Original Research Article

DOI: http://dx.doi.org/10.18203/2349-2902.isj20164476

A study of impact of gender on operative findings and outcome in patients undergoing laparoscopic cholecystectomy

Saurabh Kumar*, Praveen Kumar, Ram K. Verma, Akshat Agarwal

Department of Surgery, SGRRIM and HS, Patel Nagar, Dehradun, Uttarakhand, India

Received: 21 October 2016 Accepted: 18 November 2016

*Correspondence: Dr. Saurabh Kumar,

E-mail: saurabhecr@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Gallstone disease (GSD) is a prevalent health problem around the globe and the treatment of choice for symptomatic GSD is laparoscopic cholecystectomy (LC). There are many factors that influence the operative findings, conversion rates and the outcome of surgery. Male gender has been considered by some to be an adverse factor in this regard. Through this study we intend to find out the role of gender in the operative findings and outcome of laparoscopic cholecystectomy.

Methods: All the patients undergoing laparoscopic cholecystectomy at SMI Hospital, Dehradun during one year period were included in the study with certain exceptions. The details of clinical presentation, operative findings and conversion rates, duration of surgery and peri-operative complications were recorded separately for male and female patients and compared.

Results: A total of 402 patients were included in the study. 72 (17.9%) were male and 330 (82%) were female. The mean duration of surgery was significantly greater in the male group (66 min) as compared to female group (60.5 min). The rate of conversion to open surgery was not significantly different in the two groups. There was no significant difference in frequencies of complications in the two groups.

Conclusions: Gender has little role as far as overall morbidity and conversion to open surgery are concerned in patients undergoing laparoscopic cholecystectomy.

Keywords: Cholecystectomy, Conversion rate, Difficult dissection, Gender, Laparoscopic risk factors

INTRODUCTION

Gallstone disease (GSD) is a prevalent health problem around the globe and the treatment of choice for symptomatic GSD is laparoscopic cholecystectomy (LC). Open cholecystectomy is rarely performed in elective setting nowadays unless there is some contraindication for laparoscopic surgery. At times however the operating surgeon has to convert the laparoscopic surgery to an open one due to massive adhesions around the gall bladder, obscure anatomy of Calot's triangle or severe hemorrhage. This leads to loss of all the advantages of minimal access surgery and is seen almost as a

complication. There are many factors that influence the operative findings, conversion rates and the outcome of surgery. Hale gender has been considered by some to be an adverse factor in this regard. Hale But there is conflicting evidence in various studies. Through this study we intend to find out the role of gender, if any, in the operative findings and outcome of laparoscopic cholecystectomy performed for chronic calculous cholecystitis by comparing the findings and events in peri-operative period in male and female patients.

The main objective of this study was to find out whether gender has an impact on operative findings leading to difference in the level of difficulty in performing laparoscopic surgery, rate of conversion to open surgery or poor surgical outcome.

METHODS

All the patients undergoing laparoscopic cholecystectomy at SMI Hospital, Dehradun, India during one year period were included in the study with following exceptions

- Patients having acute cholecystitis
- Patients having history of severe pain s/o acute cholecystitis during past six weeks
- Patients having any severe co-morbid conditions (ASA grade ≥3)
- Patients operated by surgeons having less than five years of experience in laparoscopic surgery including trainees
- Patients requiring simultaneous intervention for CBD stones
- Patients with deranged liver function
- Patients found to have carcinoma of gall bladder on histopathological examination

The details of clinical presentation, operative findings, conversion rates, duration of surgery and peri-operative complications were recorded separately for male and female patients. In addition the operating surgeon was required to assign the degree of difficulty in adhesiolysis

and dissection of Calot's triangle to one of the three categories viz. easy, somewhat difficult or very difficult. Although this categorization was largely subjective, certain factors were taken into consideration while labeling a case as very difficult such as inability to remove complete gall bladder due to frozen Calot's triangle, need for prolonged use of hydro-dissection to delineate the anatomy or consideration of conversion at least at some point of time due to difficulty in dissection, whether or not the case was eventually converted, etc.

The above data were cross tabulated and compared between the two groups and the result was analyzed. Standard statistical methods were used for data analysis. For parametric variables Z-test for significance of difference in means of large samples was applied. For non-parametric variables, chi-square test was applied with Yates' correction wherever applicable. A 2-sided p value of less than 0.05 was considered significant.

