

Observational Study of Cases Subjected to Cholecystectomy - Laparoscopic Vs Open Method Under The Guidance of Predicted Risk Factors

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I. Introduction

Gallstones are among the most common gastrointestinal illness requiring hospitalization with a prevalence of 11% to 36% in autopsy reports. The optimal therapy for patients with symptomatic gallstones is cholecystectomy. Laparoscopic cholecystectomy is the method of choice for most of the patients with gall bladder disease. These postulated advantages of laparoscopic cholecystectomy are the avoidance of large incision, shortened stay in the hospital and quick return to work.

The condition of the case, the level of experience of surgeon, and the technical factors can play a role in the decision for conversion. Inability to define the anatomy and difficult dissection are the leading reasons for conversion followed by other complications like bleeding. The rate of conversion for elective laparoscopic cholecystectomy is around 5%, whereas the rate of conversion in acute cholecystitis may be as high as 30%. The purpose in our study was to determine the rate of conversion and also identify the factors responsible for the conversion of laparoscopic cholecystectomy to open procedure. Hence, these findings will allow us to discuss preoperatively the higher risk of conversion and also allow for an earlier judgement and to decide on conversion if intra-operative difficulty is encountered.

Aims And Objectives

To determine the rate of conversion of laparoscopic cholecystectomy to open cholecystectomy To identify the factors responsible for conversion of laparoscopic cholecystectomy to open cholecystectomy

II. Methodology

Source of data:

Around 100 patients are studied from the patients undergoing laparoscopic cholecystectomy at Government Rajaji Hospital and Madurai Medical College Madurai from December 2012 to November 2013. This is a prospective study conducted over 1 year.

Methods of Collection of Data:

All patients presenting with cholelithiasis without choledocholithiasis; and with no contraindication for General Anesthesia were included in study. Medical records for all patients who underwent Laparoscopic Cholecystectomy were reviewed. Data recorded included past medical history, demographic information, duration of surgery, indication for surgery, reason for conversion and post-operative complications.

Inclusion criteria:

All patients with symptomatic cholelithiasis (including acute cholecystitis).
Age > 18 years

Exclusion criteria:

Carcinoma of gall bladder,
Perforated gall bladder,
Patients unfit for general anesthesia,
Previous upper abdominal surgery,
Age < 18 years.

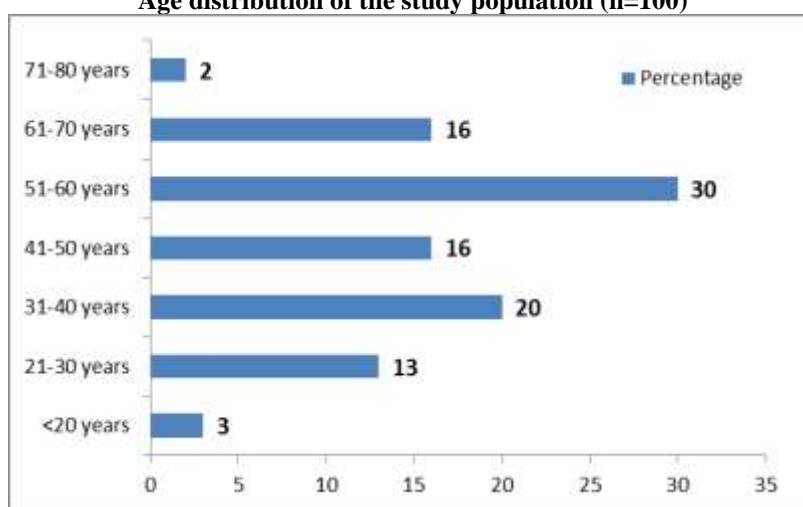
The general bio-data of patient regarding his name, age, sex, religion, occupation, socio-economic status and address was collected. A detailed history was taken with special reference to duration of right upper quadrant pain or epigastric pain, its periodicity, its aggravation by fatty meals and relief by oral or parenteral analgesics. Any significant past history was also enquired. A relevant general physical examination,

