

Leukocytosis can predict increased risk of conversion in elective laparoscopic cholecystectomy

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ABSTRACT

Introduction: Laparoscopic cholecystectomy (LC) is the gold standard in the treatment of gallbladder diseases. However, open surgery is sometimes inevitable for the procedure to be completed safely. The aim of this study was to evaluate the relationship of some laboratory findings frequently used in the preoperative period to the need to convert to open surgery in LC.

Materials and Methods: The hospital records of 173 patients who underwent LC due to benign gallbladder disease were retrospectively reviewed. Based on preoperative laboratory values, white blood cell count (WBC) $>10,000/\text{mm}^3$, alanine aminotransferase >55 IU/L, aspartate aminotransferase >35 IU/L, gamma-glutamyltransferase >65 IU/L, and alkaline phosphatase >150 IU/L were accepted as positive, according to the laboratory kits of the hospital.

Results: Of the 173 patients who were included in the study, 142 (82.0%) were female and 31 (18.0%) were male, and the mean age was 47.3 years (range: 21–81 years). In 159 (91.9%) of the patients, the operation was completed laparoscopically, while in 14 (8.1%) it was converted to open surgery. The most common symptoms seen in the patients were epigastric discomfort and right upper quadrant pain. The preoperative laboratory values of 80 patients were high. Open surgery was preferred in 7 of these patients with high laboratory values. The procedure was converted to open surgery in 5 (25.0%) of the 20 patients with high preoperative WBC value and the level of these preoperative values was found to be statistically significant ($p<0.01$). A total of 9 conversions to open surgery were required in 153 patients with low WBC score (5.8%).

Conclusion: A high WBC value ($>10,000/\text{mm}^3$) before elective LC increases the risk of the eventuality of open surgery by 4 times. This finding will help the surgeon to plan the treatment and inform the patient of the possibility before surgery.

Keywords: Cholelithiasis; conversion; laparoscopic cholecystectomy.



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Introduction

The frequency of the occurrence of gallbladder stones is 20% in the western world. Today, LC is the preferred standard method of surgery for symptomatic gallbladder stones and other benign gallbladder diseases.^[1] LC has many advantages, such as less postoperative pain, better cosmetic results, shorter hospital stay, and earlier time to return to work. Many studies on acute cholecysts have shown the safety and advantages of open surgery even at later ages.^[2] However, converting to open surgery is sometimes inevitable for the safe completion of the operation. The reason for converting to open surgery during the LC is to prevent serious complications that may occur during the procedure.^[3] In Calot's triangle dissection, open cholecystectomy is recommended when the bile ducts cannot be revealed or when a life-threatening complication arises.^[4,5]

This study aims to evaluate the relationships of some laboratory findings frequently used in the preoperative period in converting to open surgery in laparoscopic cholecystectomy.

Materials and Methods

The hospital records of 173 patients who underwent LC because of benign gallbladder diseases in our hospital between January 2013 and January 2015 were retrospectively reviewed. All patients were elective ones, and emergency cases were excluded from the study. The cases were evaluated in terms of age, gender, preoperative findings, imaging results, preoperative laboratory values, and complications during and after surgery, current symptoms, and follow-up of the patients. From the preoperative laboratory values, the white blood cell count (WBC) $>10,000/\text{mm}^3$, alanine aminotransferase (ALT) >55 IU/L, aspartate aminotransferase (AST) >35 IU/L, gamma-glutamyl transferase (GGT) >65 IU/L, and alkaline phosphatase (ALP) >150 IU/L were accepted as positive according to the laboratory kits of our hospital (Abbott® Inc. Ill., USA). The treatment began with laparoscopy, and the standard four-trocar technique was used in all patients. The operations were performed by four different surgeons. All patients underwent preoperative ultrasonography (US). The mean follow-up period of the patients was 6.2 months. The presence of redness, temperature increase, and purulent discharge at the trocar site was considered positive for wound infection. The data obtained were analyzed with SPSS (16 for Windows,

SPSS Inc., Chicago, Illinois, USA). The Fischer's exact test was used for the statistical analysis, and $p < 0.05$ was considered statistically significant.

