

# ROLE OF MALE GENDER IN LAPAROSCOPIC CHOLECYSTECTOMY OUTCOME

Rakan Alqahtani<sup>\*,1</sup>, Wagih Ghnam<sup>†</sup>, Mohammad Alqahtani<sup>\*</sup>, Abdulrahman Qatomah<sup>\*</sup>, Awdah AlKhatami<sup>\*</sup> and Adel Alhashim<sup>\*</sup>

<sup>\*</sup>King Khalid university, Abha, Saudi Arabia, <sup>†</sup>Mansoura Faculty of medicine, Mansoura university, Egypt

## ABSTRACT

**Background:** Laparoscopic cholecystectomy is one of the most commonly performed laparoscopic procedures. Many problems occur during laparoscopic cholecystectomies like common bile duct injury, hemorrhage, and other complications. Some authors consider male gender as a risk factor for laparoscopic cholecystectomy conversion rate.

**Aims:** To determine the effect of male gender on the outcome of laparoscopic cholecystectomy for Chronic Cholecystitis.

**Methods:** A retrospective clinical trial was carried out at our Hospital to investigate male gender as a predictor for difficult laparoscopic cholecystectomy. All the operations were done according to our standard four-port technique. 1 Anesthetic technique and perioperative management were the same for all patients during the study period.

**Results:** From a total number of 638 patients, who underwent laparoscopic cholecystectomy for Chronic Cholecystitis from 1st January 2012 to 1st of January 2015) 217 patients excluded according to exclusion criteria. The remaining 421 patients were included. We found that female patients were four times more than male patients, mean age was 40 years (range 13-101 years) for both genders. There were more statistically significant difficult laparoscopic cholecystectomies in males in comparison to female patients for chronic cholecystitis.

**Conclusion:** Male gender is a statistically significant predictor for difficult laparoscopy for symptomatic gallstones presented as chronic cholecystitis

**KEYWORDS:** Chronic cholecystitis, Laparoscopy, Cholecystectomy, male gender

## Introduction

Laparoscopic cholecystectomy (LC) is one of the most common procedures in laparoscopic surgery. It is now considered as the treatment of choice for symptomatic gallstones and its advantages over open cholecystectomy (OC) are well known. [1–4] Risk factors accounting for the perioperative complications of LC

has been of major interest. All literature agree that risk factors that could predict conversion are: acute cholecystitis, older age, male gender, obesity, and a thickened gallbladder wall. Many studies have shown that symptomatic gallstones, inflammation, and fibrosis are more extensive in men than in women. These findings supported the observation of high conversion rate in men than in women. On the contrary, many studies have failed to prove that male gender is a risk factor for conversion; rather, they noted a combination of risk factors, including old age, acute cholecystitis and history of upper abdominal surgery.[5–10] The conversion rate and complications associated with LC depend on the experience of the surgeon and the degree of difficulty faced during surgery. They can be affected by factors such as a history of previous abdominal surgery, acute cholecystitis (AC), repeated hospital admissions due to recurrent attacks of cholecystitis, older age of the patient, or male gender. However, despite extensive research, the controversy surrounding the role of gender as a risk factor in LC still exists.

Copyright © 2015 by the Bulgarian Association of Young Surgeons

DOI:10.5455/ijsm.20150903081650

First Received: August 20, 2015

Accepted: September 03, 2015

Manuscript Associate Editor: George Baitchev (BG)

Editor-in Chief: Ivan Inkov (BG)

Reviewers: Georgi Popivanov (BG); Soren Larsen (DK); Peter Ambe (DE)

<sup>1</sup>Rakan Saeed Alqahtani, King Khalid university, Abha, Saudi Arabia

Email:raakaan1412@hotmail.com

**Table 1** Variables of Male and Female Patients Undergoing LC and difference in Conversion Rate between Male and Female Patients Undergoing LC.

