# Impact of Sex Difference on the Outcomes of Laparoscopic Cholecystectomy

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## ABSTRACT

***Objective****: Our study was carried out to evaluate the effect of male sex on the difficulty of laparoscopic cholecystectomy and its relation to conversion to open cholecystectomy.* ***Patient and method:*** *This is a single-institution prospective study was carried in the general surgery department, Zagazig University Hospitals from January 2014 till January 2016. 196 patients (127 females (group I) and 69 males (group II)) were eligible and met the inclusion criteria and underwent laparoscopic cholecystectomy due to chronic calcular cholecystitis. All parameters are measured in relation to gender (duration of surgery, conversion rate, and postoperative complications). All cholecystectomies were done by the same senior gastrointestinal (GI) surgeon with many years experience in GI and laparoscopic surgery.* ***Results:*** *There was a statistically significant difference between males and females (P_value 0.036) as regard the conversion rate from laparoscopic to open cholecystectomy (9 males and 6 females). But no statistically significant difference between the two groups as regard postoperative complications, Group II (4.3%) and Group I (3.9%), P_value was 0.890.* ***Conclusion:*** *Male sex has an impact on laparoscopic cholecystectomy as regard increased rate of conversion and longer duration of surgery.*

***Keywords:*** *Laparoscopic cholecystectomy, Converted laparoscopic cholecystectomy, Gender and laparoscopic cholecystectomy.*

## INTRODUCTION

Cholecystitis is a very common condition that makes cholecystectomy be probably the most commonly performed surgical procedure worldwide. Both medical and surgical treatments are used in the management of gallbladder (GB) disease; however surgery especially laparoscopic cholecystectomy remains the gold standard for treatment of gallbladder disease in the elective conditions due to short hospital stay, quicker recovery, decreased postoperative pain and better cosmoses [1-7].

Conversion to open cholecystectomy (OC) during laparoscopic cholecystectomy (LC) is still encountered with a range from 3% - to up to 24%, although there are many technological advances and increased experiences[8-13].

Various factors contribute to increased difficulty of laparoscopic cholecystectomy and conversion to open technique including acute cholecystitis, fibrosis and unclear anatomy at the Callot's triangle, obesity, male gender, old age, previous upper abdominal surgery and previous endoscopic retrograde cholangiopancreatography (ERCP) [14-17].

## PATIENTS AND METHODS

This prospective study was carried out in the general surgery department, Zagazig University hospitals during the period from January 2014 till January 2016. The study included 196 patients (127 females, Group I and 69 males, Group II) all prepared for elective laparoscopic cholecystectomy due to chronic calcular cholecystitis.

***Inclusion criteria:*** All cases with chronic calcular cholecystitis

***Exclusion criteria:*** History of repeated attacks of cholecystitis, previous ERCP, acute cholecystitis and empyema of the gallbladder, upper abdominal surgery, morbid obesity and American Association of Anesthesiology (ASA) class III and IV patients.

***Technique***:

All patients underwent the same technique, 4 ports were used. 10mm periumbilical optical trocars, 10mm epigastric port for the surgeon, 5mm mid-clavicular for the surgeon and 5mm anterior axillary port for the assistant.

Antibiotic received: all patients received 1gm Cefotax or 1.5 Gm Unasyn 30 minutes preoperatively.

We started our operation with an overall view looking for adhesions (**Fig. 1, 2**). if any, we started with retraction of these adhesions to evaluate the surrounding viscera (stomach and colon). When the dissection was easy we continued our procedure by identification of Callot's triangle, clipping of both cystic duct and artery and dissection of the gallbladder from its bed (**Fig. 3, 4**). When the adhesions were tough and there was a risk of possible visceral injury or bleeding we converted from laparoscopic to open cholecystectomy.