abdominal and systemic examination was done. Pre-operative work up included a CBC, Random blood sugar, blood urea, serum creatinine, LFT, Chest X-ray and ultrasonogram of abdomen. Ultrasonogram was routinely done on all patients to confirm the clinical diagnosis of cholelithiasis with number of calculus and size of calculus, gall bladder wall thickness (>4mm was considered abnormal), pericholecystic collection and CBD calculi or dilatation of CBD. A routine pre-anaesthetic checkup was done. A fully explained well informed consent was taken with explanation of risk of conversion to open cholecystectomy. A nasogastric tube was placed in all cases for gastric decompression to prevent trocar injury. All patients received prophylactic pre-op antibiotics (Inj. Ceftriaxone 1gm IV). The patients were operated by different senior surgeons. The surgery was performed with standard 4 port technique, using CO₂ for peritoneal cavity insufflation. Veress technique was used to obtain pneumoperitoneum. Cystic duct and cystic artery were skeletonised and clamped with metallic clips separately. Following GB removal, No.16 romovac suction drain was placed in all cases. All patients had oral liquids followed by food from 3rd day after surgery, provided they had no nausea and vomiting.

III. Results

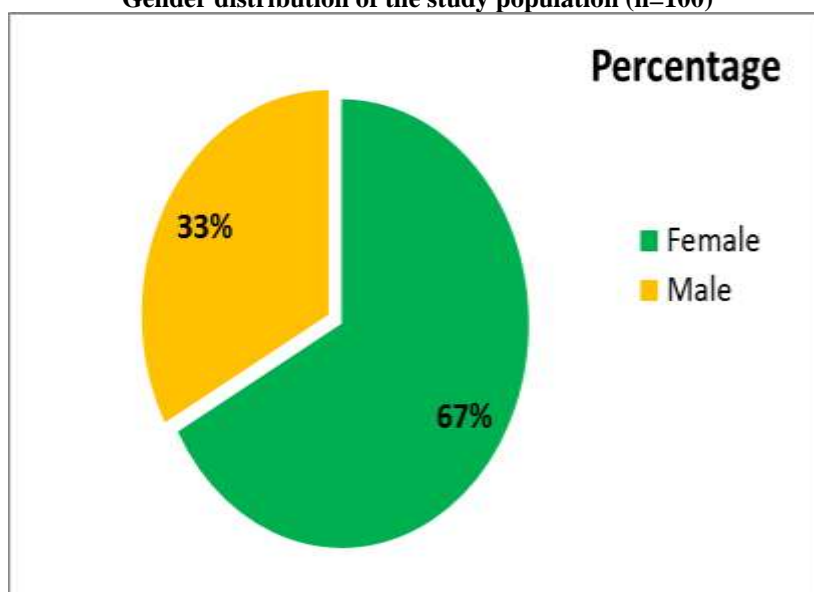
Mean age (\pm S.D): 48.07 (14.62) years, minimum: 18 years, maximum: 80 years.

Age distribution of the study population (n=100)

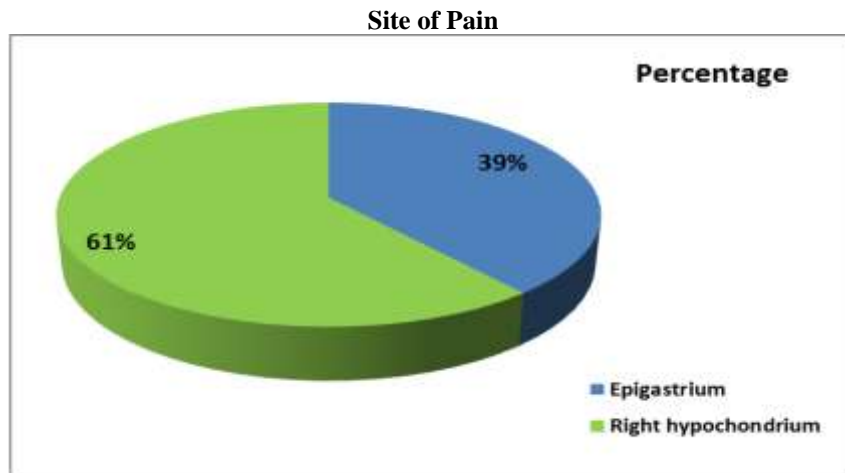


About 30% of the subjects were in the age group of 51-60 yrs while 36% were aged 31-50 yrs.