Parameter	Group I (men n=85)	Group II (women n=336)	Total cases	P value (significance)
Age mean $\pm$ SD	45.2 $\pm$ 12.3	39.7 $\pm$ 18.08	40.82 $\pm$ 17.2	0.001
Range years	20-78	13-101	13-101	
Operative time means in minutes $\pm$ SD	69.6 $\pm$ 30.08	57.5 $\pm$ 23.97	59.94 $\pm$ 25.75	0.0001
range	40-145	40-155	40-155	
Hospital stay means in days $\pm$ SD	2.78 $\pm$ 3.11	1.81 $\pm$ 2.19	2.007 $\pm$ 2.34	0.008
range	1-13	1-14	1-14	
Conversion to open surgery Number (%)	19(22.4)	30(8.9)	49(11.6)	0.001
BMI mean $\pm$ SD	31.69 $\pm$ 4.25	31.77 $\pm$ 4.34	31.76 $\pm$ 4.31	0.8
range	24.5-46.5	24.5-46.5	24.5-46.5	

The aim of this study is to investigate the role of male gender as an isolated risk factor responsible for the increased perioperative morbidity and conversion rate of LC.

### Patients and Methods

A quantitative comparative study was set up in the background that male gender, as an isolated risk factor, has no impact on the outcomes of LC.

Elective LC considered in this study, and the following data were recorded: duration of surgery from skin incision to skin closure, length of postoperative hospital stay, conversion rate, bleeding, bile duct injury, organ injury, biliary leak, pancreatitis, obstructive jaundice, and wound infection. Risk factors that may have an impact on the outcomes of LC excluded, including emergency LC, Acute cholecystitis, empyema and gangrenous gallbladder, upper abdominal surgery, and ASA class III patients. Data were collected retrospectively from our hospital records database. Authors performed LC. Hospital electronic database was used to retrieve the number of LC procedures performed during the study period. Five medical students reviewed the case notes of 638 patients who had elective LC, and 421 cases met the inclusion criteria were analyzed and reported.

### Statistics

Data were analyzed using SPSS for Windows, version 20 (IBM, Armonk, New York). Age, BMI, hospital stay, and duration of surgery were considered parametric and were analyzed with the independent samples *t*-test. The other outcome measures were found nonparametric and were analyzed with the  $\chi^2$  test. The data were summarized using cross tabulation of descriptive statistics. Inferential statistics was applied to the data to value

the effects and differences of the results for any significance. A 2-sided *P* value of  $< 0.05$  was reported.

### Results

A total of 336 women (79.8%) and 85 men (20.2%) underwent LC. In most of the patients, the gallbladder histologic diagnosis was chronic cholecystitis in 346 patients (82.1%) of the studied specimens, whereas seventy-five patients (17.8%) had cholelithiasis. The mean age was 39.7  $\pm$  18.08 years for women and 45.2  $\pm$  12.3 for men. Women had a higher BMI (31.77  $\pm$  4.34) than men (31.69  $\pm$  4.25). The mean duration of surgery was longer in men (69.6  $\pm$  30.08 minutes) than in women (57.5  $\pm$  23.97 minutes); the difference was statistically significant. Male gender had prolonged postoperative hospital stay than women, with (2.78  $\pm$  3.11 days) for men and (1.81  $\pm$  2.19 days) for women (Table 1).

There was statistically significant difference between the two genders in terms of conversion. In the male group, 19 patients (22.4%) required conversion: all because of difficulties encountered in dissecting the Calot's triangle and unclear anatomy. In the female group, 30 patients (8.9%) required conversion: 2 (0.6%) because of bleeding and the remaining 28 (8.3%) because of difficulties encountered in dissecting the Calot's triangle and unclear anatomy. (Table 1).

Perioperative and postoperative morbidity were similar in both male and females. We encountered three cases (0.7%) of common bile duct (CBD) injury in the studied groups' two females and one male detected postoperatively by endoscopic retrograde cholangio-pancreaticography (ERCP). Post-operative jaundice because of retained or slipped stones were reported in 4 patients (0.95%): 3 females and one male treated successfully by ERCP. Postoperative bile leak was reported in two female patients (0.47%) one treated conservatively and one with ERCP

**Table 2** Differences in perioperative and postoperative morbidity rates between male and female patients undergoing LC.

