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**Original Research Article**

# Risk factors for the conversion of laparoscopic to open cholecystectomy

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## ABSTRACT

**Background:** Gall stones is one of the most common diseases in man. Laparoscopic cholecystectomy is the preferred procedure, mainly due to lower morbidity and mortality, thus returning to the normal activity sooner, lesser number of hospital days and lesser pain post-surgery. However, around 2-15% of the patients need to convert from laparoscopic to open surgery due to different reasons.
**Methods:** 357 patients who came in for laparoscopic cholecystectomy were included into the study. Details such as age, height, weight, BMI, mode of surgery i.e. emergency or elective, physical and clinical examination including Ultrasound, lab results, previous history of surgery and other co morbidities were noted.
**Results:** Out of the 357 patients, 31(8.7%) were converted to open cholecystectomies, of which, 61.3% females and 38.7% males. 58% in the open cholecystectomy group were above 60 years. 67.7% of the patients who converted to open surgery had a BMI of over 25, while it was 39.6% in case of laparoscopic surgery. 74.2% among the patients who had undergone conversion to the open surgery had pain in the right hypochondrium, 67.7% had increased WBC levels.
**Conclusions:** Increased age, obesity, tenderness in the RHC, increased WBC levels, acute cholecystitis are the predisposing factors for the conversion of laparoscopic cholecystectomy to open cystectomy.

**Keywords:** Laparoscopic cholecystectomy, Open cholecystectomy, Risk factor

## INTRODUCTION

Gall stones is one of the most common diseases in man and one of the global health problem. The patients are normally asymptomatic, and this condition is normally detected with ultrasound evaluation for a totally unrelated disease. Of late, laparoscopic cholecystectomy has become a gold standard method for the treatment of gall stones.[1,2] This is mainly due to its lower morbidity and mortality, thus returning to the normal activity sooner, lesser number of hospital days and lesser pain post-surgery.[3] In spite of all this, around 2-15% of the patients need to convert from laparoscopic to open surgery due to different reasons.[4-6] This could be due to complications which may be related to anaethesia, Liver abscesses, increased incidence of iatrogenic lesions mainly to the biliary tract, thermocoagulation, pneumoperitoneum and etc. This issue can be further complicated if there is any anatomical defect, or chronic or acute inflammation.

The conversion, more than a complication, is a wise decision, to avoid further risks or damage to the patient. However, the contra indications is longer operation and hospital stay time, chances of higher morbidity and higher hospital costs. Therefore, there is a need to identify the risk factors that may lead to a conversion to open cholecystectomy. Sometimes, in most of the simple cases complications such as bleeding and accidental lesions, pneumoperitoneum may arise for the simplest of

the reasons, which makes open surgery the only choice. Some of these risk factors can be assessed before the surgery itself, based on various clinical, laboratory and instrumental parameters of the patients. Identification of these markers would help the attending surgeon to plan his procedure.

Thus, in the present study, we identified a few of the factors that would predict the outcome of surgery and the need for an open surgery.

## METHODS

The present study was conducted by the Department of Surgery at Malla Reddy medical college for women and Swaroopa multi-specialty hospital, Hyderabad from March 2015 to April 2018 during which period, all the patients who came in for laparoscopic cholecystectomy were included into the study.

Those who preferred open cholecystectomy were excluded from the study. Patients with choledocholithiasis and with co-morbid conditions such as coagulopathy and suspicion of malignancy were excluded from this study.

Detailed demographic details such as age, height, weight, BMI, mode of surgery i.e. emergency or elective were noted. Detailed physical and clinical examination including Ultrasound was done for all the patients and the results were noted.

Details of previous surgical history, of the present illness and any other comorbidities present were also taken down in detail. Blood was collected from all the patients for routine investigations such as complete blood picture, random blood sugar levels, liver and kidney profile, viral markers etc.

The laparoscopic surgery was performed by an experienced surgeon using standardized technique with four ports and the surgeon standing the left side of the patient. Diathermy coagulation was used for the Calot's triangle dissection.

The dissection of the gall bladder from the liver bed was done either with a hook or with scissors. The statistical analysis was done with chi square test and Fisher's test in SPSS 11.5 software.

## RESULTS

357 patients were scheduled for laparoscopic surgeries in the present study out of which 31(8.7%) were converted to open cholecystectomies (Figure 1).

Out of the 357 patients, 225 (63%) were females and 132 (37%) were males. 19 (61.3%) females and 12 (38.7%) males converted from laparoscopic to open cholecystectomies (Figure 2).

