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Original Article

Gender-Based Differences in the Outcome of Laparoscopic Cholecystectomy in Patients with Gall Stones

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ABSTRACT

Objective: To determine the outcome of laparoscopic cholecystectomy in males versus females.
Study Design: Cross-sectional analytical study.
Place and Duration of Study: Department of General Surgery, Combined Military Hospital Rawalpindi Pakistan, from Mar to Aug 2022.
Methodology: A total of 200 participants were enrolled in the study as Group–A (Males) and Group – B (Females). Patients were selected based on inclusion and exclusion criteria and variables analyzed were demographic profile, past abdominal surgery history, total duration of surgery computed from the insertion of the telescopic port till the extraction of the gall bladder, post-operative hospitalization in terms of the number of days, event of laparoscopic cholecystectomies to open cholecystectomies along with the reasoning of this decision, and perioperative/postoperative complications.
Results: A total of (200) elective laparoscopic cholecystectomies cases were included in the study with 35(17.5%) males (Group-A) and 165(82.5%) females (Group-B). A relatively higher frequency of 46(27.9%) (*p*-value 0.01) of lower abdominal surgeries were recorded in female participants. No statistically significant difference in duration of surgery was recorded (*p*-value 0.9). The thin-walled gallbladder was mainly represented by the female candidates 105(63.6%). Laparoscopic cholecystectomies was converted to open cholecystectomies in 2(1.2%) females however it was not encountered in any of the male participants (*p*-value 0.51).
Conclusion: Gender-based frequency of cholecystitis and laparoscopic cholecystectomies is greater in females as compared to males with a ratio of 4.7:1 with no significant difference in the preoperative, intraoperative, and postoperative outcomes between the genders.

Keywords: Cholecystectomy, Cholecystitis, Laparoscopic

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INTRODUCTION

Pathological conditions affecting the gall bladder with resulting inflammation and cholestasis are the most common medical conditions that require an elective or urgent cholecystectomy. The surgical approach can be done via an open technique or a less invasive procedure of laparoscopic cholecystectomy. Multiple factors have been identified as risk factors with variable effects on surgical outcomes in the pre-operative, intraoperative, and postoperative periods.[1]

A laparoscopic technique used in cholecystectomy is considered a gold standard technique as it involves a small surgical scar and less invasiveness leading to decreased post-operative pain and early discharge from the hospital resultantly a better and safe outcome as compared to the previously used open cholecystectomy. Considering the pros of the procedure, this technique can be converted into open cholecystectomy in certain conditions.[2] These include Body Mass Index, total leucocyte count, characteristics of the gall bladder, and site of the stone impaction.[3,4]

For decades, gender was considered a risk factor with negative effects on the outcome of laparoscopic cholecystectomy.[5,6] However, this myth was solved with the conclusion that the male gender is not an independent risk factor for the prediction of the above-mentioned variables.[7]

Male gender was also thought to be a risk factor for conversion of laparoscopic technique to open laparotomies but is no longer considered a single factor that predicts the conversion to open cholecystectomy. In the same manner, only, gender-based differences in the outcome of laparoscopic cholecystostomy didn't show significant results however patients with low socioeconomic status were prone to cholecystectomy in some studies.[8,9]

The dearth of similar studies on this important topic forms the rationale of our study, which is to find the effects of gender on the operative outcome of

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laparoscopic cholecystectomy when males are compared with females using different variables.

METHODOLOGY

This cross-sectional analytical study was carried out at Combined Military Hospital Rawalpindi, Pakistan, from March to August 2022) after taking approval from the Institutional Ethical Review Committee (ERC- 282,dated 1st March 2022). The minimum sample size calculated for the study was 127 where the hypothesized prevalence of surgical frequency for cholelithiasis was found to be 9.03% in Pakistan as described by Naseem *et al*.[11]

Inclusion Criteria: Patients belonging to either gender presenting to general surgery department planned for cholecystectomy with American Society of Anaesthesiologists status I, II, and III were enrolled.