Parameter	Group I (men n=85)	Group II (women n=336)	Total cases	P value (significance)
CBD injury (%)	1(1.18)	2(0.6)	3(0.71)	0.8
Postoperative jaundice	1(1.18)	3(0.9)	4(0.95)	0.69
Biliary leak	0(0)	2(0.6)	2(0.48)	0.87
Pancreatitis	2(2.35)	2(0.6)	4(0.95)	0.39
Port site infection	1(1.18)	3(0.9)	4(0.95)	0.7
Total cases	5(5.89)	12(3.6)	17(4.03)	0.51

and stenting. Postoperative acute pancreatitis was reported in 4 patients (0.95%) 2 males and two females treated conservatively and ERCP done in all of them with sphincterectomy and CBD clearance. Post-operative port site infection was reported in 4 patients, three women, and one male. (Table 2)

## Discussion

Laparoscopic cholecystectomy (LC) is one of the most commonly performed laparoscopic procedures. It requires only small incisions, causes relatively less pain, allows for early ambulation, requires a shorter hospital stay, allows early return to work and is associated with a lower incidence of an incisional hernia. The complications encountered during LC are numerous. [1-3] Research series have shown that LC in men is associated with a higher morbidity rate than that in women. Male gender is usually accompanied by other risk factors that contribute to the increase in the perioperative morbidity rate. This study tried to prove or not that male gender would be an independent risk factor for conversion and increased perioperative morbidity rate?

Factors affecting the outcomes of LC have been heavily investigated over the past years, aiming to predict conversion and postoperative complications. Many studies have shown age (>65 years) to be a risk factor for increased perioperative morbidity and conversion rates because of acutely associated cholecystitis and a high ASA classification. [11–15]

In a study by Merriam et al., [15] acute gangrenous cholecystitis was twice more likely to develop in men than in women, and male gender was a recognized factor for complicated cholecystitis. The study considered that these variations may handle the noticeable impact on the outcomes in men. Also in another study Severe gallbladder inflammation (gangrenous and necrotizing cholecystitis) was seen in a significant portion of the male population compared to the female population ( $p = 0.002$ ). The male gender was confirmed in a multivariate analysis as an independent risk factor for severe cholecystitis ( $p = 0.018$ ). The

same study argued that males always had advanced gall bladder disease because they found that males had twice incidence of acute cholecystitis than females, and they seek treatment after it is going to be a difficult laparoscopic cholecystectomy. [16] However, it is not the case in our study as we excluded pathologic complications of gallstone disease including gangrenous cholecystitis, empyema of the gallbladder, and acute cholecystitis. Only confirmed histologic diagnoses of chronic cholecystitis and cholelithiasis were included.

In this series, all patients were ASA class I, II and the mean age of the patients were  $40.82 \pm 17.20$  years and 90% were below the age of 60 years, which excludes age as a risk factor. [17] Wiebke et al.[7] and Rosen et al.[18] reported that male sex was not a risk factor for difficulty during surgery or conversion On the other hand, the findings Kanaan et al. [19] and Simopolous et al. [20] are in agreement with our findings that male patients have an increased risk of difficult LC and that being a male increased the risk of unsuccessful LC.

We consider as many others that conversion to Open Cholecystectomy (OC) is not a complication it is a safe strategy to prevent serious complications. [7, 20, 21]

The overall rate of complications (4.03%) in this series is similar to that found in the current literature, and nonsurgical measures successfully managed most of these. [12, 22, 23] Although intraoperative cholangiogram (IOC) was not performed in any patient in this series, the CBD injury rate of 0.71% compares favorably to that reported by others. We believe that IOC should not be performed routinely as it does not decrease the risk of biliary tree injury.[22-26]

Our overall mean operative time was 59.94 minutes that is slightly less than other series. [25, 27] the average operative time was (statistically significant) longer in men than women (69.6 vs. 57.5 min). In this study, postoperative hospital stay was significantly longer for men. It probably attributed to the increased rate of conversion in men than women. The male patients can thus inform that (in view that their post-operative

stay is likely to be longer) they are unlikely to be scheduled as a day-case LC.

We found that male gender was a significant predictor of the outcome of LC. Few reports have shown that male gender is not a risk factor for conversion to OC. [22-26] Although Gronroos et al. [9] reported that women were at a higher risk for severe bile duct injuries during LC, most studies have shown that the outcome of LC is worse in men. This likely relates to the increased severity of gallstone disease in men. [7-12;22-27]

Obesity and BMI >40 have always been considered risks for conversion in LC. [23] In our study fourteen patients (3.3%) had BMI>40 twelve were females and two males with the insignificant rate of conversion between both genders.

