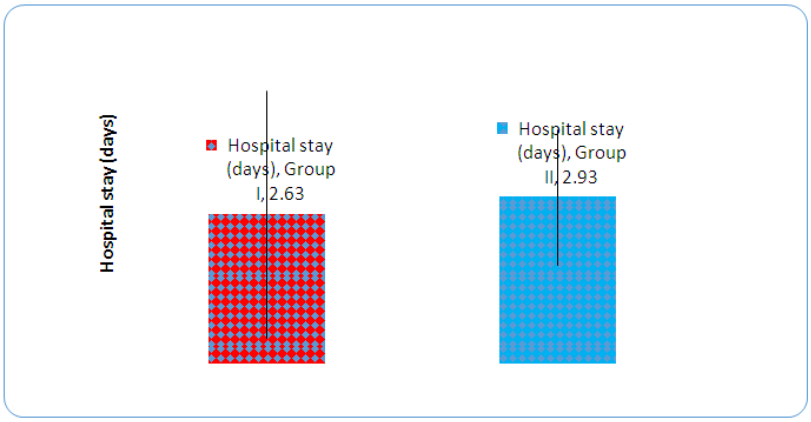

Figure 15.3 Comparison ofhospital stay in two groups studied

Table 15 and Graph 15.1 to 15.3 compares Age, intraoperative time (minutes) and hospital stay (days) in two groups studied. In our study in group I most of the patient were in mean age of 34 and in group II they were in 60 years of age with a p value of <0.001 which is statistically significant. Intraoperative time was 31.18+/-12.07 in group I which was less than group II and is statistically significant. Although there was not much difference in number of days in hospital stay.

IV. Discussion

The global population is aging. Census predictions indicate that from 1995 to 2020 the percentages of the population aged 65 years or older will increase from 12.8% to 15%, 75 years or older will increase from 5.6% to 6.8% and 85 years or older will increase from 1.4% to 2%. The increasing age of the population has led to an increasing prevalence of gallstones; therefore, cholecystectomy is a common operation in ageing patients.[51] Advanced age is frequently associated with significant comorbidity and limited functional reserve, which is associated with higher rate of complications, and longer hospital stay.

Laparoscopic cholecystectomy (LC) causes less pain after surgery, shorter hospital stay, faster return to work activities and a lower metabolic-endocrine-immune response to trauma.[41-44]LC has demonstrated results superior to OC in elderly patients with symptomatic cholelithiasis in terms of morbidity and hospital stay.[45] This procedure has been the gold standard for elective cholecystectomy for the general population in the last two decades.[46]

Gall stone disease is more frequently encountered in females and this was seen in our study with 90% of the patients with cholelithiasis were females. In Manipur incidence of gall stone disease is towards higher side in younger age females. Median age of laparoscopic cholecystectomy in group I was 34 years while in group II it was 60 years. Indications for LC were chronic cholecystitis, asymptomatic cholelithiasis and

gallstone pancreatitis. Although complicated cholelithiasis is more common in elderly patients but in our study we encounter it more in group I i.e. 16.7% and 10 % in group II. This is contrary to the study conducted by Nazeeret al.[19]

The reported incidence of mortality and morbidity with LC in elderly patients is 5% to 15% and 0% to 1% in most of the series[18, 19] which was similar in our study with 0% mortality and morbidity. Thus laparoscopic cholecystectomy in elderly patient is a reliable approach that allows patients to benefit from advantages of minimally invasive surgery without further increasing the risk of surgery. In our study 21.7 % patients in group II had comorbidity like diabetes and hypertension with ASA score of 2 in 68.3% of the patients but there were no mortality which is also reported in a study by HyungOok Kim et al. These results may indicate that perioperative outcome is not influenced by chronological age in elderly, but is influenced by disease presentation.[20]

The goal of treatment for the elderly is to provide them with the best possible quality of life with the lowest physiological cost. Several retrospective studies have shown that most elderly patients undergoing LC do well, but when compared with younger patients, the elderly have higher rates of conversion to OC, somewhat longer postoperative stays, and more complications. There were complications in our study like GB perforation in 3.3%, Calot's triangle bleed 5%, and conversion to OC in 1.7 % without increase in morbidity and was differing from other series.[47, 48]There was bleeding at calot's triangle in 6 cases out of which 5 cases we could control laparoscopically but one case in group II required conversion which reflects the wise and timely taken decision of surgeon and this has reduced mortality. The conversion rate to open surgery in our series was 1.7%, compared with 2.5% to 14% in LC other series studying elective LC for symptomatic cholelithiasis in the elderly.[40, 49, 50]

The conversion rate most likely depends on the relative experience of the surgeon with the procedure and on individual patient factors or selection. In this series, age was an independent predictor of conversion. The degree of inflammation and adhesions in the region of the gallbladder is particularly severe in the elderly and was responsible for the increase in intraoperative time. The most important advantage of LC in elderly patients may be the associated reduction in morbidity and mortality rates.