RESULTS

A total of 496 patients underwent laparoscopic cholecystectomy at this center during study period, out of which 402 patients were included in the study after excluding 94 patients according to the criteria mentioned above. Of the 402 patients 72 (17.9%) were male and 330(82%) were female. The mean age in male group was 46.12 years while that in female group was 47 years (Table 1).

Table 1: Comparison of variables between male and female groups.

	Male (n = 72)	Female (n = 330)	z-score /p-value	Statistical significance
Age (years)	46.12	47	Z = 0.625, P > 0.5	NS
BMI	25.4	27.6	Z = 6.27, P < 0.01	Highly significant
Duration of surgery (min)	66	60.5	Z = 3.29, P < 0.01	Highly significant

The difference was not statistically significant (p >0.05). The mean BMI was higher in female group (27.6) as compared to male group (25.4) which was statistically significant (p <0.0001). The mean duration of surgery from skin incision to skin closure was significantly greater in the male group (66 min) as compared to female group (60.5 min).

In both the groups the proportion of cases labeled "very difficult dissection" with regard to adhesiolysis and dissection of Calot's triangle by the operating surgeon was calculated. The proportion of such cases was significantly higher in the male group (Table 2).

The proportion of cases that had to be converted from laparoscopic to open surgery was not significantly different in the two groups with males having a conversion rate of 6.94% and females a rate of 3.3% (Table 3).

Table 2: Comparison of difficulty in adhesiolysis and dissection of calot's triangle (difference analyzed only in proportion of cases labelled very difficult dissection).

	Male (n = 72)	Female (n = 330)	p-value
Easy	18	146	-
Somewhat difficult	33	127	-
Very difficult	21 (29.16%)	57 (17.27%)	< 0.05

The rates of various complications were also recorded and compared. Conversion to open surgery was not considered among the complications and was analyzed separately. The data regarding complications has been summarized in table 4.

There was no statistically significant difference in frequencies of any of these complications in the two groups. Total morbidity rate was 8.3% in the male group

and 6% in the female group; the difference was again not statistically significant.

Table 3: Comparison of proportion of cases converted to open surgery.

	Male (n = 72)	Female (n = 330)	p-value	Statistical significance
Conversion to open surgery	5 (6.94%)	11 (3.3%)	>0.05	NS

Table 4: Comparison of complications.

Complications	Male (n = 72)	Female (n = 330)	p-value	Statistical significance
Bleeding	2 (2.8%)	5 (1.5%)	>0.5	NS
Wound infection	1 (1.3%)	5 (1.5%)	>0.5	NS
Bile duct injury	0	3 (0.9%)	>0.5	NS
Post-operative bile leak	2 (2.8%)	3 (0.9%)	>0.1	NS
Post-operative pancreatitis	0	2 (0.6%)	>0.5	NS
Post-operative jaundice	1 (1.3%)	2 (0.6%)	>0.5	NS
Bowel injury	1 (1.3%)	0	>0.1	NS
Total morbidity	6 (8.3%)	20 (6%)	>0.5	NS

DISCUSSION

Laparoscopic cholecystectomy like many minimally invasive surgeries has distinct advantages but at the same time there are hazards associated with pneumoperitoneum and limited access. So it is not free from complications. In order to minimize complications a careful selection of cases is required for minimal access surgery. Therefore there has been a considerable interest studying the factors responsible for complications. Giger UF et al analyzed data from a large database to determine the risk factors for laparoscopic and cholecystectomy concluded that perioperative complications can be estimated based on patient characteristics (gender, age, ASA score, body weight), clinical findings (acute versus chronic cholecystitis), and the surgeon's own clinical practice with LC1. Male gender has been found to be an adverse factor in some studies on laparoscopic cholecystectomy. 1,3-5 Male gender is also associated with a more severe disease i.e. a higher proportion of necrotizing and gangrenous cholecystitis.5,6

A prospective study was designed wherein we removed the confounding factors and then compared different variables between male and female patients undergoing laparoscopic cholecystectomy. We compared the distribution of patients according to age and BMI in the two groups as advanced age and obesity are associated with increased perioperative complications and postoperative stay. ^{1,4} Mean age of patients was not significantly different in the two groups but female patients had a significantly higher mean BMI in our study (p value <0.01). We have deliberately omitted duration of postoperative stay in hospital from our study as this hospital caters to a large number of patients coming from

distant hilly regions and these patients have reasons other than just recovery for their variable duration of stay in hospital. This was a major deficiency in our study.

cholecystitis was earlier considered contraindication for surgery and more so for laparoscopic cholecystectomy. But over a period of time LC has become an acceptable modality of treatment even for acute cholecystitis and is being more commonly performed for this indication.⁵⁻¹⁰ Still the timing of surgery with respect to onset of pain is very important consideration and not all cases of acute cholecystitis are suitable for surgery. In addition it requires exceptional expertise to operate such cases laparoscopically and conversion to open surgery is more likely.3-5 Therefore, as we had to compare difficulty in dissection in males and females, we have excluded acute cholecystitis completely from our study.