Considering the excluded risk factors for conversion and perioperative morbidity, we observed a higher rate in the male group than in the female group, this observation was statistically significant. This finding coincides with one study that found a higher conversion rate among males suggested that gallbladder disease in males is a different entity. [28] The same survey argued that males always have advanced gall bladder disease, and they seek treatment after it is going to be a difficult laparoscopic cholecystectomy. Another study found a higher conversion rate among males due to a greater incidence of the gallbladder and biliary tree anatomic difficulties in men. [29]

Furthermore, the study showed a higher biliary morbidity rate in the women as compared to their male counterparts, with no obvious scientific explanation. Maybe it is attributed to the increased number of women underwent LC compared to men although it was statistically insignificant (Table 2).

Our study showed statistically significant evidence that male gender has a unique bad effect on the outcomes of LC; it did show that surgeons performing LC had to spend more time treating men than treating women. Conversion occurred after a median operative time of 50 minutes. Complications are four times higher when LC operative time is greater than two hours when compared with LC operative time between 30 and 60 minutes. Although the difference indicates that the duration of LC in men is longer than that in women, in this study does not identify other factors responsible for this observation and its impact on LC outcome. [30, 31]

In fact, the main finding of our study is longer operative time and higher conversion rate in the male gender. On the condition that most sources of bias were controlled, it is unclear what the exact cause is for it. The retrospective nature of the study do not allow us to find the exact causes for conversion and it may be only the chance is the possible explanation of our results.

## Conclusion

We found that male gender as an isolated risk factor has an impact on the outcomes of LC. Gender affects the conversion rate and duration of surgery because more time is required to complete LC in men than in women. Larger-scale studies may provide a different answer and disclose the factors responsible for variations in the outcome of surgery between the two genders and its impact on perioperative morbidity.

## Authors' Statements

### Competing Interests

The authors declare no conflict of interest.

## References

1. Ghannam W, Malek J, Shebl E, Elbeshry T, Ibrahim A. Rate of conversion and complications of laparoscopic cholecystectomy in a tertiary care center in Saudi Arabia. *Annals of Saudi Medicine*. 2010; 30(2):145-148. doi:10.4103/0256-4947.60521.
2. McMahon AJ, Russell IT, Baxter JN, et al. Laparoscopic versus minilaparotomy cholecystectomy: a randomized trial. *Lancet*. 1994; 343:135-138.
3. Berggren U, Gordh T, Grama D, Haglund U, Rastad J, Arvidsson D. Laparoscopic versus open cholecystectomy: hospitalization, sick leave, analgesia and trauma responses. *Br J Surg*. 1994; 81:1362-1365.
4. Trondsen E, Reiertsen O, Andersen OK, Kjaersgaard P. Laparoscopic and open cholecystectomy: a prospective, randomized study. *Eur J Surg*. 1993; 159:217-221.
5. Fried GM, Barkun JS, Sigman HH, et al. Factors determining conversion to laparotomy in patients undergoing laparoscopic cholecystectomy. *Am J Surg*. 1994; 167(1):35-39.
6. Yol S, Kartal A, Vatansev C, Aksoy F, Toy H. Sex as a factor in conversion from laparoscopic cholecystectomy to open surgery. *JLS*. 2006; 10(3):359-363.
7. Wiebke EA, Pruitt AL, Howard TJ, Jacobson LE, Broadie LE, Goulet RJ. Conversion of laparoscopic to open cholecystectomy: an analysis of risk factors. *Surg Endosc*. 1996; 10:742-745.
8. Kama NA, Doganay M, Dolapci M, Recs E, Atli M, Kologlu M. Risk factor resulting in the conversion of laparoscopic cholecystectomy to open surgery. *Surg Endosc*. 2001; 15(9):965-968.
9. Gronroos JM, Hömölöinen MT, Karvonen J, Gullichsen R, Laine S. Is male gender a risk for bile duct injury during laparoscopic cholecystectomy? *Langenbecks Arch Surg*. 2003; 388:261-264.
10. Liu CL, Fan ST, Lai EC, Lo CM, Chu KM. Factors affecting the conversion of laparoscopic cholecystectomy to open surgery. *Arch Surg*. 1996; 131(1):98-101.
11. Al-Mulhim AA. Male gender is not a risk factor for the outcome of laparoscopic cholecystectomy: a single surgeon experience. *Saudi J Gastroenterol*. 2008; 14:73-79.
12. Sanabria JR, Gallinger S, Croxford R, Strasberg SM. Risk factors in elective laparoscopic cholecystectomy for conversion to open cholecystectomy. *J Am Coll Surg*. 1994; 179:696-704.
13. Jansen S, Jorgensen J, Caplehorn J, Hunt D. Preoperative ultrasound to predict conversions in laparoscopic cholecystectomy. *Surg Laparosc Endosc*. 1997; 7:121-123.
14. Brodsky A, Matter I, Sabo E, Cohen A, Abrahamson J, Eldar S. Laparoscopic cholecystectomy for acute cholecystitis: can the need for conversion and the probability of complications be predicted? A prospective study. *Surg Endosc*. 2000; 14:755-760.

