ABSTRACT
Recognition of these factors is important for understanding the characteristics of patients at a higher risk of conversion.

RESULTS: The final multivariate model identified two risk factors for conversion: ultrasoundography signs of inflammation (adjusted odds ratio [aOR] = 8.5; 95% confidence interval [CI]: 3.3, 21.9) and age > 60 years (aOR = 8.1; 95% CI: 2.3, 22.2) after adjusting for physical signs, alkaline phosphatase and BMI levels.

CONCLUSION: Preoperative risk factors evaluated by the present study confirm the likelihood of conversion. Recognition of these factors is important for understanding the characteristics of patients at a higher risk of conversion.

INTRODUCTION:
Laparoscopic Cholecystectomy (LC) has revolutionized minimally invasive procedures.[1],[2],[3] Decreased postoperative pain, earlier oral intake, shorter hospital stay, early resumption of normal activity, and improved cosmesis have been well recognized after LC.[4],[5],[6] A significant reduction in the incidence of wound complications and postoperative ileus has been documented in patients undergoing LC.[7],[8] However, substantial proportions of patients in whom LC cannot be successfully performed are converted to Open Cholecystectomy (OC) because of technical difficulty or intraoperative complications.[9],[10],[11] The current study aimed at evaluating preoperative risk factors for conversion from laparoscopic to open cholecystectomy in our setting.

MATERIALS AND METHODS: A case control study of patients who underwent laparoscopic surgery from May 2016 to April 2017 at Shere Kashmir Institute of Medical Sciences, Srinagar. All those patients who were converted to open surgery (n = 73) were enrolled as cases. Two controls who had successful laparoscopic surgery (n = 146) were matched with each case for operating surgeon and closest date of surgery.

RESULTS: The final multivariate model identified two risk factors for conversion: ultrasoundography signs of inflammation (adjusted odds ratio [aOR] = 8.5; 95% confidence interval [CI]: 3.3, 21.9) and age > 60 years (aOR = 8.1; 95% CI: 2.3, 22.2) after adjusting for physical signs, alkaline phosphatase and BMI levels.

CONCLUSION: Preoperative risk factors evaluated by the present study confirm the likelihood of conversion. Recognition of these factors is important for understanding the characteristics of patients at a higher risk of conversion.

MATERIAL AND METHODS:
The study was planned to identify the circumstances and the risk factors influencing the conversion of laparoscopic cholecystectomy to open procedure.

AIMS AND OBJECTIVE
This study was planned to identify the circumstances and the risk factors influencing the conversion of laparoscopic cholecystectomy to open procedure.

STATISTICAL ANALYSIS:
Data were analysed using Statistical Package for Social Sciences (SPSS).

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Sciences (SPSS version 11.0). Descriptive statistics were computed for characteristics of patients, laboratory and ultrasonographic findings.

RESULTS:
A total of 240 LCs were attempted during the study period, out of which 32 were converted to open cholecystectomy; thus the conversion rate in our study was 7.5%. Twenty-one patients were excluded from the study due to incomplete data while 73 patients with complete medical records were selected as cases. Among these cases 23.3% were males and the reasons for conversion in both genders were dense adhesions in 41 (56.2%), identification of an empyema of the gall bladder in 9 (12.2%), obscure anatomy in 14 (19.2%), periperioperative finding of common bile duct stone in 8 (11.2%), and suspicion of common bile duct injury in 2 cases (2.7%); while the reason for conversion was not documented in the remaining 2 cases.

Patient characteristics, laboratory and ultrasonographic findings.

Patient's characteristics recorded in the 73 converted and 146 successful LC patients with means and standard deviations (SD). Conversion to OC compared with successful LC was significantly associated with higher age, longer duration of surgery and hospital stay, higher white blood cell count and alkaline phosphatase levels, and thicker gall bladder wall. Among the periperioperative variables recorded. Patient's age >60 years, previous upper abdominal surgery, clinical and ultrasonographic signs of acute cholecystitis at admission, and white blood cell count > 10 x 109/L were found significantly associated with conversion to OC.

MULTIVARIATE ANALYSIS

The multivariate model of risk factors independently associated with conversion. Patients with ultrasonographic signs of inflammation (gall bladder wall thickness > 3 mm, oedematous wall, pericholecystic fluid, and ultrasonographic Murphy's sign) were 8.5 times more likely to be converted to OC compared to the patients who underwent successful LC (95% CI: 3.3, 21.9) after adjusting all other variables in the model. Age > 60 years (OR = 8.1, 95% CI: 2.9, 22.2) was also identified as a risk factor for conversion. The final model also adjusted simultaneously for other factors such as alkaline phosphatase level > 130 IU/L, and body mass index of > 25 kg/m2. Hosmer and Leme show goodness of fit test showed a good fit of the model (2 = 10.1, P-value = 0.11).