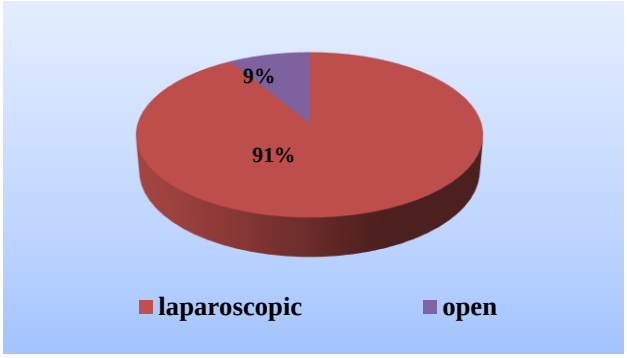


**Figure 1: Conversion from laparoscopic to open cholecystectomy.**

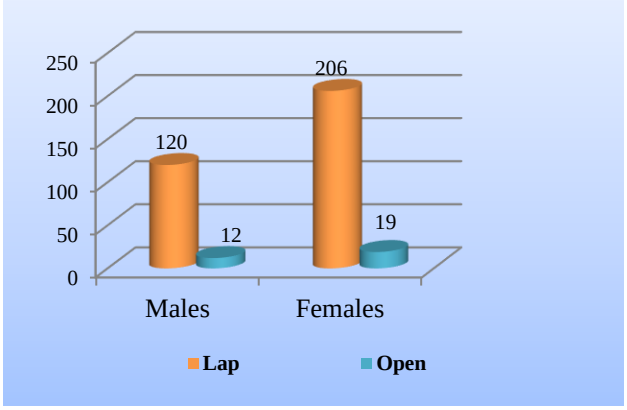


**Figure 2: Gender wise distribution of open and laparoscopic cholecystectomy patients.**

34% of the patients belonged to an age group of above 60 years of age while 58% in the open category were above 60 years, showing age group plays a very important factor in the conversion to open surgery. 67.7% of the patient s who converted to open surgery had a BMI of over 25, showing that they were either overweight or obese. In case of laparoscopic surgery, 39.6% were above 25 BMI (Table 1).

**Table 1: Past history findings and comorbidities.**

| Findings | LC N=326 | Converted N=31 | P value |
|---|---|---|---|
| Age (≥60 years) | 113 (34.7%) | 18 (58.1%) | <0.001 |
| BMI (≥25) | 129 (39.6%) | 21 (67.7%) | <0.001 |
| Hypertension | 97 (29.8%) | 10 (32.3%) | 0.211 |
| Diabetes mellitus | 114 (35%) | 12 (38.9%) | 0.636 |
| Past history of Surgery | 96 (29.4%) | 11 (35.5%) | 0.445 |
| Mode of admission elective | 341 (95.5%) | 28 (90.3%) | 0.217 |
| Emergency | 16 (4.5%) | 3 (9.7%) | 0.133 |

There were more number of patients, 14.4% among the laparoscopic cholecystectomy and 16.1% among the open cholecystectomy to have acute pancreatitis also. 11.7% and 12.9% of the laparoscopic cholecystectomy and open cholecystectomy patients respectively had biliary colitis, while 5.5% and 9.7% of them respectively had acute cholecystitis (Figure 3). However, there was no significant difference in all these co morbidities among both the groups. Most of the patients among the converted ones (74.2%) had pain in the right hypochondrium, which was highly significant.

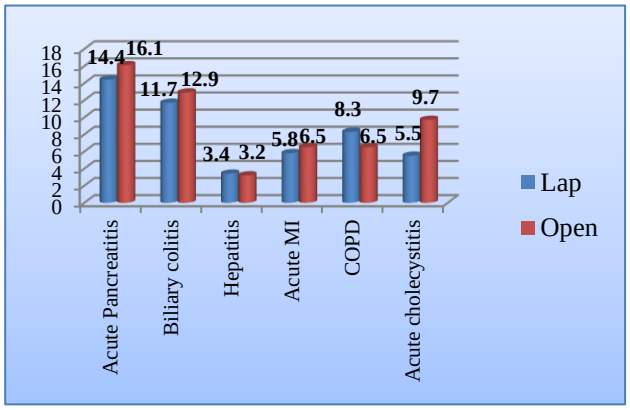


**Figure 3: Other comorbidities (in percentage).**

There was a significant increase in the WBC count among the converted patients (67.7%), while the increased count was seen only in 23.6% among the patients who went in for laparoscopic surgery.