15. Merriam LT, Kanaan SA, Dawes LG, Angelos P, Prystowsky JB, Rege RV, et al. Gangrenous cholecystitis: analysis of risk factors and experience with laparoscopic cholecystectomy. *Surgery*. 1999; 126:680–685.
16. Ambe PC, Weber SA, Wassenberg D. Is gallbladder inflammation more severe in male patients presenting with acute cholecystitis? *BMC Surgery*. 2015;15:48. doi:10.1186/s12893-015-0034-0.
17. Brunt LM, Quasebarth MA, Dunnegan DL, Soper NJ. Outcome and analysis of laparoscopic cholecystectomy in the extremely elderly. *Surg Endosc*. 2001; 15:700–705.
18. Rosen M, Brody F, Ponsky J. Predictive factors for conversion of laparoscopic cholecystectomy. *Am J Surg* 2002;184:254-8.
19. Kanaan SA, Murayama KM, Merriam LT, Dawes LG, Prystowsky JB, Rege RV. Risk factors for conversion of laparoscopic to open cholecystectomy. *J Surg Res* 2002; 106:20-4.
20. Simopoulos C, Botaitis S, Polychronidis A, Tripsianis G, Karayiannakis AJ. Risk factors for conversion of laparoscopic cholecystectomy to open cholecystectomy. *Surg Endosc* 2005; 19: 905-9.
21. McManus PL, Wheatley KE. Consent and complications: Risk disclosure varies widely between individual surgeons. *Ann R Coll Surg Engl*. 2003; 85:79–82.
22. Bittner R. Laparoscopic surgery: 15 years after clinical introduction. *World J Surg*. 2006; 30:1190–203.
23. Ibrahim S, Hean TK, Ho LS, Ravintharan T, Chye TN, Chee CH. Risk factors for conversion to open surgery in patients undergoing laparoscopic cholecystectomy. *World J Surg*. 2006; 30:1698–704.
24. Giger UF, Michel JM, Optiz I, Inderbitzin DT, Kocher T, Krähenbühl L. Risk factors for preoperative complications in patients undergoing laparoscopic cholecystectomy: Analysis of 22,953 consecutive cases from the Swiss Association of Laparoscopic and Thoracoscopic Surgery Database. *J Am Coll Surg*. 2006; 203:723–8.
25. Cuschieri A, Dubois F, Mouiel J, Mouret P, Becker H, Buess G, et al. The European experience with laparoscopic cholecystectomy. *Am J Surg*. 1991; 161:385–7
26. Lepner U, Grunthal V. Intraoperative cholangiography can be safely omitted during laparoscopic cholecystectomy: A prospective study of 413 consecutive patients. *Scand J Surg*. 2005; 94:197–200.
27. Velanovich V, Morton JM, McDonald M, Orlando R, 3rd, Maupin G, Traverso LW, et al. Analysis of the SAGES outcomes initiative cholecystectomy registry. *Surg Endosc*. 2006; 20:43–50.
28. Russell JC, Walsh SJ, Reed-Fourquet L, Mattie A, Lynch J. Symptomatic cholelithiasis: a different disease in men? Connecticut Laparoscopic Cholecystectomy Registry. *Ann Surg*. 1998; 227: 195–200.
29. Zisman A, Gold-Deutch R, Zisman E, Negri M, Halpern Z, Lin G, Halevy A. Is male gender a risk factor for conversion of laparoscopic into open cholecystectomy? *Surg Endosc*. 1996; 10: 892–894.
30. Ishizaki Y, Miwa K, Yoshimoto J, Sugo H, Kawasaki S. Conversion of elective laparoscopic to open cholecystectomy between 1993 and 2004. *Br J Surg*. 2006; 93:987–91.
31. Alponat A, Kum CK, Koh BC, Rajnakova A, Goh PM. Predictive factors for conversion of laparoscopic cholecystectomy. *World J Surg*. 1997; 21:629–33.