In our study the mean duration of surgery was longer in the male group (66 min) than the female group (60.5 min). This difference may seem small but it was highly significant statistically (p-value < 0.01). Increased duration of surgery adversely affects the outcome of surgery. Chong JU et al have concluded in their study that duration of surgery is one of the factors affecting post-operative hospital stay. SALTS Study Group also concluded that if LC lasts longer than 2 hours, the cumulative risk for perioperative complications is four times higher compared with an intervention that lasts between 30 and 60 minutes, independent of the surgeon's personal skills with LC.^{1,2} So an increased duration of surgery may potentially translate into increased perioperative complications though in our study it did not.

Certain co-morbid conditions which may be associated with poor outcome are more often seen in males so we have excluded them by taking only ASA grade 1 and 2 patients. For assessment of difficulty in dissection we have added an additional variable for study by asking the operating surgeon to describe the difficulty in terms of categories mentioned above.

One might argue that such categorization is subjective and hence not reliable. But taking into account the fact that all the operating surgeons were having at least five years of experience in laparoscopic surgery and that only the cases labeled very difficult "were considered for analysis disregarding the intermediate category i.e. "somewhat difficult", such analysis can be relied upon.

Moreover, the operating surgeons had been kept blind to the objective of the study to minimize the bias. The proportion of very difficult cases was significantly greater in males (29.16%) as compared to females (17.27%). The mean duration of surgery was also greater in males which appears related to difficulty if dissection. But in spite of this the rate of conversion to open surgery although higher in males (6.94%) as compared to females (3.3%), was not significantly different in the two groups (p-value >0.5). Ambe PC et al and Bazoua G et al also found similar results for conversion rates in their studies.^{7,11} But there are some other studies which suggest that conversion rates are indeed higher in males. 3,4,12-16 Although conversion to open surgery should not be seen as a complication, as it is done to ensure patient safety usually after a well-considered decision, it is indeed a significant event as it is likely to increase postoperative morbidity and stay. This not only adds to the cost of treatment but the patient might not take it positively if not properly counseled beforehand.

Post-operative bile leak was seen in 2 male patients (2.8%) and 3 female patients (0.9%). The difference was not statistically significant. Four of these five cases of leak didn't require additional intervention. Bile duct injury occurred in 3 females (0.9%) but only two were diagnosed intraoperatively and required conversion and hepatico-jejunostomy. One case was diagnosed postoperatively and responded to ERCP and CBD stenting only. No male patient had any bile duct injury. Biliary complication rate in this study population was very low although studies suggest that biliary complication rate has increased in the laparoscopic era. ^{17,18}

One patient had colon injury during adhesiolysis. The case had to be converted to open surgery but still the patient developed colo-cutaneous fistula in the postoperative period. It was managed conservatively with a favorable outcome. Post-operative jaundice developed in 2 females (0.6%), both due to pancreatitis, and in one male (1.3%) which resolved spontaneously.

Bleeding is a dreaded complication in LC.¹⁹ The incidence of significant bleeding requiring conversion and that of wound infection was also not statistically different in the two groups. Over all morbidity rate was 8.3% in males and 6% in females and the difference was not statistically significant (p-value >0.5). So despite a greater duration of surgery and a more difficult dissection in males, surgical complications were seen more frequently in females and the difference was statistically insignificant. The impression of poor outcome in males may have arisen from a greater incidence of severe disease, which was not analyzed in this study, rather than increased complications of LC.

CONCLUSION

Gender has little role as far as overall morbidity and conversion to open surgery are concerned in patients undergoing laparoscopic cholecystectomy. Male gender is a risk factor for a more difficult dissection and increased duration of surgery which may indirectly increase the chances of complications related to increased exposure to anesthesia.

ACKNOWLEDGMENTS

Author would like to acknowledge the support of the institute's management for providing us suitable environment for this research project.