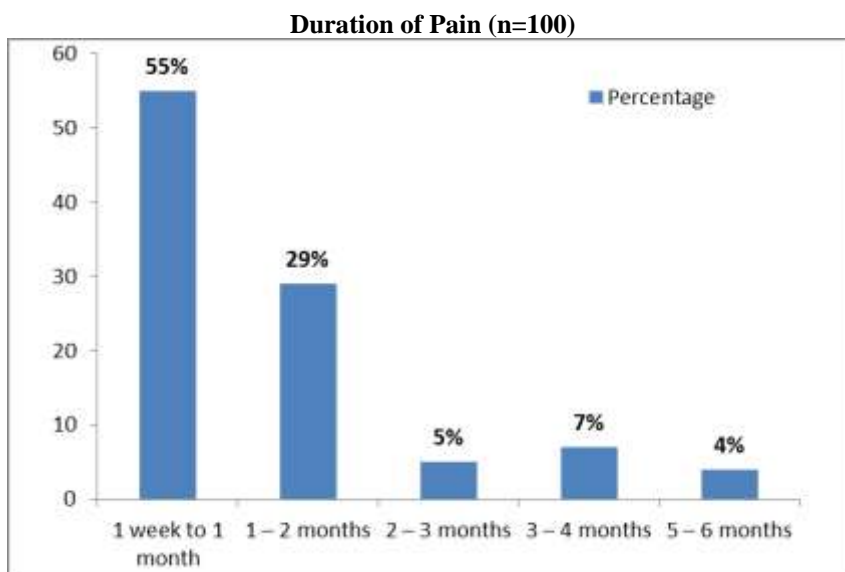
Gender distribution of the study population (n=100)



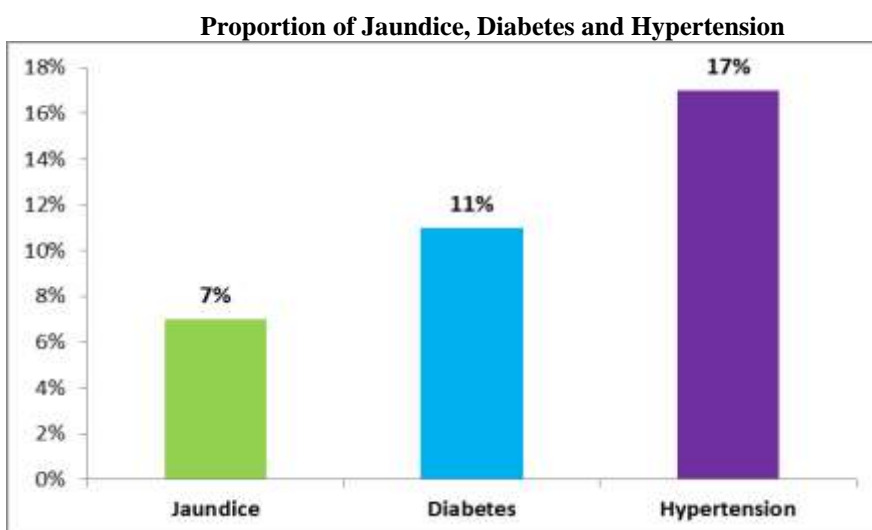
Majority of the study population were females (67%).



Majority of the study population had pain in the right hypochondrium (61%)

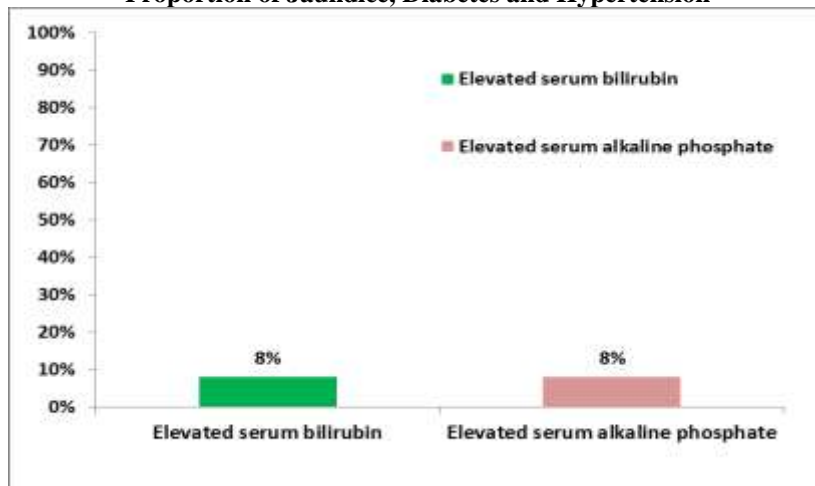


More than half of the study population had pain for less than one month (55%)



