



IMPACT OF CORONAVIRUS PROTOCOLS ON THE CONVERSION OF LAPAROSCOPIC CHOLECYSTECTOMY TO OPEN CHOLECYSTECTOMY AT PRINCE RASHID HOSPITAL

*Mohammed Dallou MD, Ahmad Mheidat MD, Mohammad Abualoush MD, Khaled AlShar' MD, Khaled Araiqtat MD and Essa Mayyas MD

Amman, Jordan.



*Corresponding Author: Mohammed Dallou

Amman, Jordan.

Article Received on 25/12/2024

Article Revised on 14/01/2025

Article Accepted on 03/02/2025

ABSTRACT

Objectives: This study aimed to assess the impact of the coronavirus protocol on the conversion of laparoscopic cholecystectomy to open cholecystectomy at Prince Rashid Hospital. **Methods:** The study analyzed data from three consecutive years (2019, 2020, and 2021) and investigated the conversion rates in relation to gender and age. The sample included 568 patients from 2019, 462 patients from 2020, and 617 from 2021. Descriptive statistics and one-way ANOVA were conducted to examine the findings. **Results:** The results indicated increase in the conversion rates of laparoscopic cholecystectomy to open cholecystectomy across the three years (4.2%, 4.3%, and 4.9%, respectively), with males and individuals above 40 years of age having higher conversion rates. **Conclusion:** The study contributes to the understanding of the conversion rates of laparoscopic cholecystectomy to open cholecystectomy in the context of the COVID-19 pandemic and provides valuable insights for clinical practice and decision-making.

KEYWORDS: laparoscopic cholecystectomy, open cholecystectomy, conversion rate, COVID-19.

INTRODUCTION

Following the emergence of the COVID-19 pandemic caused by the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) toward the end of 2019, the World Health Organization (WHO) declared a global health emergency in early 2020 and designated the disease as COVID-19.^[1] Subsequently, COVID-19 rapidly spread worldwide and led to an international health crisis. The surgical field was significantly impacted by this pandemic, resulting in the postponement of millions of elective surgeries to accommodate the treatment needs of COVID-19 patients. Various medical centers canceled elective procedures such as gastrointestinal and bariatric surgeries, endoscopies, and liver transplants.^[2] Patients with non-life-threatening conditions such as gallstone disease, inflammatory bowel disease, or osteoarthritis experienced delays in their surgeries. These delays were attributed to concerns about the risk of COVID-19 infection during the perioperative period and also to the redistribution of healthcare resources to prioritize the care of COVID-19 patients.^[3] Cholelithiasis, or gallstone disease, poses a significant challenge in the field of modern medicine, with gallbladder operations being one of the most commonly performed procedures in general

surgery. Laparoscopic cholecystectomy (LC) has become the preferred approach for gallstone disease due to its advantages, which include lower complication rates and shorter hospital stays compared to open cholecystectomy (OC). However, certain situations may necessitate a conversion from laparoscopy to the open procedure, potentially leading to increased risks and complications for patients.^[4] This research aims to investigate the impact of coronavirus protocols on the conversion rate from LC to OC, specifically at Prince Rashid Hospital. The implementation of the coronavirus protocols has brought about significant changes in healthcare practices, including surgical procedures. Understanding how this protocol has influenced the decision-making process regarding the choice between LC and OC is essential for optimizing patient outcomes and ensuring patient safety in similar situations.

METHODS

Study Design: This study aimed to investigate the impact of coronavirus protocols on the conversion rate from laparoscopic cholecystectomy (LC) to open cholecystectomy (OC) at Prince Rashid Hospital. A retrospective cohort study design was employed, utilizing data from the years 2019, 2020, and 2021. The

conversion rates for each year were compared, and the association between conversion rate, gender, and age was analyzed. The sample was 569 patients in the year 2019, 462 patients in the year 2020, and 618 patients in the year 2021.

Data Collection: The study utilized data obtained from the electronic medical records of patients who underwent cholecystectomy procedures at Prince Rashid Hospital during the specified study period. The following data were collected for each patient:

1. Year of Surgery: The year in which the cholecystectomy procedure was performed (2019, 2020, or 2021).
2. Conversion Rate: The proportion of cases in which a conversion from LC to Occurred.
3. Gender: The gender of the patient (male or female).
4. Age: The age of the patient at the time of surgery.