According to Operative Grading System for Cholecystitis Severity conducted by Michael et al , **Table 1**. We convert cases with sever to extreme difficulty specially for cases with sever adhesions that burying GB with score three and cases with adhesions from previous surgery limiting access with score one. The scoring system proposed is based on the severity of cholecystitis and degree of potential difficulty with a score from 1 to 10. With this scoring system a score of <2 would be considered easy, 2 to 4 moderate, 5–7 very difficult, and 8 to 10, extreme. The five key aspects include: 1) gallbladder appearance and amount of adhesions, 2) degree of distension/contracture of the gallbladder, 3) ease of access, 4) local/septic complications, and, 5) time taken to identify the cystic artery and duct . Where there are no adhesions, a score of zero is given. The maximum achievable score for adhesions is 3, which would occur if the gallbladder were completely buried in adhesions. A distended gallbladder receives a score of 1. Failure to grasp the gallbladder with a standard, atraumatic laparoscopic forceps scores a further point. This applies either with or without adhesions present. If decompression is performed to allow grasping then a point is still awarded. Further points are awarded for access difficulties (i.e. port placement difficulties using Hasson's technique) and complicated cholecystitis with perforation.

- Patients started sips of water 6 hours postoperatively.

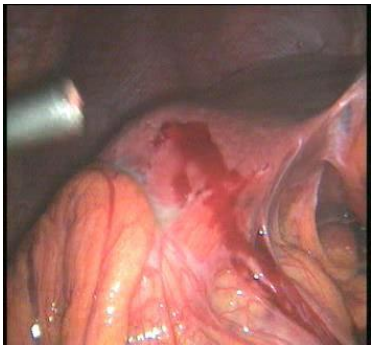

**Fig (1)** adhesions in male patient.

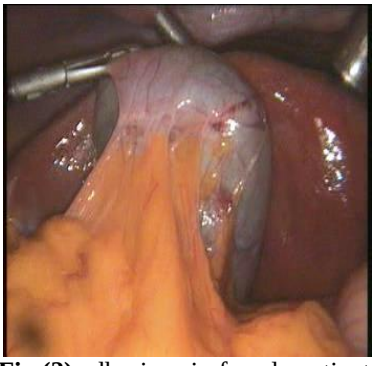

**Fig (2)** adhesions in female patient.

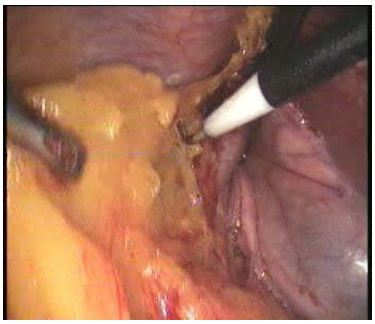

**Fig (3)** dissection of adhesions.

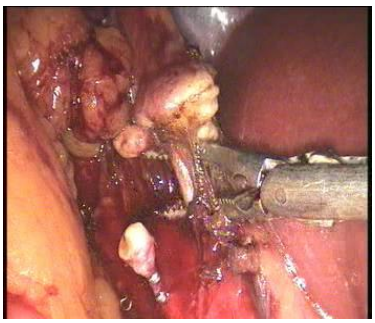

**Fig (4)** clipping of cystic duct & artery.

**Table 1: Operative Grading System for Cholecystitis Severity**

| **Operative Grading System for Cholecystitis Severity** | **Score** |
|---|---|
| **Gallbladder appearance** | |
| Adhesions < 50% of GB | 1 |
| Adhesions burying GB | 3 |
| Max score | 3 |
| **Distension/Contraction** | |
| Distended GB (or contracted shrivelled GB) | 1 |
| Unable to grasp with atraumatic laparoscopic forceps | 1 |
| Stone ≥1 cm impacted in Hartman's Pouch | 1 |
| **Access** | |
| BMI >30 | 1 |
| Adhesions from previous surgery limiting access | 1 |
| **Severe Sepsis/Complications** | |
| Bile or Pus outside GB | 1 |
| **Time to identify cystic artery and duct >90 minutes** | 1 |
| **Total Max 10** | |
| **Degree of difficulty** | |
| A. Mild | <2 |
| B. Moderate | 2-4 |
| C. Sever | 5-7 |
| D. Extreme | 8-10 |

***Data Collection, parameter measured and Follow-up:***

Standardized data collection was performed by the attending resident and our surgeon team, and each patient was evaluated by the main surgeon twice immediate postoperatively and after 12 hours, then the patients followed at the hospital outpatient clinic weekly.