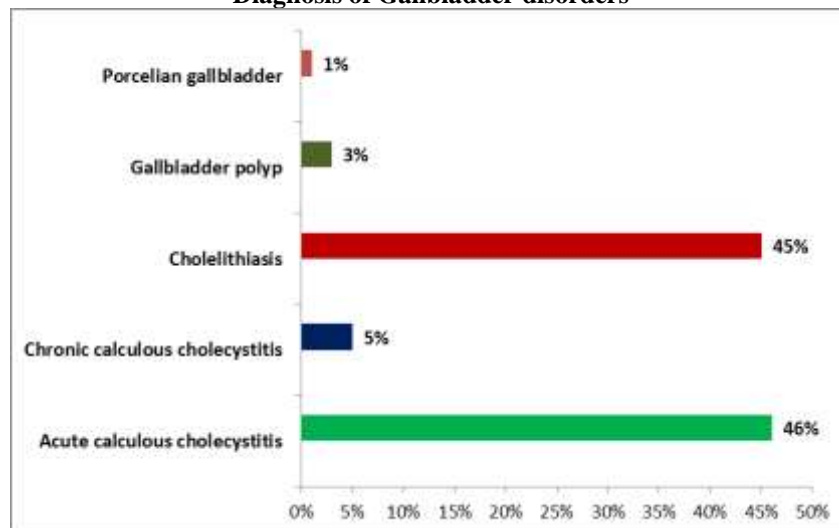
Majority of the study population (93%) were not hospitalized previously for gall bladder disease.
Only 7% of the subjects had jaundice. About 11% of the subjects had type II diabetic mellitus.
About 17% of the subjects had hypertension.

Proportion of Jaundice, Diabetes and Hypertension



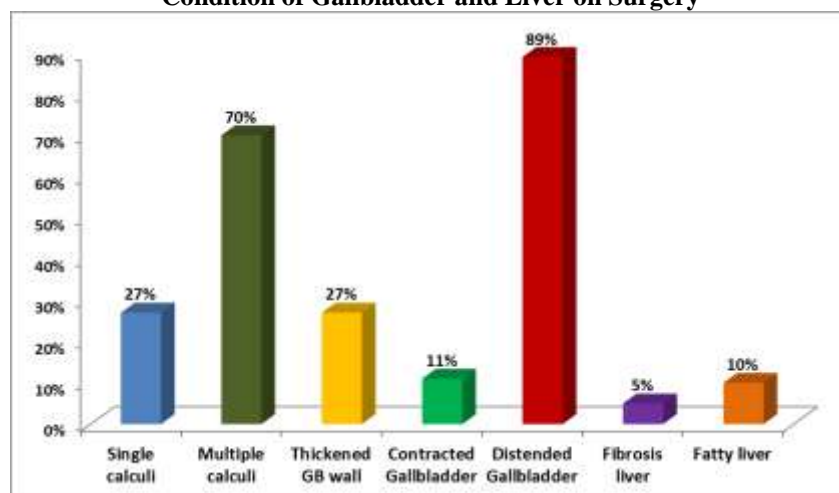
Only 1 subject had lower abdominal surgery in the past. Only 8% of the subjects had lower elevation in serum bilirubin and serum alkaline phosphatase levels while none of the subjects had coagulopathy.

Diagnosis of Gallbladder disorders



Cholelithiasis was present in 45% while Calculous cholecystitis was present in 42%