Many publications have reported that LC is associated with shorter hospital stay .[47, 48]We also observed same result, with average length of stay of 3.0 days for LC. In our study we did not encounter any port site infection and sub umbilical hernia at operated site. Anatomical abnormality at Calot's triangle was reported in 10.8% cases, more in younger age group which could be one of the factor for bile duct injury detected postoperatively in our series. Incidence of GB malignancy and adhesion due to prior surgery has not been reported in our study.

Laparoscopic cholecystectomy is minimally invasive surgery and takes shorter operative time compared to open cholecystectomy. Therefore LC is gold standard even in elderly population. In 81.6% of the cases LC was completed within 40 minutes while in 21.7% cases in group II this time was >40 minutes which was less than the study done by HyungOok Kim et al.[20]In younger age group since repeated attacks of cholecystitis would not have occurred as compared with elderly patients which makes surgery easier and simple in younger patients than elderly populations. We encountered 64.2% of the patient with clear anatomy at calot's triangle while in 10% of the cases it was not clear and 9.2% had adhesions at calot's triangle. In 3 patients (2 in group I and 1 in group II) GB was chronically inflamed and contracted. In group I one patient it had intrahepatic GB while in group II 5 patient had intrahepatic GB. We encountered 3 patients with type I Mirizzi syndrome and 3 patients with short cystic duct. In 2 patients in group I we found anterior right hepatic artery and one in group II. Pneumoperitoneum was difficult in 2 case, one in each group but could be created safely. In 4 patient gall bladder perforated intraoperatively with spillage of bile resulting in increase in IO time. Intraabdominal fluid was compared in two groups and was present in 5 patients in group I while 8 patients in group II. Intraoperative bleeding was present in 5 patient in group I and in 7 patient in group II. One patient in group II had mucocele. Bile was present in 2 patients in group I and 2 patients in group II and these findings were statistically not significant. In our study we did not encounter any port site infection and sub umbilical hernia postoperatively which was contrary to other study done by Rafael S et al [22] where they had 16.7% postoperative complications. We had bile leak (lateral thermal injury to CBD) in one patient in group I which was detected postoperatively in Ryles tube drain and was managed conservatively.

While comparing age, intraoperative time and number of hospital stay in days in both the groups we found significant association in age groups and intraoperative time in both groups while number of hospital stays in days was not significant. We did not encounter any incidence of gall bladder malignancy in followup with histopathological examination report. We emphasize that possible biases related to the age groups and the small number of patients involved must be taken into account when interpreting the results.This study has several limitations. First, we did not analyze long-term quality of life and functional outcome. It is not clear that short-term benefits translate into better outcomes in the long term. For instance, a recent study demonstrated no differences in health-related quality of life between patients randomized to OC or LC, either 1 month or 1 year postoperatively[52]. Second, we did not evaluate physiologic complications of pneumoperitoneum. Pneumoperitoneum for laparoscopic surgery may be harmful to elderly patients with underlying comorbidity, especially cardiopulmonary disease, because pneumoperitoneum itself can be physical stress during longer operation time for them. The pneumoperitoneum required for laparoscopic surgery leads to several important hemodynamic alterations. Cardiac output decreases by up to 30% during laparoscopic surgery, due to a decrease in stroke volume. Pneumoperitoneum also causes an increase in systemic vascular resistance. As a result, mean arterial pressure remains unchanged or increases up to 16%. Therefore, patients with marginal cardiac performance may warrant invasive cardiac monitoring to assure they tolerate pneumoperitoneum.