The following data were collected and recorded: demography of patients, duration of surgery (from skin incision to skin closure), conversion to open surgery and postoperative complications (bleeding, bile duct injury, an occurrence of jaundice and wound infection).

**Statistical Analysis**

Continuous variables were expressed as mean ± SD. Categorical variables were expressed as a number (percentage). Continuous variables were checked for normality by using Shapiro-Wilk test. Independent samples Student's-t test was used to compare between two groups of normally distributed variables. Percent of categorical variables were compared using the Pearson's Chi-square test. All tests were two sided. $p < 0.05$ was considered statistically significant. All data were analyzed using Statistical Package for Social Science for windows version 20.0 (SPSS Inc., Chicago, IL, USA).

## RESULTS

Total of 196 patients; 127 females (64.8%) and 69 males (35.2%) underwent laparoscopic cholecystectomy with a ratio between females and males about 2:1 and this roughly corresponds to the documented prevalence of gallbladder disease in general populations. The mean age was 48±14.7 years for Group I (Female group) and 50.4±12.6 years for Group II (P <0.08). Females had higher Body Mass Index (BMI) (28.6±4.4) than males (26.7±3.5) with P value < 0.05 (0.002).The mean duration of surgery was longer in males, Group II (65.4±28 minutes) than in females (54.5±23.8 minutes) with P value < 0.05 (0.004) (statistically significant). **(Table 2)**

There was a statistically significant difference between males and females (P value was 0.036) as regard the conversion rate from laparoscopic to open cholecystectomy; where in the males group, 9 patients (13%) underwent conversion all due to unclear anatomy at the Calot's triangle and firm adhesions. In the females group 6 patients (4.7%) required conversion: 2 patients (1.6%) due to bleeding and 4 patients (3.1%) due to unclear anatomy at the Calot's triangle. The overall conversion rate in the studied group was 7.6% (15 patients). **(Table 3)**

As regard postoperative complications **(Table 4);** there was no statistically significant difference between Group II (4.3%) and Group I (3.9%), the P value was 0.890.

No bile duct injuries occurred in both groups. Postoperative biliary leakage occurred in 2 female patients (1.6%) and 1 male patient (1.4%) where the male patient and 1 female patient treated conservatively within 10 days and the other female patient required ERCP with the placement of a stent.

Postoperative wound infection occurred in 2 males (2.9%) and 3 females (2.3%) all cured by repeated dressing under cover of broad-spectrum antibiotics on regular outpatient clinic visits.

**Table (2): Demographic data and duration of surgery**

| ***Demographic data and duration of surgery*** | ***Group I (Female group) (N=127)*** | ***Group II (Male group) (N=69)*** | ***p-value**** |
|---|---|---|---|
| Age (Mean ± SD) year | 48.14 ± 14.7 | 50.4 ± 12.6 | 0.281 |
| BMI (Mean ± SD) $kg/m^2$ | 28.6 ± 4.4 | 26.7 ± 3.5 | 0.002 |
| Duration of surgery (Mean ± SD) min. | 54.5 ± 23.8 | 65.4 ± 28 | 0.004 |

N=Total number of patients in each group; * Independent samples student's t-test; p< 0.05 is significant.

**Table (3): Conversion from laparoscopic to open cholecystectomy:**

| ***Conversion from laparoscopic to open cholecystectomy*** | ***Group I (Female group) (N=127)*** | ***Group II (Male group) (N=69)*** | ***p-value**** |
|---|---|---|---|
| Conversion rate | 6 (4.7%) | 9 (13%) | 0.036 |
| Cause of conversion | | | |
| *Bleeding | 2 (1.6%) | 0 (0%) | 0.541 |
| *Unclear anatomy at the Callot's triangle and firm adhesions | 4 (3.1%) | 9(13%) | 0.008 |

N=Total number of patients in each group; Qualitative data were expressed as a number (percentage); § Chi-square test; p< 0.05 is significant.