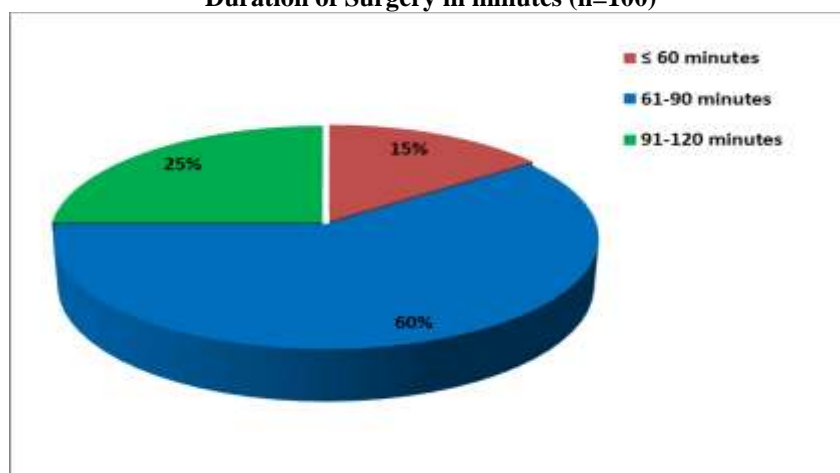
Condition of Gallbladder and Liver on Surgery



About 27% had pericystic fluid collection found during surgery. Majority (89%) had a distended gallbladder during surgery. About 27% had a thickened gallbladder wall during surgery.

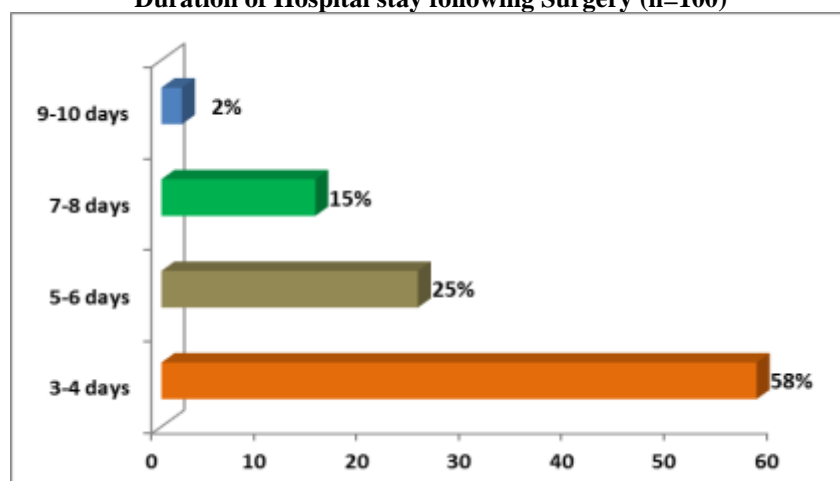
About 70% had a multiple gallbladder calculi during surgery. About 10% had fatty liver while 5% had fibrosis of liver during surgery.

Duration of Surgery in minutes (n=100)



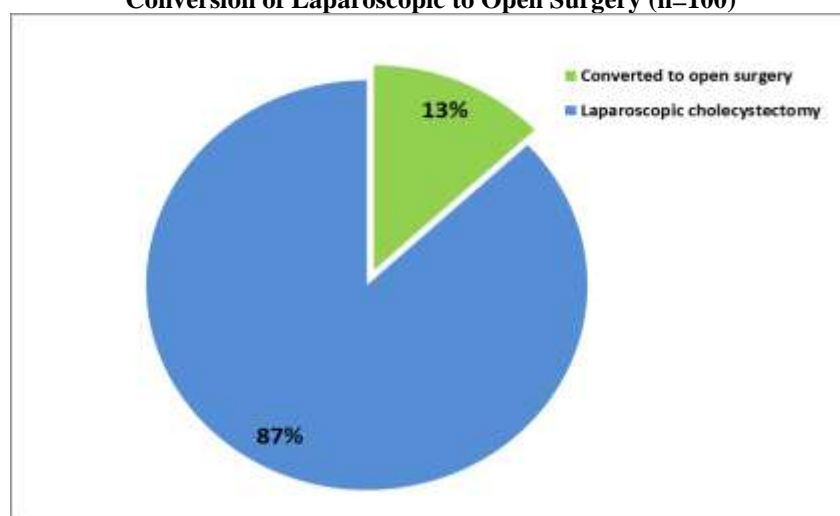
The operating time for 60% was between 1 to 1.5 hours.

Duration of Hospital stay following Surgery (n=100)



More than half of the cases were discharged on 4th or 5th post-operative day following surgery.

Conversion of Laparoscopic to Open Surgery (n=100)



In about 13% of the subjects, laparoscopic surgery was converted to open cholecystectomy. In about half of the cases the reason for conversion to open surgery was dense adhesions.