Exclusion Criteria: Patients presenting with acute cholecystitis or acute pancreatitis, history of comorbidities, dilatation of common bile duct or intraoperative bile duct exploration, gallbladder empyema or malignancy, obstructive jaundice complicated by common bile duct stones or mass necessitated endoscopic retrograde cholangiopancreatography (ERCP), cases of emergency cholecystectomy and intraoperative cholangiography were excluded.

As per protocol informed written consent from the patients was endorsed along with comprehensive medical history. Males (Group-A) and females (Group-B) were divided into two groups. Cases were operated by a team of skilled, experienced surgeons.

Variables analyzed were demographic profile, including age, gender Body Mass Index (BMI), history of past abdominal surgery, total duration of surgery computed from the insertion of the telescopic port till the extraction of the gall bladder, post-operative hospitalization in terms of the number of days, event of laparoscopic cholecystectomies (LC) to open cholecystectomies (OC) along with the reasoning of this decision, and perioperative or postoperative complications in addition to bleeding episodes.

Data was recorded on a pre-designed proforma and were analysed by Statistical Package for Social Sciences version 23.0 software. Categorical variables were compared using the Chi-square test while inter-group comparison drawn with student t-test. The *p*-value of ≤0.05 was considered statistically significant.

RESULTS

A total of 200 elective LC cases were included in the study with 35(17.5%) males (Group-A) and 165(82.5%) females (Group-B). Female: male ratio was 4.7:1 with a compatible mean age of 39.6±11.01 years and 36.16±14.24 years for males and females respectively (*p*-value 0.14). Similarly, no significant difference was noted among BMI of male and female participants with mean values of 24.0±3.7 kg/m^2 and 24.6±2.9 kg/m^2 (*p*-value 0.23) respectively. The demographic characteristics of both groups are elaborated in Table–I.

Table-I: Demographic Data of the Respondents (n=200)

Demographic Characteristics	Group-A (n=35)	Group-B (n=165)	*p*-value
Age (Years; Mean±SD)	39.6±11.01	36.16±14.24	0.14
BMI (kg/m2; Mean±SD)	24.0±3.7	24.6±2.9	0.23
Abdominal Surgery History	3(8.6%)	46(27.9%)	0.01
History of Co-morbidities	9(25.7%)	22(13.3%)	0.13
Hepatitis 'C' Positive	3(8.6%)	-	0.005

A relatively higher frequency of 46(27.9%, *p*=0.01) of lower abdominal surgeries were recorded in female participants due to lower segment cesarean sections (LSCS) or other gynecological surgeries. Whereas associated comorbidities were more prevalent among males 9(25.7%) compared to females 22(13.3%, *p*=0.13).

Table-II: Surgical Outcomes (n=200)

Variables		Group-A (n=35)	Group-B (n=165)	*p*-value
Surgery Duration (Minutes; Mean±SD)		29.4±9.3	28.9±15.7	0.9
Blood Loss (ml; Mean±SD)		22.3±28.3	26.9±46.2	0.55
Gall Bladder Characteristics	Distension	26(74.2%)	146(88.4%)	
	Mucocele	4(11.4%)	14 (8.4%)	0.07
	Contraction	3(8.6%)	2(1.2%)	
	Edematous	1(2.8%)	1(0.6%)	
	Pyocele	1(2.8%)	2(1.2%)	
Characteristics of Gallbladder Wall	Thin	15(42.8%)	105(63.6%)	0.07
	Thick	14(40.0%)	44(26.6%)	
	Inflamed	6(17.1%)	16(9.6%)	
Adhesions to Adjacent Structures		26(74.2%)	117(61.25)	0.79
Open Cholecystectomy Conversion		0	2(1.2%)	0.51
Length of Post-Operative stay (Days; Mean±SD)		2.5±1.3	2.7±1.5	0.50

No statistically significant difference in duration of surgery was recorded in groups A and B with mean values of 29.4±9.3 and 28.9±15.7 respectively (*p*=0.9). Intraoperatively, gall bladder characteristics such as distension or contracted, mucocele or pyocele, and edematous were observed however no notable differences between genders were enumerated. The

thin-walled gallbladder was mainly represented by the female candidates as 105(63.6%) had the characteristic (p=0.07). Laparoscopic cholecystectomy was converted to open cholecystectomy 2(1.2%) in females however it was not encountered in any of the male participants (p-value 0.51). Blood loss recorded in Group-A and Group-B was 22.3±28.3 and 26.9±46.2, showing a slightly greater propensity to bleed among female patients however it was not considered statistically significant (p-value 0.55). Surgical events are enumerated in Table–II.