V. Conclusion

This prospective study aimed to compare the outcomes of laparoscopic cholecystectomy in elderly and younger age group, was conducted on 120 patients with 60 patients in each group. The study is based on perioperative outcome, rate of conversion to OC, postoperative complications and number of days in hospital stay. Emphasis is also given on correct assessment of cardiovascular surgical risk, since elder group of patients have lower vital reserve, being more sensitive to surgical trauma.This study has shown that LC can be performed safely in the elderly patients. However, anatomy at calot's triangle is the main factor that influences the adverse outcome of LC. This study has shown that in elderly patients anatomy at calot's triangle is not very clear in comparison to younger age group due to repeated attacks of cholecystitis leading to adhesions.

Based on this study though limited in number, we have found that LC can be performed safely in any age group and also that operative difficulty, rate of conversion, hospital stay and postoperative short term outcome are not influenced by the age of patient. Therefore laparoscopic cholecystectomy should be considered and encouraged for any age group of patients with symptomatic cholelithiasis in medically fit patients. Perioperative outcomes and rate of conversion to OC are not influenced by age and comorbidity but are influenced by disease process itself, anatomy at calot's triangle and experience of the operating laparoscopic surgeon.

Financial support and sponsorship : Nil
Conflict of interest : There is no conflict of interest.
Address for correspondence : Dr. Angela B Marak, Department of Surgery, Regional Institite of Medical Sciences, Lamphelpat, Imphal- 795004, Manipur, India

References

[1]. Soper NJ, stockman PT, Dunnegan DL, Ashley SW. Laparoscopic cholecystectomy: The new gold standard. Arch Surg 1992;127(8):917-21.
[2]. Barkun JS, Sampalls JS, Fried G, Wexler MJ, Meakins JL, Taylor B, et al. Randomized control trial of laparoscopic versus mini cholecystectomy. Lancet 1992;8828(340):1116-9.
[3]. Bass EB, Pitt HA, Lillemoe KD. Cost-effectiveness of laparoscopic cholecystectomy versus open cholecystectomy. Am J Surg 1993;165(4):466-71.
[4]. Ransohoff D, Gracie WA, Wolfenson LB, Neuhauser D. Prophylactic cholecystectomy or expectant management for silent gallstones: a decision analysis to assess survival. Ann Intern Med 1983;99(2):199-204.
[5]. Tagge E, Othersen HJ, Jackson SM, Smith CD, Gayoso AJ, Abbound MR, et al. Impact of laparoscopic cholecystectomy on the management of cholelithiasis in children with sickle cell disease. J PediatrSurg 1994;29(2):209-12.
[6]. Soper NJ, Hunter JG, Petrie RH. Laparoscopic cholecystectomy during pregnancy. SurgEndosc 1992;6(3):115-7.
[7]. Davidoff AM, Pappas TN, Murray EA, HillerenDJ,Johnson RD, Baker ME, et al. Mechanism of major biliary injury during laparoscopic cholecystectomy. Ann Surg 1992;215(3):196-202.
[8]. Evers BM, Townsend CM, Thompson JC, Firth M, Prather CM. Organ physiology of aging. SurgClin North Am 1994;74(1):23-39.