There was no statistically significant association between age-group and conversion to open cholecystectomy. There was no statistically significant association between gender and conversion to open cholecystectomy. There was no statistically significant association between site of pain and conversion to open cholecystectomy. There was a statistically significant difference in conversion rate to open cholecystectomy among subjects with various groups of pain duration.

Conversion to open cholecystectomy was higher among subjects with previous hospitalization than subjects without and this difference was statistically significant. Conversion to open cholecystectomy was higher among subjects with jaundice than subjects without jaundice but this difference was not statistically significant. There was no statistically significant difference in conversion rate to open cholecystectomy among subjects with and without diabetes.

Conversion to open cholecystectomy was higher among subjects with hypertension than subjects without hypertension but this difference was not statistically significant. There was no statistically significant difference in conversion rate to open cholecystectomy among subjects with and without previous history of abdominal surgery. Conversion to open cholecystectomy was higher among subjects with hyperbilirubinemia than subjects without hyperbilirubinemia but this difference was not statistically significant.

Conversion to open cholecystectomy was higher among subjects with elevated alkaline phosphatase levels than subjects with normal alkaline phosphatase levels and this difference was statistically significant. There was no statistically significant difference in conversion to open cholecystectomy according to various diagnosis. Conversion to open cholecystectomy was higher among subjects with peri-cholecystic fluid collection than subjects without and this difference was statistically significant.

Conversion to open cholecystectomy was higher among subjects with contracted gallbladder than subjects with distended gall bladder and this difference was statistically significant. Conversion to open cholecystectomy was higher among subjects with thickened gallbladder wall than subjects without and this difference was statistically significant. The difference in conversion to open cholecystectomy was not statistically significant among subjects with multiple and subjects with single or no calculi.

Conversion to open cholecystectomy was higher among subjects with fibrosed or fatty liver parenchyma than subjects with normal liver parenchyma and this difference was statistically significant. Conversion to open cholecystectomy occurred only among obese subjects but not normal or overweight subjects but this difference was not statistically significant.

IV. Discussion

Cholelithiasis is a common disease entity. Frequent occurrence and serious complications of cholelithiasis have made this one of the most important surgically correctable diseases. Open cholecystectomy has been a gold standard for the treatment of gallbladder diseases for more than 100 years since Carel Johann Langenbuch has performed first open cholecystectomy in 1882. 1st laparoscopic cholecystectomy in human has been done in 1987 by Dr. Philip Mouret to become the new gold standard and almost replaced open cholecystectomy for the treatment of gallbladder disease. The first laparoscopic cholecystectomy in India was performed in 1990 at the JJ Hospital, Mumbai, followed by few months later in Pune by Dr. Jyotsna Kulkarni. In our hospital we have started with laparoscopic surgery in 2001. Conversion to open surgery is not visualized as a complication, rather a matter of sound surgical judgment as patient safety is of foremost importance.

Age incidence

No age is said to be immune to gallbladder disease, however they were more common in the fourth, fifth and sixth decades of life as 66% of the cases belonged to these decades

Maximum incidence was seen in the age group of 51-60 years i.e, 30 patients (30.0%) followed by that in 31-40 years i.e, 20 patients (20.0%). Our study population was middle age, mean age 43.4 years. Daradkeh reported mean age of 47.2 years, whereas Bingener et al 40 years. All the 100 patients were planned for elective laparoscopic cholecystectomy. 13 out of the hundred patients i.e, 13.0 % were converted to open cholecystectomy. Maximum converted patients were in the age group of 51-60 years i.e., 6 patients (20.0 %). Workers like Thomas B Hugh et al, R Schmitz et al have reported a similar peak incidence in the 4th and 5th decade.

Sex incidence

The main sufferers of gallbladder disease in our study were females as compared to males. Out of total 100 cases, 67(67%) were females and 33 (33%) were males, which are very much similar to those observed by Frazee et al and U.Berggren et al The reason for the high incidence among females could be that pregnancy and child birth have a definitive influence on biliary tract disease, acting by casual stasis as well as weight gain and consequent hypercholesteremia. In a series of 6147 patients of laparoscopic cholecystectomy by Singh Kuldeep et al

(1993-2004) 2124 were males (34.5%) and 4023 were females (65.4%) with an average age of 48.6 years (range 22-84 years). In another series of 6380 patients of laparoscopic cholecystectomy by Singh Kuldip et al (1992-2005) 2250 were males (35.2%) and 4130 were females (64.7%) with an average age of 49 years (range 22-84 years). Thus our study coincides with both the studies of Singh Kuldip et al.