Funding: No funding sources Conflict of interest: None declared Ethical approval: Not required

REFERENCES

- Giger UF, Michel JM, Opitz I, Inderbitzin TD, Kocher T, Krahenbuhl L. Risk factors for perioperative 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(5):723-8.
- 2. Chong JU, Lee JH, Yoon YC. Influencing factors on postoperative hospital stay after laparoscopic cholecystectomy. Korean J Hepato Biliary Pancreatic Surg. 2016;20(1):12-16.
- 3. Zhang WJ, Li JM, Wu GZ, Luo KL, Dong ZT. Risk factors affecting conversion in patients undergoing laparoscopic cholecystectomy. ANZ J Surg. 2008;78(11):973-6.
- 4. Fried GM, Barkun JS, Sigman HH, Joseph L, Clas D, Garzon J, et al. Factors determining conversion to laparotomy in patients undergoing laparoscopic cholecystectomy. Am J Surg. 1994;167(1):35-9.
- 5. Merriam LT, Kanaan SA, Dawes LG, Angelos P, Prystowsky JB, Rege RV, Joehl RJ. Gangrenous cholecystitis: analysis of risk factors and experience with laparoscopic cholecystectomy. Surgery. 1999;126(4):680-5.

- 6. Ambe PC, Weber SA, Wassenberg D. Is gallbladder inflammation more severe in male patients presenting with acute cholecystitis? BMC Surg. 2015;15:48.
- 7. Ambe PC, Kohler L. Is the male gender an independent risk factor for complication in patients undergoing laparoscopic cholecystectomy for acute cholecystitis? Int Surg. 2015;100(5):854-9.
- 8. Oymaci E, Ucar AD, Aydogan S, Sari E, Erkan N, Yildirim M. Evaluation of affecting factors for conversion to open cholecystectomy in acute cholecystitis. Przegląd Gastroenterologiczny. 2014;9(6):336-41.
- 9. Stefanidis D, Bingener J, Richards M, Schwesinger W, Dorman J, Sirinek K. Gangrenous cholecystitis in the decade before and after the introduction of laparoscopic cholecystectomy. J Society Laparoendoscopic Surgeons. 2005;9(2):169-73.
- 10. Ciftci F, Abdurrahman I, Girgin S. The outcome of early laparoscopic surgery to treat acute cholecystitis: a single-center experience. Int Journal Clinical Experimental Med. 2015;8(3):4563-8.
- 11. Bazoua G, Tilston MP. Male Gender impact on the outcome of laparoscopic cholecystectomy. J Society Laparoendoscopic Surg. 2014;18(1):50-4.
- 12. Yol S, Kartal A, Vatansev C, Aksoy F, Toy H. Sex as a factor in conversion from laparoscopic cholecystectomy to open surgery. J Society Laparoendoscopic Surg. 2006;10(3):359-63.
- 13. Alqahtani R, Ghnnam W, Alqahtani M, Qatomah A, AlKhathami A, Alhashim A. Role of male gender in laparoscopic cholecystectomy outcome. IJSM. 2015;1(2):38-42.

- 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(8):755-60.
- 15. Yang TF, Guo L, Wang Q. Evaluation of preoperative risk factor for converting laparoscopic to open cholecystectomy: a meta-analysis. Hepatogastroenterol. 2014;61(132):958-65.
- 16. Genc V, Sulaimanov M, Cipe G. What necessitates the conversion to open cholecystectomy? A retrospective analysis of 5164 consecutive laparoscopic operations. Clinics. 2011;66(3):417-20.
- 17. Koirala U, Subba K, Thakur A, Joshi MR, Thapa P, Singh DR, et al. Biliary complications after laparoscopic cholecystectomy. J Nepal Health Res Counc. 2011;9(1):38-43.
- 18. Duca S, Bala O, Hajjar AN. Laparoscopic cholecystectomy: incidents and complications. A retrospective analysis of 9542 consecutive laparoscopic operations. HPB. Official J Int Hepato Pancreato Biliary Asso. 2003;5(3):152-8.
- 19. Kaushik R. Bleeding complications in laparoscopic cholecystectomy: incidence, mechanisms, prevention and management. J Minimal Access Surg. 2010;6(3):59-65.

Cite this article as: Kumar S, Kumar P, Verma RK, Agarwal A. A study of impact of gender on operative findings and outcome in patients undergoing laparoscopic cholecystectomy. Int Surg J 2017:4:390-4.