Examining the risk factors of conversion to open surgery in patients with urgent laparoscopic cholecystectomy

Nobuhiro Nakazawa1*, Hideki Suzuki1, Shigehumi Tanaka1, Hiroyuki Kuwano2, Ken Shirabe2

ABSTRACT

Introduction: Laparoscopic cholecystectomy (LC) is the gold standard for treating gallbladder disease. However, approximately 2–15% of patients require conversion to open surgery for various reasons. In this study, we investigated predictive risk factors of conversion in patients undergoing LC for acute cholecystitis. Materials and Methods: We included 143 patients with acute cholecystitis who underwent LC from January 2010 to December 2014 in our Isesaki Municipal Hospital. A total of 15 patients needed conversion to open cholecystectomy (OC). Patients who completed LC and required conversion to OC were compared in terms of age, sex, body mass index, fever (>38°C), Murphy’s sign, laboratory and computed tomography (CT) findings, pre-operative endoscopic retrograde cholangiopancreatography, operation time and bleeding, and duration of hospital stay. Results: The overall conversion rate was 10.5%. Univariate analysis showed that age, sex, fever, Murphy’s sign, raised white blood cell, blood platelet, C-reactive protein, gallbladder wall thickness on CT, and operative bleeding were significantly correlated with conversion. Conclusions: It is possible to predict the risk of conversion. We should emphasize the possibility of conversion to those patients preoperatively.

KEY WORDS: Acute cholecystitis, Conversion, Laparoscopic cholecystectomy, Risk factors

INTRODUCTION

Laparoscopic cholecystectomy (LC) is the gold standard for treating gallbladder disease. Acute cholecystitis patients undergoing LC had a significantly lower rate of complications, shorter hospital stays, and more comfortable post-operative periods than those undergoing open cholecystectomy (OC).[1] However, approximately 2–15% of patients require conversion to open surgery for various reasons.[2,3] The most common reason for conversion is believed to be inflammatory tissue reactions that make dissection difficult. It is well accepted that the inability to identify the anatomy of the Calot’s triangle as a result of inflammation in the area around the gallbladder tends to require conversion to OC. Consequently, there is a need to identify potential risk factors in patients with acute cholecystitis and stratify them accordingly. This will assist surgeons in choosing the best approach for cholecystectomy in these patients and, hopefully, reduce the complication rates associated with interval LC for acute cholecystitis.[4] Thus, the objective of our study is to determine the predictive risk factors of conversion in patients undergoing LC for acute cholecystitis. A discussion of some of related medical literature on this subject is also presented.

MATERIALS AND METHODS

Our study included 143 patients with acute cholecystitis who underwent LC from January 2010 to December 2014 in our Isesaki Municipal Hospital. A total of 15 patients needed conversion to OC. Patients who completed LC and required conversion to OC were compared in terms of age, sex, body mass index (BMI), fever (>38°C), Murphy’s sign, laboratory and computed tomography (CT) findings, pre-operative endoscopic retrograde cholangiopancreatography (ERCP), operation time and bleeding, and duration of hospital stay. Results from laboratory tests such as white blood cell count (WBC), neutrophil-to-lymphocyte ratio (NLR), platelet (PLT), glutamic pyruvic transaminase, γ-glutamyltranspeptidase, and C-reactive protein (CRP) were collected. Because NLR is prognostic in severe cholecystitis, we compared the two groups.[5] CT findings, such as the major axis of

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the gallbladder and thick-walled (>4 mm) gallbladder, were collected. The number of times of pre-operative ERCP was also noted.

Cholecystectomies were performed using the standard four-port technique. The first port (blunt port) was inserted in the umbilical region. Three 5 mm ports were inserted along the subcostal margin under direct vision at the middle, midclavicular, and anterior axillary lines. Dissection of the Calot’s triangle and the gallbladder from the liver bed was accomplished using monopolar electrocautery. The gallbladder was retrieved in an endoscopic bag and extracted through the umbilical port. Conversion was performed by median or subcostal laparotomy according to the surgeon’s decision and each patient’s condition.

The pre-operative, intraoperative, and post-operative factors of patients undergoing LC (n = 128) versus conversion (n = 15) were compared using the Kruskal–Wallis rank sum or Mann–Whitney test for quantitative measures and Pearson’s Chi-square or Fisher’s exact test for categorical data. Differences were considered statistically significant at P < 0.05.