Symptomatology

Out of 100 operated patients, 61 patients (61.0%) presented with a chief complaint of pain in the right hypochondrium and 39 patients (39.0%) presented with pain in the epigastrium. Conversion to open cholecystectomy was required in 19 of 678 patients in non diabetic group (2.8%) and 13 of 184 patients in diabetic group (7.1%). The author's concluded laparoscopically cholecystectomy in diabetic patients is associated with more morbidity and a higher conversion rate than that in non diabetic patient. In our study of 100 cases of laparoscopic cholecystectomy, conversion to open cholecystectomy was required in 12 of 100 patients in non diabetic group (13.5%) and 1 of 13 patients in diabetic group (9.1%). But our study does not correlate with this Study. In our study, out of 13 converted patients 3 were hypertensive (17.6%) and out of 87 successful laparoscopies 14 were hypertensive (16.09%). According to our study, the factor of hypertension was not statistically significant regarding conversion to open cholecystectomy.

Laboratory parameters

In our study, conversion to open cholecystectomy was higher among 3 out of 8 subjects with elevated alkaline phosphatase levels (37.5%) than 10 out of 82 subjects with normal alkaline phosphatase levels (10.9%) and this difference was statistically significant.

Ultrasonography

Today ultrasonography is the best non-invasive, economical and an easily available investigation. In our study, 27 out of 100 patients showed a thickened gall bladder wall on ultrasonography, of which 9 patients (33.3%) were converted. Out of the remaining 73 patients in whom the gall bladder wall wasn't thickened, 4 patients (5.5%) were converted. In another study by Tayeb M et al 58% of the patients with gallbladder wall thickness more than 3mm were converted to open cholecystectomy, suggesting gall bladder thickness as a good predictive factor for conversion. Our finding coincides with these studies.

Pre-operative diagnosis

In a retrospective analysis by Chahin F over a 3 year period of 557 patients who underwent laparoscopic cholecystectomy; 88 patients had acute cholecystitis. He concluded that conversion rates were 22% in patients with acute cholecystitis as compared to 5.5% in case of patients with chronic cholecystitis. In our study of 100 patients, 46 patients (46%) had acute cholecystitis, out of which 7 patients (15.2%) were converted.

According to Singh Kuldip, Ohri Ashish within 72 hours of symptoms the tissue planes are edematous and inflamed but are easier to dissect, having no adhesions at all. But after 72 hours, the tissue becomes more friable and becomes dangerous and risky to dissect till 3-4 weeks time when inflammation subsides and fibrosis sets in. In another study by Koo KP et al authors experienced that laparoscopic cholecystectomy for acute cholecystitis demonstrated a high conversion rate if delayed for more than 72 hours. Prior acute cholecystitis results in a scarred and fibrosed GB, and in dense fibrotic adhesions that render laparoscopic dissection difficult. GB wall thickness is related to the inflammation or fibrosis that follows previous attacks of cholecystitis, and thus may reflect difficulty in delineation of the anatomy during surgery.

Duration of surgery

The average duration of surgery in our series was 75 mins. In our study, the mean duration of surgery in converted cases was 101.2 min and *successful laparoscopic operated was 79.4 min*. In a study by Tayeb M, Raza Syed Ahsan et al from 1997 to 2001, the mean duration of surgery in converted cases was 2.4 hours and successful laparoscopic operated was 1.3 hours.

Period of hospital stay

The period of hospital stay was taken from day of surgery to discharge. The total period of post-operative hospital stay in our study was around 4.5 days. Compared to our series, the study conducted by U. Berggren et al and Rooh-ul-Muqim et al showed a post-operative hospital stay of 1.8 days and 2.06 days respectively which is shorter than seen in our study. The reason for longer hospital stay in our hospital could be that even though many of our patients could have been suggested discharge earlier, because most of our patients were from rural background they insisted on staying till sutures were removed and hence majority of cases discharged after a week.