**Table: 3: Association of physical examination and laboratory diagnosis.**

| Findings | LC | Converted | P value |
|---|---|---|---|
| Tenderness in RHC | 165 (50.6%) | 23 (74.2%) | <0.001 |
| Palpable gall bladder | 13 (4%) | 11 (35.5%) | <0.001 |
| WBC <9 x $10^3$/dl | 249 (76.4%) | 10 (32.3%) | <0.005 |
| >9 x $10^3$/dl | 77 (23.6%) | 21 (67.7%) | |
| Direct bilirubin >0.15mg/dl | 68 (20.9 %) | 11 (35.5%) | ns |
| Indirect bilirubin >1.2mg/dl | 72 (22.1%) | 9 (29%) | ns |
| ALP >130 IU/l | 111 (34.1%) | 10 (32.3%) | ns |
| Gall Bladder thickness >3mm | 73 (22.4%) | 19 (61.3%) | <0.001 |
| Edema in gall bladder | 41 (12.6%) | 21 (67.7%) | <0.001 |
| Pericholecystic fluid | 36 (11.1%) | 17 (54.8%) | <0.001 |

There was no significant association in the liver profile between the two groups, however a there was considerable change in the edema, size of the gall bladder between them.

## DISCUSSION

Laparoscopic cholecystectomy is converted to open cholecystectomy only in cases when a safe completion of the former procedure cannot be ensured. Rather than a failure of surgery, it is a good judgment by the attending surgeon, to avoid the forthcoming complications of the laparoscopic cholecystectomy. Thus, the identification of factors which can predict the conversion of the surgery helps in proper perioperative planning of the surgery including counseling of the patients and relatives.

In the present study, the conversion rate from laparoscopic cholecystectomy to open cholecystectomy was 8.7%. Less than 3% rate were reported by Constantini et al, 5.35% was reported by Bhar et al. A very high rate of 25% was reported by Licciardello et al.[7-9]

There was not much difference in the gender among the patients who got converted. This was seen in other similar studies, where there was no significance difference in the number of males and females.[8,10] However in many of the studies laparoscopic cholecystectomy conversion to open cholecystectomy was seen more in the males rather than the females due to anatomical difficulties as well as more adhesions in males.[11-13]

Age seemed to be one of the risk factors for conversion, In present study, a higher rate of conversion was seen among the patients above 60 years of age. Similar results were reported from other studies such as Constantini et al, where also the elderly showed a higher rate of conversion. Several other studies in the literature also showed similar results.[14-16] Freid et al, Liu et al and Brodsky et al also have reported >60years to be of a significant value.[17-19] The reason could be attributed to the fact that the elderly patients have a chronicity of the gall bladder disease, thus with more episodes of acute attacks, thereby causing fibrotic adhesions.[20] This repeated attack of cholecystitis and complicated biliary disease in the elderly has been demonstrated in many other studies. Due to the metabolic decompensation also, the elderly is at a greater risk for conversion into the open surgery. However, the conversion and the scheduling of the surgery should also take into consideration the other contributing risk factors warranting a judicial approach.[5,6,18,21,22] However, Livingston et al and Yetim et al, in their studies reported no association of conversion with age.[4,23]

Obesity and overweight seemed to be one of the risk factors for the conversion in present study. 67.7% of the patients in present study who were converted to open

surgery were overweight or obese had a BMI of >25. This was corroborated by studies by Fried et al in their study.[17] Hutchinson et al reported that an increase in BMI above the normal levels increased the chances of conversion rate from laparoscopic to open.[24]

Hypertension on present study had no significant association with the conversion. This was in accordance to the study by Constantini et al, while in a study by Livingston et al there was a significant assiociation, although the reason for that was not clear.[4,8] Although diabetes mellitus had no association in conversion, the contrary was reported by Constantini et al which was due to the long term microvascular complication on the condition, which also affects the walls of the gall bladder.[8] In present study, there was no contraindication of an earlier abdominal surgery to the laparoscopic cholecystectomy. A similar result was observed by Genc et al, however, in other studies, earlier abdominal surgeries were associated with increased adhesions resulting in a higher conversion rates.[12,25,26] Ecran et al, in their study reported 37.2% of the patients who were converted to have had an earlier abdominal surgery.[13]

The lipid profile of all the patients, whether they underwent laparoscopic of open cholecystectomy was comparable with no significant difference. This was in accordance to the study by Atmaram and Lakshman, who found no significance difference in the bilirubin levels, though there was a significant variation in the ALP levels.[27]

Leucocytosis was very prominent in present study, with 67.7% of the patients who had undergone conversion, having increased WBC levels. Cholecystitis was also observed in significantly higher numbers in the patients undergoing open cholecystectomy compared to the other group. Similar results were observed by several other authors.[5-8,13,24]

## CONCLUSION

Increased age, obesity, tenderness in the RHC, increased WBC levels, acute cholecystitis are the predisposing factors for the conversion of laparoscopic cholecystectomy to open cystectomy. A complete knowledge of these factors before surgery can help the surgeon to decide the plan of action and necessary precautions to be taken.

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