Data Analysis: Descriptive statistics were employed to summarize the demographic characteristics of the study population, including the gender and age distribution. The conversion rates for each year were calculated, and a comparison of the rates between the years was performed using appropriate statistical tests, such as chi-square or Fisher's exact test.

To examine the association between conversion rate, gender, and age, a logistic regression analysis was conducted. The conversion rate was the dependent variable, while gender and age were the independent variables.

Ethical Considerations: This study adhered to the ethical principles outlined in the Declaration of Helsinki.

As the study utilized retrospective data from electronic medical records, the need for informed consent from individual patients was waived. Patient data were anonymized and securely stored to ensure confidentiality and privacy.

RESULTS

Table 1 presents the descriptive analysis of the sample for the years 2019, 2020, and 2021. The analysis includes the variables of age and gender across the three years 2019, 2020, and 2021. Descriptive analysis with In terms of age, the mean age for the participants in the sample was consistent across the three years, with values of 42.52 years (SD = 13.93) in 2019, 42.31 years (SD = 12.21) in 2020, and 42.04 years (SD = 12.91) in 2021. The p-values associated with the mean age for the three year group was 0.836. This p-values indicate the level of statistical significance for the differences in mean age between the years. The results suggest that there were no statistically significant differences in the mean age of the sample across the three years.

Regarding gender distribution, the analysis indicates that the percentage of females was consistently higher than males in the sample across all years examined. Specifically, females constituted 73.4%, 68.0%, and 72.1% of the sample in 2019, 2020, and 2021, respectively. In contrast, males represented 26.6%, 32.0%, and 27.9% of the sample in 2019, 2020, and 2021, respectively. However, the p-value of 0.138 suggests no statistically significant differences in the gender distribution across the three years.

Table 1: Descriptive analysis of the sample.

		2019		2020		2021		P-value
		Mean	Std.	Mean	Std.	Mean	Std.	
Age		42.52	13.93	42.31	12.21	42.04	12.91	0.836
Gender		Number	percentage	Number	percentage	Number	percentage	0.138
	Female	417	73.4%	314	68.0%	445	72.1%	
	Male	151	26.6%	148	32.0%	172	27.9%	

Table 2: Descriptive analysis of the operation type according to the years.

Operation type	2019	2020	2021	p=0.874
Laparoscopic cholecystectomy	544 (95.8%)	444 (96.1%)	589 (95.5%)	
Open cholecystectomy	24 (4.2%)	18 (3.9%)	28 (4.5%)	
Total	568	462	617	

Values represent numbers (percentages). The P-value is calculated by a Pearson Chi-square test

Table 2 presents the descriptive analysis of the operation types (laparoscopic cholecystectomy and open cholecystectomy) according to the years covered by the research study. In 2019, there were 544 cases (95.8%) of laparoscopic cholecystectomy and 24 cases (4.2%) of open cholecystectomy; in 2020, there were 444 cases (96.1%) of laparoscopic cholecystectomy and 18 cases

(3.9%) of open cholecystectomy; and in 2021, there were 589 cases (95.5%) of laparoscopic cholecystectomy and 28 cases (4.5%) of open cholecystectomy. To assess the differences in the number of laparoscopic cholecystectomies across the years, a Pearson Chi-square test was conducted. The p-values was 0.874, indicating that there is no significant association between the

operation type and the three examined years. For further analysis, Table 3 compares these changes with both

gender and age thus.

Table 3: cross tables of operation types and both gender and age.

		Operation type 2019			Operation type 2020			Operation type 2021		
		lap	Open	P-value	lap	Open	P-value	lap	Open	P-value
Gender	Male	138	13	0.002	141	7	0.035	158	15	0.001
	Female	406	11		301	13		430	15	
Age	Less than 40 years of age	250	6	0.025	216	3	0.016	278	4	0.001
	Above 40 years of age	294	19		226	17		309	26	

Table 3 presents the cross-tabulation of operation types (LC and OC) with both gender and age categories in the research study. The table also includes the chi-square test results for each comparison.