Results

Of the 173 patients who were included in the study, 142 (82.0%) were female and 31 (18.0%) were male, and their mean age was 47.3 (21–81) years. The operation was completed laparoscopically in 159 (91.9%) of the patients and was converted to open surgery in 14 (8.1%). The most common symptoms observed in the patients were epigastric discomfort and right upper quadrant pain (Table 1). Among the patients, 11 (6.3%) also had umbilical hernia, and they were primarily treated. All patients who were treated with laparoscopy were discharged on the first postoperative day. The mean hospital stay of the patients with complication was 3.4 (2–6) days. During the operation, two patients had hemorrhaged from the trocar insertion site, and one patient was re-operated because of postoperative hemorrhage. Postoperatively, mortality was seen as a result of organ perforation in one of our patients. One patient had umbilical trocar site hernia, eight patients had wound infection, and three patients (two underwent LC and one underwent open surgery) were observed to have biliary leakage. Among the patients who developed wound infection, three underwent LC, and five had open surgery. The preoperative laboratory value of 80 patients was high. The operation of seven of these patients with high laboratory values was converted to open surgery. Among the 20 patients who had high preoperative WBC values and underwent LC, 5 (25.0%) underwent the operation that was converted to open surgery. The high level of this value was found to be statistically significant before surgery ($p < 0.05$). Nine open surgeries were needed in 153 patients with low WBC values (5.8%). The AST, ALT, GGT, and ALP levels were not statistically significant (Table 2).

Table 1. Presenting symptoms

Symptoms	Number of patients	Percentage
Pain at upper abdomen	103	59.5
Intolerance of food	37	21.4
Nausea/Vomiting	21	12.1
Right shoulder pain	12	7.0

Table 2. Laboratory values of patients

Laboratory values	Laparoscopic cholecystectomy n=159 (91.9%)		Converted to open cholecystectomy n=14 (8.1%)		p
	n	%	n	%	
White blood cell >10,000/mm ³	20	12.5	5	35.7	0.02
Aspartate aminotransferase >35 IU/L	15	9.4	1	7.1	0.89
Alanine aminotransferase >55 IU/L	16	10.0	0	0.0	0.26
Gamma-glutamyl transferase >65 IU/L	21	13.2	1	7.1	0.65
Alkaline phosphatase >150 IU/L	8	5.0	0	0.0	0.47

Discussion

Many studies have shown that LC has the advantages of reduced postoperative pain, earlier onset of oral intake, shorter duration of hospital stay, early onset of normal activity, and good wound healing compared with open cholecystectomy.^[6,7] However, in a crucial situation that can occur during the operation, it can be converted to laparotomy for the safety of the patient. Converting to open surgery is not a failure or a complication but should be considered as an attempt to ensure the safety of the patient. The most common cause of converting to open surgery is the inability to correctly identify the anatomy of Calot's triangle around the bile duct as a result of inflammation.^[8]

The risk factors for converting to laparotomy have been discussed in the literature, and they include age, sex, obesity, body mass index, duration of symptoms, WBC, liver function tests, US, cholangitis attacks, pancreatitis history, and preoperative endoscopic retrograde cholangiopancreatography.^[9,10] In this study, the effect of WBC value, one of the preoperative laboratory values, on the conversion to laparotomy was found to be statistically significant. Nine open surgeries were needed in 148 patients with low WBC values (6.1%). According to the results of this study, the high WBC value (>10,000/mm³) before elective laparoscopic cholecystectomy increases the risk of converting to open surgery by four times.

Despite the current use of laparoscopic surgery in many diseases, this method has involved many complications from the first day it was implemented until today. During the first days that LC was used, many common bile duct injuries and other complications were encountered.^[11,12] The reason for this situation was that the surgeons initially encountered a difficult learning curve. Despite the wide range of surgical and technical experience, compli-

cations of this procedure are still being reported in the modern world.^[12,13]

Early laparotomy during LC can reduce the severity and the number of complications. Ali A. et al. found that the rates of both preoperative and postoperative complications in patients treated with laparoscopy were higher than those in patients treated with laparoscopy converted to laparotomy.^[13] In this study, two patients bled from the trocar insertion site, and one patient was re-operated because of postoperative hemorrhage. Postoperative mortality was considered a result of organ perforation in one of the patients treated with laparoscopy.

The rates of conversion to laparotomy have been reported to be 2%–15%^[14,15] in the literature. The rate of conversion to open surgery in this study was 8.1% (14 of 173). In the analysis of the effect of preoperative laboratory values on conversion to open surgery, the WBC value was statistically significant but the high value of the liver enzyme had no effect.

In conclusion, accurately predicting the probability of converting to open surgery before the operation is useful. The patient can be forewarned and the surgeon can get ready for a longer and more difficult procedure. Knowing that these laboratory values are risk factors for conversion to open surgery before the operation can help surgeons in planning the treatments and informing the patients about it before surgery.

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