DISCUSSION:
The well-documented advantages and safety of LC have made it standard of care for the management of patients with symptomatic gallstones. Despite these advantages, conversion to open procedure is required in a varying proportion of patients which ranges from 2% to 15% in different studies.[4] Recent reports also indicate that LC could be a safe and effective treatment option for patients with acute cholecystitis, although the procedure tends to be more difficult with a higher risk of conversion.[12],[13] It is important to realize that the need for conversion to laparotomy is neither a failure nor a complication, but an attempt to avoid complication and ensure patient safety.

The importance of factors predisposing to conversion from laparoscopic to open cholecystectomy has been emphasized in several studies reported from the developed countries.[13],[14],[15],[16] In our study, the final multivariate model demonstrated that ultrasonographic signs of inflammation and age > 60 years were independently associated with conversion after controlling for the confounding effect of other factors in the model. The finding that ultrasonographic signs of inflammation are risk factors for conversion is consistent with previously demonstrated studies that radiographic findings of inflammation increases the risk of conversion to OC.[3],[12],[15],[16],[17] Ultrasonography signs analysed in our study were: gall bladder wall thickness, oedematous wall, pericholecystic fluid and ultrasonographic Murphy's sign. Of these, gall bladder wall thickness was strongly associated with conversion on univariate analysis. Our data shows that 58% of patients with a thickness >3 mm had to be converted, contradicting the belief that this is a weak predictor. [20] However, these categories were merged for simplicity of analysis in the final model, which facilitated identification of ultrasonographic signs of inflammation as an independent risk factor. The presence of these predictive factors allows the operating surgeon to anticipate this situation and perhaps to attempt a more cautious approach before performing LC. He then proceeds with the LC cautiously based on his or her experience. Additionally, some patients are at a greater risk of conversion due to complications of metabolic decompression. Therefore preliminary diagnostic laparoscopy should help identify patients who, due to the presence of dense adhesions or unclear anatomy, require early conversion. The surgeon and the patient, however, should be aware of the increased risk of conversion in the older age group and open surgery should be scheduled especially in the presence of other contributing risk factors. This judicious approach will help in avoiding prolonged surgery as well as the risk of complications like injury to the biliary tree.

The multivariate analysis model also shows that patients older than 60 years of age have an increased likelihood of conversion probably because of the chronicity of gall bladder disease and more fibrotic adhesions. The increased risk of conversion in elderly patients because of recurrent attacks of cholecystitis and complicated biliary tract disease has previously been demonstrated by several studies.[3],[10],[19],[21] Older patients are probably at a greater risk of conversion due to complications of metabolic decomposition. Therefore preliminary diagnostic laparoscopy should help identify patients who, due to the presence of dense adhesions or unclear anatomy, require early conversion. The surgeon and the patient, however, should be aware of the increased risk of conversion in the older age group and open surgery should be scheduled especially in the presence of other contributing risk factors. This judicious approach will help in avoiding prolonged surgery as well as the risk of complications like injury to the biliary tree.

The present study however did not identify alkaline phosphatase level of > 130 IU/L as an independent risk factor for conversion. Increased levels of alkaline phosphatase are of little value since most of them are within the normal range in patients who actually require conversion. Previously obesity (BMI > 30 kg/m2) had been identified as a major factor predicting conversion and had ranged from a moderate to highly significant risk factor [4],[17],[22] however it was not identified as an independent risk factor in our logistic regression model even though obesity was checked for its possible association with conversion on univariate analysis and was identified as marginally significant with an odds ratio of 1.5. The probable explanation is a fewer number of patients with a BMI > 30 kg/m2 (38.4% among converted). However the risk factors in the final model were adjusted for obesity and other factors due to their plausible and significance on univariate analysis.

The review of risk factors from this study has propositions for surgeons while encountering difficulty during LC. Patients who require conversion based on a suspicion of identified preoperative findings are the ones who are likely to be prone to postoperative complications as well. Also, conversion to OC should be regarded as a prudent and conscious attempt to avoid complications. As anticipated, apart from the loss of all the potential advantages of a minimally invasive procedure, conversion also results in increased morbidity, prolonged hospital stay, and increased cost. If a prediction model based on the risk factors evaluated from our logistic regression model can be applied in a clinical setting, it can prevent the surgeon from persisting with a difficult operation. With patients > 60 years of age and in those with signs of inflammation on ultrasonography, the surgeon should maintain a low threshold for conversion.
CONCLUSION:
This study identifies the preoperative risk factors for conversion from laparoscopic to open cholecystectomy in our setting. Patient factors, presentation, and preoperative ultrasonography findings can all contribute to the prediction of conversion.

Recognition of these factors is important for understanding the characteristics of patients at a higher risk of conversion since they require longer hospital stay and place more demands on the health care facilities. The knowledge of these risk factors might help in better psychological preparation of the patient for open surgery and for prolonged convalescence. It will also allow for better organization of the operating room schedule ultimately leading to reduction in procedure-related costs.

REFERENCES:

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