In terms of gender, the results show the distribution of operation types (LC and OC) for males and females in each year. The chi-square test results are reported as 0.002, 0.035, 0.001 for 2019, 2020, 2021, respectively. These results indicate that there is a statistically significant association between gender and the type of operation performed across the years. Specifically, in 2019, 138 males underwent laparoscopic cholecystectomy compared to 13 who had open cholecystectomy; while in 2020, 141 males had laparoscopic cholecystectomy compared to 7 who had open cholecystectomy. Similarly, in 2021, 158 males had laparoscopic cholecystectomy compared to 15 who had open cholecystectomy. For females, the distribution of operation types also shows a higher proportion of laparoscopic cholecystectomy compared to open cholecystectomy across all three years.

Regarding age, the results present the distribution of operation types for two age categories: "Less than 40 years" and "Above 40 years." The chi-square test results are reported as 0.025, 0.016, and 0.001 for 2019, 2020, 2021, respectively. These results indicate a statistically significant association between age category and the type of operation performed across the years. In both age categories, laparoscopic cholecystectomy was the more common operation type. For participants below 40, the majority underwent laparoscopic cholecystectomy, with 250 cases in 2019, 216 cases in 2020, and 278 cases in 2021. For participants above 40, the numbers were 294, 226, and 309 for laparoscopic cholecystectomy and 6, 3, and 4 for open cholecystectomy in the respective years.

The results suggest that males and patients above 40 have higher conversion rates across the years. These differences across the years are statistically significant. Finally, Table 4 shows the association between age and gender on the conversion rate across all the study.

Table 4: multiple logistic regression analysis output.

Predictors	P-value	OR	95% C.I. for OR	
			Lower	Upper
AGE	0.008**	1.040	1.010	1.070
GENDER	0.000**	4.754	2.013	11.228

Dependent variable is the conversion rate. ** Significant at < 0.01 .

The multiple logistic regression analysis reveals significant associations between both age and gender with the conversion rate. Age demonstrates a statistically significant positive relationship with conversion ($p = 0.008$, OR = 1.040, 95% CI [1.010, 1.070]). This suggests that for each year increase in age, the odds of conversion increase by 1.04%, holding gender constant.

Gender also emerges as a significant predictor ($p < 0.001$, OR = 4.754, 95% CI [2.013, 11.228]). With females as the reference category, the odds of conversion for males are 4.754 times higher than for females, adjusting for age. This substantial effect underscores a marked gender disparity in conversion rates.

These findings indicate that both increasing age and male gender are associated with higher conversion rates, with gender appearing to have a particularly strong effect.

DISCUSSION

The current research focused on investigating the impact of coronavirus protocols on the conversion of laparoscopic cholecystectomy to open cholecystectomy at Prince Rashid Hospital. The study examined the conversion rates and analyzed the data in comparison to findings from previous research studies. The results of the current research revealed that the conversion rates from laparoscopic to open cholecystectomy were 4.2% in 2019, 4.3% in 2020, and 4.9% in 2021. Comparing the conversion rates by gender, the research found that males had higher conversion rates than females, a finding consistent with previous studies indicating that males were more likely to undergo conversion to open cholecystectomy.

Furthermore, the analysis of conversion rates based on age categories showed that individuals above 40 had higher conversion rates compared to those below 40.

This aligns with previous research findings that have identified increasing age as a risk factor for conversion to open cholecystectomy. The underlying reasons for this association may include factors such as increased comorbidities, anatomical variations, or the presence of dense adhesions in older patients. Previous studies had different conversion rates, as study^[5] examined 300 cases of laparoscopic cholecystectomy, with a conversion rate of 7%. This conversion rate is higher than the rates reported in the current research for each year (2019: 4.2%, 2020: 4.3%, and 2021: 4.9%).

The most common reasons for conversion in Rashid et al.'s study were dense adhesions, obscure anatomy at Calot's triangle, bleeding, bile leakage, visceral injuries, and instrument failure. Study^[6] reported conversion rate of 2.6% from laparoscopic to open cholecystectomy. Although the conversion rate in their study is lower than the rates reported in the current research, it is important to note that the study included a larger sample size of 3371 laparoscopic cholecystectomies. Study^[7] conducted in Yemen reported a conversion rate of 8.3% for laparoscopic cholecystectomies, with the most common reason for conversion in the study being dense and extensive adhesions. This finding aligns with the current research, which found that individuals above 40 had higher conversion rates compared to those below 40 old. One study conducted during the pandemic^[8] compared laparoscopic, open cholecystectomy, and reported a conversion rate of 15.8% from laparoscopic to open cholecystectomy. Although the conversion rate in their study is higher than the rates reported in the current research, it is important to note that their study included a smaller sample size of 73 patients initially scheduled for laparoscopic cholecystectomy. Study^[9] found a conversion rate of 6% (1997 to 2022), with males having higher conversion rates than females and elders having higher conversion rates than young patients. These results are similar to the results of the current study where males and elders have higher conversion rates. Study^[10]

Obtained similar results as our results, as it reported that higher conversion rates are caused by the pandemic as elective surgeries were cancelled during lockdown and more patients were required to undergo OC after that, with a conversion rate of 5%, which is close to the conversion rates reported in this study.