Conversion to open procedure

Conversion to open technique is considered a major morbidity of LC as it loses its supremacy over open technique once the conversion takes place. The conversion rate in this study was 13.0% and this is comparable to the conversion rate of 2.6% to 14% reported in literature. In 1 (7.6%) cases, conversion was enforced due to bleeding from unknown artery. In 2 (7.6%) cases, there was uncontrolled bleeding from cystic artery. . Conversion to OC was required to achieve successful haemostasis, as they could not be controlled laparoscopically.

Study	Place	Year	No. of cases	Conversion rate
This study	India	2013	100	13.0%
Masoom Raza et al [88]	Karachi	2006	118	11.1%
Tarcoveanu et al [59]	Romania	2005	6985	3.2%
Ishiazaki et al [53]	Japan	2006	1179	7.5%
Dholia et al [56]	Larkana	2005	100	8.0%
Lim et al [60]	Singapore	2005	443	11.5%
Vecchio et al [57]	USA	1998	114005	2.2%
Tan et al [89]	Australia	2006	202	4.2%
Tayeb et al [67]	Karachi	2005	1249	7.5%
Cheema et al [90]	Lahore	2001	75	16.0%
Magee et al [61]	UK	1996	149	10.0%
Balsara & Shah [91]	India	1994	100	10.0%
Saeed Hadi et al [92]	Yemen	2009	709	8.3%
Butt et al [58]	Lahore	2006	300	4%
Guraya et al [63]	Saudi Arabia	2004	549	2.9%

Conversion rate of laparoscopic cholecystectomy into open cholecystectomy

A comparative comparison of rates of conversion with other studies as mentioned above shows that the rate of conversion is high (7.5-16%) amongst studies from the Asian countries, whereas studies from Europe, USA and Australia are showing a decline in their conversion rates (2.6-4.2%).

With the passage of time the experience has grown, the laparoscopic technique has been understood and thus the conversion rate has reached a remarkably low level of 1-6%. In our series, the conversion to open cholecystectomy was required in 13 patients with conversion rate of 13.0%. This rate is comparable to the results of most international studies published in early years of LC (2-15%), it's higher than those results reported recently in last five years (1-6%). This may be due to differences in institutional and individual practice including experience of operating team. Difficult anatomy at Calot's triangle accounted for about half of the conversions (46.10%); the reasons of obscured anatomy were acute inflammation causing dense adhesions (80%) and aberrant anatomy (10%). Al Salamah ,Ibrahim et al and Bingener et al also found it as the most common reason for conversion observed in 41.5%, 48.5% and 50% of patients respectively. We observed that individual anatomy was obscured primarily by dense adhesions (46.1%) and aberrant anatomy (7.6%) was also noted.

V. Conclusion

- 1) As age increases by 1 year, the risk of conversion to open cholecystectomy also increased by 16% but this was not statistically significant.
- 2) Females had higher risk of conversion to open cholecystectomy than males but this was not statistically significant.
- 3) As BMI increases by 1 unit, the risk of conversion to open cholecystectomy also increased by 27% and this was statistically significant.

- 4) As duration of pain increases by 1 day, the risk of conversion to open cholecystectomy also increased by 16% and this was statistically significant.
- 5) Subjects with history of previous hospitalization had 13 times increased risk of conversion to open cholecystectomy than subjects without previous hospitalization.
- 6) Subjects with elevated alkaline phosphatase levels had 5 times increased risk of conversion to open cholecystectomy than subjects with normal alkaline phosphatase levels.
- 7) Subjects with Peri-cholecystic fluid collection had 5 times increased risk of conversion to open cholecystectomy than subjects without Peri-cholecystic fluid collection.
- 8) Subjects with contracted gall bladder and thickened gallbladder wall had 8.4 and 8.6 times increased risk of conversion to open cholecystectomy than subjects with distended gall bladder and normal gallbladder wall, respectively.
- 9) Subjects with fibrosis of liver or fatty liver had 50 and 5 times increased risk of conversion to open cholecystectomy than subjects with normal liver parenchyma.
- 10) Site of pain, occurrence or presence of jaundice, diabetes, hypertension, elevated serum bilirubin levels, pre-operative diagnosis and number of gallbladder calculi were not significant predictors of conversion to open cholecystectomy.

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