**Table (4): Postoperative complications:**

| ***Postoperative complications*** | ***Group I (Female group) (N=127)*** | ***Group II (Male group) (N=69)*** | ***p-value**** |
|---|---|---|---|
| Postoperative complication | 5 (3.9%) | 3 (4.3%) | 0.890 |
| Bile duct injuries | 0 (0%) | 0 (0%) | ---- |
| Postoperative biliary leakage | 2 (1.6%) | 1 (1.4%) | 0.945 |
| Postoperative wound infection | 3 (2.4%) | 2 (2.9%) | 0.820 |

N=Total number of patients in each group; Qualitative data were expressed as a number (percentage); § Chi-square test; p< 0.05 is significant.

## DISCUSSION

Laparoscopic cholecystectomy is considered the gold standard for treatment of cholecystitis. However, conversion to open cholecystectomy during laparoscopy is still encountered with a range from 3% up to 24%.

Our clinical observations supported by many researches[18-21] who have shown that laparoscopic cholecystectomy in males is more challenging than in females, so our study was planned to evaluate the impact of sex difference on the outcomes of laparoscopic cholecystectomy.

While conversion to open cholecystectomy will always be an essential part of safe surgical practice, a greater understanding of the factors leading to conversion and potential post-operative complications would be essential. While a number of preoperative scoring systems are reported there is no operative classification of findings at laparoscopic surgery[22-23], until a new operative grading system for cholecystitis severity conducted by Michael et al[24] and according to the system, we convert cases with maximum achievable score for adhesions which is three points.

Conversion rate from laparoscopic to open cholecystectomy there was statistically significant difference between both groups (4.7 % in females and 13 % in males) with a total of 7.6% and this near to rate of conversion reported by many series (6.1%)[19&20&26&28]. Other studies showed insignificant difference[21&25-27] . Botaitis et al [29] in his study on 2000 patients found that males had greater risk of conversion but when he used multivariate analysis to control confounders, this significant difference disappeared.

The conversion is higher in male patients and this could be explained by that male patients show increased severity of symptomatic cholecystitis, sever fibrosis and some anatomical changes due to inflammation[25-27]. Also, male patients may have symptoms for a long duration before seeking medical advice. This is because males have higher pain threshold than females[6&30], so males may have recurrent attacks of cholecystitis with minimal symptoms.

There was statistically significant difference between both groups as regard the duration of surgery being longer in males (65.4±28 minutes) than in females (54.5±23.8 minutes), this could be explained by the same reasons of increased conversion rate such as severity of inflammation and anatomical changes at the Calot's triangle where dissection takes much of this time. This is the same as reported by other series[1&2&8].

As regard the overall postoperative complications rate there was statistically insignificant difference between males and females (4.3% and 3.9% respectively) this coincides with other reports[5&7].

**Conclusion**

Male sex has an impact on laparoscopic cholecystectomy as regard increased rate of conversion and longer duration of surgery.

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**Conflicts of interest**:

There are no conflicts of interest.

## REFERENCES

1. Ambe P, Janghorban B, Tasci I. Is laparoscopic cholecystectomy more challenging in male patients?. Surg Endosc 2011; 25:2236-2240.
2. Akcakaya A, Okan I, Bas G. Does the difficulty of laparoscopic cholecystectomy differ between genders?. Indian J Surg 2015;77(2):452-456.
3. Simopoulos C, Botaitis S, Polychronidis A. risk factors for conversion of laparoscopic cholecystectomy to open cholecystectomy. Surg Endosc 2005;19: 905-909.
4. Donkervoort S, Dijksman L, Nes L. outcome of laparoscopic cholecystectomy conversion: is the surgeon`s selection needed?. Surg Endosc 2012;26:2360-2366.
5. Thesbjerg S, Harboe K, Bardram L. sex differences in laparoscopic cholecystectomy. Surg Endosc 2010;24: 3068-3072.
6. Uchiyama K, Kawai M, Tani M. gender differences in postoperative pain after laparoscopic cholecystectomy . Surg Endosc 2006;20: 448-451.
7. Bazoua G and Tilston M. Male gender impact on the outcome of laparoscopic cholecystectomy. JSLS 2014;18(1):50-54.
8. Bingener-Casey J, Richards ML, Strodel WE. Reasons for conversion from laparoscopic to open cholecystectomy: a 10-year review. J Gastrointest Surg 2002;6:800–805.
9. Kama N, Kologlu M, Doganay M. A risk score for conversion from laparoscopic to open cholecystectomy. Am J Surg 2001;181:520–525.
10. Livingston E and Rege R. Technical complications are rising as common duct exploration is becoming rare. J Am Coll Surg 2005;201:426–433.