[9]. Kahng KU, Roslyn JJ. Surgical issues for the elderly patients with hepatobiliary disease. SurgClin North Am 1994;74(2):345-73.
[10]. Kauvar DS, Brown BD, Braswell AW, Harnisch M. Laparoscopic cholecystectomy in elderly: increased operative complications and conversion to open laparotomy. J LaparoendoscAdvSurg Tech A 2005;15(4):379-82.
[11]. Bingener J, Richards ML, Schwesinger WH, Strodel WE, Sirinek KR. Laparoscopic cholecystectomy for elderly patients: gold standard for golden years. Arch Surg 2003;138(5):531-5.
[12]. Fried GM, Clas D, Meakins JL. Minimally invasive surgery in the elderly patient. SurgClin North Am 1994;74:375-87.
[13]. Arthur JD, Edward PR, Chagla LS. Management of gall disease in the elderly. Ann R CollSurgEngl 2003;85(2):91-6.
[14]. Tagle FM, Lavergne J, Barkin JS, Unger SW. Laparoscopic cholecystectomy in the elderly.SurgEndosc1997;11(6):636–8.
[15]. Brunt LM, Quasebarth MA, Dunnegan DL, Soper NJ. Outcomes analysis of laparoscopic cholecystectomy in the extremely elderly.SurgEndosc2001;15(7):700–5.
[16]. McMahon AJ, Fischbacher CM, Frame SH, MacLeod MC. Impact of laparoscopic cholecystectomy: a population-based study. Lancet 2000;356(9242):1632–7.
[17]. Qasaimeh GR, Banihani MN. Laparoscopic cholecystectomy in the elderly and young: a comparative study. Hepatogastroenterol 2012;59(113):22-5.
[18]. Yetkin G, Uludag M, Oba S, Citgez B, Paksoy I. Laparoscopy cholecystectomy in elderly patients. Journal of the Society of Laparoendoscopic Surgeons 2009;13(4):587-91.
[19]. Nazeer MA, Ali M, Ahmed K, Saleem R, Ali M, Suleman B. Outcomes of laparoscopic cholecystectomy in the elderly versus young patients. Pakistan Journal of Medical and Health Sciences 2012;3(6):544-6.
[20]. Kim HO, Yun JW, Shin JH, Hwang S, Cho YK, Son BH, et al. Outcomes of laparoscopic cholecystectomy is not influenced by chronological age in the elderly. World J Gastroenterol 2009;15(6):722-6.
[21]. BingenerJ, Richards ML, Schwesinger WH, Strodel WF, Sirinek KR. Laparoscopic cholecystectomy for elderly patients: gold standards for golden years. Arch Surg 2003;138(5):531-5.
[22]. Marcari RS, Lupinacci RM, Nadal LR, Rego RE, Coelho AM, Farah J F. Outcomes of laparoscopic cholecystectomy in octogenarians. Journal of the Society of Laparoendoscopic Surgeons 2012;16(2):271-5.
[23]. Paganini AM, Feliciotti F, Guerrieri M, Tamburini A, Campagnacci R, Lezoche A. Long-term results after laparoscopic cholecystectomy for common bile duct stones. SurgEndosc 2003;17(5):773-6.
[24]. Yi NJ, Han HS, Min SK. The safety of laparoscopic cholecystectomy in acute cholecystitis in high risk patients older than sixty with stratification based on ASA score. Minim Invasive Ther Allied Technol 2006;15(3):159-64.
[25]. Hazzan D, GeronN, Golijanin D, Reissman P, Shiloni E. Laparoscopic cholecystectomy in octogenarians. SurgEndosc 2003;17(5):773-6.
[26]. Bergman S, Sourial N, Vedel I, Hanna WC, Fraser SA, Newman D, et al. Gallstone disease in the elderly: are older patients managed differently. SurgEndosc 2011; 25(1):55–61.
[27]. Leandros E, Alexakis N, Archontovasilis F, Albanopoulos K, Dardamanis D, Menenakos E, et al . Outcome analysis of laparoscopic cholecystectomy in patients aged 80 years and older with complicated gallstone disease. J LaparoendoscAdvSurg Tech A 2007;17(6):731-6.
[28]. Pavlidis TE, Marakis GN, Symeonidis N, Psarras K, Ballas K, Rafailidis S, et al. Considerations concerning laparoscopic cholecystectomy in the extremely elderly. J LaparoendoscAdvSurg Tech A 2008;18(1):56–60.
[29]. Bhandari TR, Shahi S, Bhandari R, PoudelR.Laparoscopiccholecystectomy in the elderly: an experience at a tertiary care hospital in western Nepal. Surgery Research and Practice 2017;5(2):138-9.
[30]. Zappulla E, Russo V, Gullotta I, Patane G, Trovato S, Lucifora B, et al. Laparoscopic cholecystectomy in theelderly. BMC Geriatr 2009;9(1):11.
[31]. Kuwabara K, Matsuda S, Fushimi K, Koichi B, Ishikawa A, Hooriguchi H, et al. Relationships of age, cholecystectomy approach and timing with the surgical and functional outcomes of elderly patients with cholecystitis. International Journal of Surgery 2011;5(9):392-9.
[32]. Zilberstein B, Eshkenazy R, Ribeiro MA, Sallet JA, Ramos AC. Laparoscopic cholecystectomy in children and adolescents. Sao Paulo Med J 1996;114(6):211-6.
[33]. Dua A, Aziz A, Desai SS, McMaster J, Kuy SR. National trends in the adoption of laparoscopic cholecystectomy over 7 years in the United States and impact of laparoscopic approaches stratified by age. Minimally Invasive Surgery 2014;(10):155-9.
[34]. Rubert CP, Higa RA, Farias FVB. Comparison between open and laparoscopic elective cholecystectomy in elderly, in a teaching hospital. Revista do ColegioBrasileiro de Cirurgioes 2016;43(1):2-5.
[35]. Pessaux P, Tuech JJ, Derouet N, Roughe C, Regenet N, Arnaud JP. Laparoscopic cholecystectomy in the elderly: a prospective study. SurgEndosc 2000;14(11):1067-9.
[36]. Giger UF, Michel JM, Inderbitzin DT, Krahenbuhl LT. Risk factors for perioperative complications in patients undergoing laparoscopic cholecystectomy: analysis of 22,953 consecutive cases from the swiss association of laparoscopic and thoracoscopic surgery (SALTS) database. J Am CollSurg 2006;203(5):723-8.
[37]. Malik AM, Laqhari AA, Talpur KA, Memon A, Pathan R, Memon JM. Laparoscopic cholecystectomy in the elderly patients: an experience at Liaquat University Hospital Jamshoro. L Ayub Med Coll Abbottabad 2007;19(4):45-8.
[38]. Lee S, Na BG, Yoo YS, Mun SP, Choi NK. Clinical outcome for laparoscopic cholecystectomy in extremely elderly patients. Ann Surg Treat Res 2015;88(3):145-51.
[39]. Kuy S, Sosa JA, Roman SA, Desai R, Rosenthal RA. Age matters: a study of clinical and economic outcomes following cholecystectomy in elderly Americans. Am J Surg2011;201(6):789–96.

