Effect of gender on the conversion rate of laparoscopic cholecystectomy

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ABSTRACT

Introduction: Many factors have been found to be associated with a higher rate of conversion from laparoscopic to open cholecystectomy. The aim of this study was to examine whether the patient's gender, specifically the male gender, is one of these factors.

Methods: This retrospective study included patients of both sexes who underwent cholecystectomy at Prince Hashim Bin Abdullah II Hospital between 2015 and 2018. The exclusion criteria were defined to eliminate the effect of most confounding factors. Data were statistically analysed using SPSS version 23.

Results: Three hundred patients with a mean age of 43.57 years were included in the study, 29.3% of whom were males. The conversion rate was 8.3% for the whole sample (13.6% for males, 6.1% for females), with a statistically significant difference between males and females (P = 0.032) and an odds ratio of 2.417. The most common cause for conversion was the inability to display anatomy safely (40%).

Conclusion: Male gender is an independent risk factor for conversion of laparoscopic cholecystectomy to the open approach. However, more research is needed to determine the underlying pathophysiology.

Keywords: Laparoscopic cholecystectomy; Open cholecystectomy; Gender; Conversion.

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Introduction

Laparoscopic cholecystectomy (LC) has replaced open surgery as the gold standard treatment for patients with symptomatic gallbladder disease.[1–3] The advantages of LC over the conventional technique include reduced postoperative pain, less impairment of vital functions, shorter hospital stay, faster return to normal activities and work, fewer complications, better cosmoses and a lower treatment cost.[4-8]

However, some patients require conversion to open cholecystectomy (OC). Therefore, identifying risk factors that could distinguish these patients might be helpful for both patients and surgeons. Patients who require conversion have a longer length of stay, longer operating time and more complications than those who undergo LC.[9] Several clinical and epidemiological studies suggest that the outcome of LC depends on factors such as age, body weight, clinical presentation, previous abdominal surgery and the surgeon's experience.[10]

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Some investigators have suggested that gender affects the conversion risk, while others do not agree. The aim of this study was to determine whether gender is an independent risk factor for conversion to open cholecystectomy.

METHODS

This retrospective study included patients who underwent elective cholecystectomy at Prince Hashim Bin Abdullah II Hospital between 2015 and 2018. The operation room record was used to recruit patients, whose medical records were subsequently reviewed.

Exclusion criteria were defined to reduce the effect of confounding factors and to ensure that cases were matched as close as possible. These criteria included: (1) patients who were operated on in an emergency situation (acute cholecystitis), (2) morbidly obese patients, (3) patients with known coagulopathy or abnormal clotting parameters, (4) patients with a previous history of upper abdominal surgery, or (5) those with abnormal liver function tests. All surgeries used the four trocar standard technique, and the pneumoperitoneum was created using the Verres needle technique, the closed technique or the open (Hasson) technique.

SPSS version 23 was used to statistically analyse all available data. Independent t-test, chi-square test and binary logistic regression were used, and 95% confidence intervals (CI) were used when pertinent. A P-value <0.05 was used to indicate statistical significance.

RESULTS

Of the 300 patients included in the study, 212(70.7%) were females and 88(29.3%) were males. The age of the patients ranged from 18 to 69 years, with 85.7% of them aged under 60 years. The mean age of the whole sample was 43.57 years, and there was no statistically significant difference between the two genders (P = 0.451).

Of the 300 patients, 25 (8.3%,95% CI [5.2, 11.4]) required conversion to OC, comprised of12(13.6%) males and 13(6.1%) females. Using a chi-square test and logistic regression, a statistically significant difference was detected between the two genders (P = 0.032), with an odds ratio of 2.417(95% CI [1.056, 5.531]).Patient characteristics and statistical findings are summarised in **Table I**.

Table I: Patient characteristics and statistical findings (95% confidence interval).

	Male	**Female**	**Total**
Number	88 (29.3%)	212 (70.7%)	300
Mean age(years) P-value	44.49	43.19	43.57 0.451
Converted Confidence interval	12 (13.6%) 6.4–21%	13 (6.1%) 2.9–9.3%	25 (8.3%) 5.2–11.4%
P-value Odds ratio	0.032 2.417		

The most common causes of conversion included the inability to display anatomy safely (40%), bleeding (20%) and adhesions. Other less common causes included common bile duct injury and bowel injury. The reasons for conversion are listed in **Table II**.

Table II: Causes of conversion.

Cause	Male	Female	Total
Unable to display anatomy safely	7	3	10 (40%)
Bleeding	2	3	5 (20%)
Adhesion around the gallbladder	3	2	5 (20%)
Bile duct injury	0	2	2 (8%)
Bowel injury	0	1	1 (4%)
Equipment failure	0	1	1 (4%)
Spillage of stones	0	1	1 (4%)
Total	12	13	25

The majority of patients (94%) had uneventful recovery. Postoperative morbidity was found in 18 patients. These included incisional hernia, bleeding, wound infection, common bile duct injury and bile leak as shown in **Table III**. There was no mortality.

Table III: Postoperative complications:

Incisional hernia	10
Port site bleeding	1
Wound infection	3
Common bile duct injury	3
Bile leak	1

DISCUSSION

First introduced in 1987, LC has become the standard approach for the treatment of gallstone disease. It is the most common laparoscopically performed operation worldwide,[15,16] and has many well-known advantages over the open approach **Table IV**.

Table IV: Advantages of laparoscopic cholecystectomy over open cholecystectomy.

Better cosmesis
Earlier return to work
Lower cost
Lower mortality
Reduced postoperative pain
Less tissue damage
Shorter or no hospital stay

Nevertheless, there are situations in which it is essential to convert to the open approach. This conversion is neither a failure nor a complication, but an attempt to avoid complications. Despite an increase in expertise and advances in technology, the conversion rate still ranges from 1.5% to 19% across different centres [12] (8.3% in our study).

Many risk factors for an increased risk of conversion have been identified and studied **Table V**. In the current study, we tried to match the study sample using a set of exclusion criteria that excluded most previously described risk factors. Also, 85.7% of our patients were aged below 60 years, thereby excluding age as a risk factor. Unfortunately, in our institution, surgeon experience remains a confounding factor.

Table V: Factors associated with the conversion to open surgery.

Experience of surgeon
Emergency surgery
Previous laparotomy
CBD stone
Body temperature
WBC
Bilirubin
BMI
Age

CBD, common bile duct; WBC, white blood cells; BMI, body mass index.

Whether the patient's gender is a risk factor for conversion remains controversial. Male sex has been considered a risk factor by many researchers including Livingston et al., Kama et al., Mohanapriya et al., and many others,[11,12,17-25]whereas other studies have not found male sex to be an independent risk factor for predicting conversion, including studies by Abdul Mohsen, Lo et al., Schrenk et al., Liu et al. and others.[10,13,14,23]In our study, we found a statistically significant difference between the two genders (P=0.032), with males being more than 2.4-times more likely to be converted than females.

The reasons for conversion are listed in **Table II**; however, it is still not clear why the rate is higher in males. A more difficult plane of dissection between the gallbladder and liver has been reported in males, in addition greater fibrosis in the area of Calot's triangle. [24]More research is needed in this field.

CONCLUSION

Identifying the risk factors for conversion is helpful for preoperative patient counselling, especially in the era of day case surgery. Male gender is an independent risk factor for conversion; however, more research is needed to determine the underlying pathophysiology.

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