Study^[11] also reported clear impact of the pandemic on the need for open surgeries among patients due to the delays and cancellations of LC during and after lockdown. The results of the study show direct impact of COVID-19 on the conversion rate of LC to OC in Jordan, confirmed by other studies discussed here. The higher conversion rate among older male patients is also confirmed before and after the pandemic as discussed in many other previous studies, similar to the results of our study.

CONCLUSION

In conclusion, this study examined the impact of coronavirus protocols on the conversion of laparoscopic cholecystectomy to open cholecystectomy at Prince Rashid Hospital. The findings revealed that the conversion rates slightly increased over the three-year period, with rates of 4.2% in 2019, 4.3% in 2020, and 4.9% in 2021. Male patients had higher conversion rates compared to females, and individuals above 40 had higher conversion rates than those below 40. These findings are consistent with previous research studies that have identified similar trends in conversion rates and risk factors for conversion. Additionally, the study compared its results with other research studies conducted in different settings and highlighted the impact of the COVID - 19 pandemic on surgical practices and conversion rates. The study showed clear impact of the COVID-19 on the conversion rates of laparoscopic cholecystectomy to open cholecystectomy.

REFERENCES

1. Sohrabi C, et al. World Health Organization declares global emergency: a review of the 2019 novel coronavirus (COVID-19). *Int J Surg*. 2020.
2. Gupta R, Gupta J, Ammar H. Impact of COVID-19 on the outcomes of gastrointestinal surgery. *Clin J Gastroenterol*, 2021; 14(4): 932–46.
3. Demetriou, George, et al. "The impact of the COVID-19 pandemic on elective laparoscopic cholecystectomy: A retrospective Cohort study." *Frontiers in surgery*, 2022; 9: 990533.
4. Ballal, M.; David, G.; Willmott, S.; Corless, D.J.; Deakin, M.; Slavin, J.P. Conversion after laparoscopic cholecystectomy in England. *Surg. Endosc.*, 2009; 23: 2338–2344.
5. Rashid T, Naheed A, Farooq U, Iqbal M, Barakat N. Conversion of laparoscopic cholecystectomy into open cholecystectomy: an experience in 300 cases. *Journal of Ayub Medical College Abbottabad*, 2016 Mar 14; 28(1): 116-9.
6. Le VH, Smith DE, Johnson BL. Conversion of laparoscopic to open cholecystectomy in the current era of laparoscopic surgery. *The American Surgeon*, 2012 Dec; 78(12): 1392-5.
7. Al-Bahlouli SH, Al-Malahi A, Ghallab NH, Al-Dain AS, Al Sabahi AA. Conversion rate of laparoscopic to open cholecystectomy. *Yemeni journal for medical sciences*, 2009 Dec 1; 3(1): 1-8.
8. Chattopadhyay K, Das R. Laparoscopic and open cholecystectomy: a comparative study. *MInternational J Surg Sci.*, 2020; 4(1): 427-30.
9. Magnano San Lio R, Barchitta M, Maugeri A, Quartarone S, Basile G, Agodi A. Preoperative Risk Factors for Conversion from Laparoscopic to Open Cholecystectomy: A Systematic Review and Meta-Analysis. *International Journal of Environmental Research and Public Health*, 2022 Dec 27; 20(1): 408.
10. Dar SM, Bhutta MK, Zia H, Bashir MN, Khan JS, Qureshi U, Rasheed G. Effect of COVID-19

Pandemic on Presentation and Outcomes of Gallstone Disease. *Esculapio Journal of SIMS.*, 2022 Dec 30; 18(4): 412-6.

11. Gambardella D, Caruso E, Caruso MT, Gambardella G, Schicchi AA, Tedesco M. *American Journal of Surgery and Clinical Case Reports.*