[40]. Tambyraja AL, Kumar S, Nixon SJ. Outcome of laparoscopic cholecystectomy in patients 80 years and older. World J Surg 2004;28(8):745-8.
[41]. Alponat A, Kum CK, Koh BC, Rajnakova A, Goh PM. Predictive factors for conversion of laparoscopic cholecystectomy. World J Surg 1997;21(6):629-33.
[42]. Aktan AO, Büyükgebiz O, Yegen C, Yalin R. How minimally invasive is laparoscopic surgery.SurgLaparoscEndosc 1994;4(1):18-21.
[43]. Cho JM, LaPorta AJ, Clark JR, Schofield MJ, Hammond SL, Mallory PL. Response of serum cytokines in patients undergoing laparoscopic cholecystectomy. SurgEndosc 1994;8(12):1380-3.
[44]. Mealy K, Gallagher H, Barry M, Lennon F, Traynor O, Hyland J. Physiological and metabolic responses to open and laparoscopic cholecystectomy. Br J Surg 1992;79(10):1061-4.
[45]. Lujan JA, Bueno SF, Parrilla P, Robles R, Torralba JA, Costea RG. Laparoscopic vs. open cholecystectomy in patients aged 65 and older. SurgLaparoscEndosc 1998;8(3):208-10.
[46]. Dubois F, Berthelot G, Levard H. Coelioscopic cholecystectomy: experience with 2006 cases. World J Surg 1995;19(5):748-52.
[47]. Lujan JA, Parrilla P, Robles R, Marin P, Torralba JA, Ayllon GJ. Laparoscopic cholecystectomy vs open cholecystectomy in the treatment of acute cholecystitis: a prospective study. Arch Surg 1998;133(2):173-5.
[48]. Leardi S, Devita F, Pietroletti R, Simi M. Cholecystectomy for gallbladder disease in elderly aged 80 years and over. Hepatogastroenterol 2009;56(90):303-6.
[49]. Behrman SW, Melvin WS, Babb ME, Johnson J, Ellison EC. Laparoscopic cholecystectomy in the geriatric population. Am Surg 1996;62(5):386-90.
[50]. Golden WE, Cleves MA, Johnston JC. Laparoscopic cholecystectomy in the geriatric population. J Am GeriatrSoc 1996;44(11):1380-3.
[51]. Kurbanov FS, Abbasova SF, AlieviuG, Sushko AN, Dobrovolskii SR. The laparoscopic cholecystectomy in elderly patients. Khirurgiia (Mosk) 2012;(9):38–41.
[52]. Nilsson E, Ros A, Rahmqvist M, Backman K, Carlsson P. Cholecystectomy: costs and health-related quality of life: a comparison of two techniques. Int J Qual Health Care 2004;16(6):473–82.

Dr. Piyushkumar Agrawal. "A Comparative Study of Laparoscopic Cholecystectomy in The Elderly And Young." IOSR Journal of Dental and Medical Sciences (IOSR-JDMS), vol. 18, no. 2, 2019, pp 34-50.