RESULTS

A total of 143 LCs performed at Isesaki Municipal Hospital from January 2010 to December 2014 were included in this study. 15 patients required conversion to OC. Therefore, the overall conversion rate was 10.5%. The mean age of LC patients was 54.0 ± 2.9 years, and the conversion group was 65.3 ± 8.3 years (P = 0.0121). Male patients had a significantly higher LC failure rate as compared to female patients (P = 0.0081). Of interest, no statistically significant difference was found between groups in terms of BMI (P = 0.9697). Both fever (>38°C) and a positive Murphy’s sign were found in 25 patients in the LC group and five patients in the conversion group. A statistically significant difference was found between groups in terms of fever (>38°C) and Murphy’s sign (P = 0.0102) [Table 1].

WBC counts, blood PLT counts, and CRP responses were significantly different in conversion group (P < 0.05). However, the NLR and liver enzymes were not found to be significantly different between the two groups.

With regard to the CT findings, the mean major axis in LC patients was 74.46 ± 3.88 mm, and conversion group’s was 84.13 ± 11.20 mm. There was no statistically significant difference between the two groups (P = 0.1090). On the other hand, thick walls (>4 mm) were significantly more prevalent in the conversion group (P = 0.0164).

The number of times of pre-operative (ERCP was not found to be statistically significant (P = 0.8345) [Table 2].

The mean operative bleeding was 23.07 ± 26.19 ml in the LC group, whereas it was 248.57 ± 60.63 ml in the conversion group. This was found to be statistically significant (P < 0.0001). However, the mean operative time was 136.38 ± 9.14 min in the LC group, whereas it was 160.93 ± 26.42 min in the conversion group. This was not found to be statistically significant (P = 0.0848) [Table 3].

The mean hospital stay was 6.19 ± 0.88 days in the LC group, whereas it was 7.60 ± 2.53 days in the conversion group. A statistically significant difference was not found between the two groups (P = 0.2978) [Table 4].

DISCUSSION

LC, one of the most common laparoscopic surgeries performed in a general surgical unit, is the gold standard for treating gallbladder disease. Patients with acute cholecystitis who underwent LC had a significantly lower rate of complications, shorter hospital stays, and more comfortable post-operative periods than did those who underwent OC.[1]

However, LC for acute cholecystitis may still be associated with conversion to laparotomy. Approximately 2–15% of patients required conversion to open surgery for various reasons.[2,3] Extensive inflammation as well as bleeding and adhesion around the Calot’s triangle make dissection difficult. The rate of conversion to laparotomy in our study was 10.5%. Pre-operative prediction of the risk of conversion is an important aspect of planning laparoscopic surgery. In our study, we considered the risk of conversion from various aspects.

First, the age was found to be statistically significant predictive factor in our study. Some studies reported that the age >65 years was a significant independent factor.[6,7] Increasing age was an identified pre-operative risk factor of conversion. Furthermore, male gender was found to be a significant predictive factor. Several studies demonstrated that male patients were significantly more likely to have severe inflammation requiring conversion to LC in acute cholecystitis.[6-8] In general, male patients tend to have more severe cholecystitis, such as gangrenous cholecystitis, than do women. We suggest that this is why male gender was a significant predictor of severe inflammation and conversion to LC. In our study, 12 of 13 patients diagnosed with gangrenous cholecystitis in pathology were men.

Some literature reported that obesity was an independent predictor of conversion to OC in patients with acute cholecystitis.[9,10] However, in our series, BMI was not found to be a predictor of difficult cholecystectomy. Some studies also failed to identify the statistical significance of BMI in
In our study, advanced age, male sex, fever (>38°C), positive Murphy’s sign, raised WBC, PLT, and CRP, and thick walls (>4 mm) in CT findings have emerged as effective indicators for conversion cholecystectomy.

Predicting those risk factors for conversion will assist surgeons in choosing the best approach for laparoscopic cholecystectomy and reduce the complication rates associated with interval LC.

However, as the sample size of our study is too small, more studies will enable us to evaluate these predictors in acute cholecystitis.

REFERENCES

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