Unanticipated intraoperative complications were recorded to 9(25.7%) in males whereas 65(39.3%) among females (p=0.11) as illustrated in Table–III.

Table-III: Summary of Intra- and Post-Operative Complications (n=139)

Complications	Group-A (n=35)	Group-B (n=165)	p-value
Critical intraoperative episodes	9(25.7%)	65(39.3)	0.11
Bile Leakage	2(5.71%)	14(8.4%)	0.58
Bleeding	3(8.6%)	33(17.27)	0.11
Stone Spillage	0	4(2.42%)	0.35
Postoperative Complications	1(2.8%)	4(2.42%)	0.88
Wound Infection	0	2(1.2%)	0.51
Bilious extravasation (up to 14 days)	0	1(0.6%)	0.58
Distension of Abdomen	1(2.8%)	0	0.03

DISCUSSION

This study revealed the increased frequency of laparoscopic cholecystectomy performed in females who were more prone to developing gallstones as compared to males. Outcomes of the procedure using different variables revealed no significant intergender differences.

Speculation of the male gender affecting the postoperative outcome was resolved when several studies produced similar results as our study signifying that the male gender does not pose a risk and cannot be considered as an independent risk factor for the outcome.[9]

The rate of conversion from laparoscopy to open cholecystectomy is directly proportional to increased chances of post-operative infection, prolonged hospital stays, morbidity, and increased requirement for analgesia after surgical procedures. To find the impact of gender on the rate of conversion from a laparoscopic to an open technique of cholecystectomy, it was found that when males were compared to female patients, there was no significant difference in the rate of conversion, intraoperative time, complications and post-operative hospital stay negating the general concept of male gender as a determinant of difficult laparoscopic technique.[10]

Intergender comparison for postoperative pain after the laparoscopic technique of cholecystectomy revealed that younger female patients required a greater quantity of analgesics with higher pain scores as compared to males suggesting that younger females were more sensitive to pain.[11,12]

In another study several factors in addition to male gender such as increased BMI, chronic history of gall stones, diabetes, leukocytosis, previous history of ERCP, multiple adhesions, multiple stones intra-operatively were found to be associated with the risk of conversion from a laparoscopic technique to open cholecystectomy. This has led to a conclusion that patients with all these risk factors must be counselled for the conversion before the commencement of cholecystectomy.[13]

Similar to our study another study revealed that patients presented for cholecystectomy were 78% females and 49% males. Using multiple variables patients were assessed and graded as difficult or very difficult for laparoscopic cholecystectomy. In conjunction with other variables like raised BMI, male gender, cause of hospital admission prediction for difficult surgical procedure was reliable however considering a male gender independently, the difficulty of procedure cannot be predicted.[14,15]

When younger vs elder patients were compared, it was found that elder patients had a greater propensity of having comorbidities with higher ASA grades. Following laparoscopic cholecystectomy, in both age groups, the intraoperative outcome revealed greater conversion to open laparotomies and prolonged hospital stay with a greater rate of complications and morbidity in the elderly.[16,17] In a similar way low socioeconomic status led to greater chances of cholecystectomy with greater propensity of infections and prolonged hospital stays after the surgical procedure.[18,19]

In another study conducted in a tertiary care hospital of Pakistan also revealed the greater ratio of female patients as compared to male patients who underwent laparoscopic cholecystectomy.[20] In another study, no intergender differences in the intraoperative or post-operative period were reported, however the most common complication after surgery was port site infection.[21]

CONCLUSION

Gender-based frequency of cholecystitis and laparoscopic cholecystectomy is greater in females as compared to males with a ratio of 4.7:1 with no significant difference in the preoperative, intraoperative, and post-operative outcomes between the genders.

Conflict of Interest: None.

Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

SA & MSK: Conception, drafting the manuscript, approval of the final version to be published.

NMW & ARR: Data acquisition, data analysis, critical review, approval of the final version to be published.

SAZ: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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