11. Bulbuller N, Ilhan Y, Baktir A. Implementation of a scoring system for assessing difficult cholecystectomies in a single center. Surg Today 2006;36:37–40.
12. Ballal M, David G, Willmott S. Conversion after laparoscopic cholecystectomy in England. Surg Endosc 2009;23:2338–2344.
13. Boddy A, Bennett J, Ranka S. Who should perform laparoscopic cholecystectomy? A 10-year audit. Surg Endosc 2007; 21:1492–1497.
14. Csikesz N, Singla A, Murphy M. Surgeon volume metrics in laparoscopic cholecystectomy. Dig Dis Sci 2010; 55:2398–2405.
15. Kauvar D, Braswell A, Brown B. Influence of resident and attending surgeon seniority on operative performance in laparoscopic cholecystectomy. J Surg Res 2006;132:159–163.
16. McManus P and Wheatley K. Consent and complications: risk disclosure varies widely between individual surgeons. Ann R Coll Surg Engl 2003;85:79–82.
17. Murphy M, Ng S, Simons J. Predictors of major complications after laparoscopic cholecystectomy: surgeon, hospital, or patient? J Am Coll Surg 2010;211:73–80.
18. Bulbuller N, Ilhan Y, Baktir A. Implementation of a scoring system for assessing difficult cholecystectomies in a single center. Surg Today 2006;36:37–40.
19. Russell J, Walsh S, Reed-Fourquet L. Symptomatic cholelithiasis: a different disease in men? Connecticut Laparoscopic Cholecystectomy Registry. Ann Surg 1998; 227:195–200.
20. Alponat A, Kum C, Koh B. Predictive factors for conversion of laparoscopic cholecystectomy. World J Surg 1997;21:629–633.
21. Simopoulos C, Botaitis S, Polychronidis A. Risk factors for conversion of laparoscopic cholecystectomy to open cholecystectomy. Surg Endosc 2005;19:905–909.
22. Gupta N, Ranjan G, Arora MP, Goswami B, Chaudhary P, Kapur A, et al. Validation of a scoring system to predict difficult laparoscopic cholecystectomy. Int J Surg. 2013;11:1002–1006.
23. Vivek MA, Augustine AJ, Rao R. A comprehensive predictive scoring method for difficult laparoscopic cholecystectomy. Journal of minimal access surgery. 2014;10:62–67.
24. Michael Sugrue, Shaheel M Sahebally, Luca Ansaloni, Martin D Zielinski. Grading operative findings at laparoscopic cholecystectomy- a new scoring system. World Journal of Emergency Surgery 2015; 10:14.
25. Gharaibeh KI, Qasaimeh GR, Al-Heiss H. Effect of timing of surgery, type of inflammation, and sex on outcome of laparoscopic cholecystectomy for acute cholecystitis. J Laparoendosc Adv Surg Tech A. 2002; 12: 193–198
26. Yol S, Kartal A, Vatansev C, Aksoy F, Toy H. Sex as a factor in conversion from laparoscopic cholecystectomy to open surgery. JSLS. 2006; 10(3):359-363.
27. Ibrahim S, Hean TK, Ravintharan T, Chye TN, Chee CH. Risk factors for conversion to open surgery in patients undergoing laparoscopic cholecystectomy. World J Surg. 2006; 30:1698-1704.
28. Rosen M, Brody F, Ponsky J. Predictive factors for conversion of laparoscopic cholecystectomy. Am J Surg 2002;184:254–258.
29. Botaitis S, Polychronidis A, Pitiakoudis M. Does gender affect laparoscopic cholecystectomy?. Surg Laparosc Endosc Percutan Tech 2008;18:157–161.
30. Riley J III, Robinson M, Wise E. Sex differences in the perception of noxious experimental stimuli: a meta-analysis. Pain. 1998;74: 181–187.