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The Impact of COVID-19 Infection on the Results of Surgical Interventions (Experience of the Al-Zahrawi Surgical Hospital)

Conflict of interest: nothing to declare.

Authors' contribution: Alebady M.H.A. – conceptualization, methodology, formal analysis, investigation, resources, data curation, writing – original draft; Aldayyeni S.A.Z. – conceptualization, investigation, resources, data curation, visualization; Alhijaj S.A.A.A. – resources, data curation, writing – original draft, review, editing.

Ethics statement: this study was approved by the Department of Surgery, Faculty of Medicine, University of Misan (ID: #23). The article is published in the author's edition.

Submitted: 11.08.2023

Accepted: 11.12.2023

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Abstract

Introduction. SARS-CoV-2 infection has impacted all fields of life. It is raising the challenges, complications, morbidity, and mortality risk post-surgery. This study will determine the postoperative complication of COVID-19 pneumonia in patients who underwent surgical operations.

Purpose. To assess the postoperative complications of asymptomatic, mild, and severe COVID-19 infection in patients undergoing surgery.

Materials and methods. A retrospective study on participants undergoing surgery infected with COVID-19. The present study was conducted at Al-Zahrawi Surgical Hospital during a period from June 2022 to May 2023. Totally, 155 COVID-19 patients collected. The sample was divided into three groups: Asymptomatic (n= 31), Mild (n=69), and Severe (n=55) according to the severity of COVID-19. The data was collected from patient's reports and files in the Intensive care unit (ICU), recovery room, and operative theater which included the age of patients, gender, severity of COVID-19, types of surgery, sepsis, death, hospitalization, duration in ICU and any complication postoperative.

Results. Died subjects were more in the severe illness cases (n=23) than in mild and asymptomatic groups with a high statistical difference (p=0.002). Although, severe cases stayed more days in ICU (8.1 ± 3.3 days) than mild cases and asymptomatic. Only sepsis has a significant effect in the univariate model (p=0.001). Univariate and multivariate models revealed that a more severe course of infection, together with more severe surgical pathology, is associated with a greater likelihood of death and severe complications.

Conclusion. Severe COVID-19 pneumonitis undergoing surgery, has a great possibility of prolonged hospitalization and ICU when compared with those who are asymptomatic or have mild infection. All elective surgical procedures should be postponed during the COVID-19 pandemic. The threshold of emergency surgeries is higher in the COVID-19 pandemic period. As a result, we recommend promoting supportive treatment wherever possible, to delay or avoid the requirement for the surgery.

Keywords: COVID-19, morbidity, death rate, mortality, surgical procedures



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Влияние инфекции COVID-19 на результаты хирургических вмешательств (опыт хирургической больницы Аль-Захрави)

Конфликт интересов: не заявлен.

Вклад авторов: Алебади М.Х.А. – концепция, методология, формальный анализ, исследование, ресурсы, обработка данных, написание текста; Алдайени С.А.З. – концепция, исследование, ресурсы, обработка данных, визуализация; Альхиджадж С.А.А. – ресурсы, обработка данных, написание текста, обзор, редактирование.

Этическое заявление: данное исследование было одобрено кафедрой хирургии медицинского факультета Университета Мисана (ID: № 23).

Статья опубликована в авторской редакции.

Подана: 11.08.2023

Принята: 11.12.2023

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Резюме

Введение. Инфекция SARS-CoV-2 повлияла на все сферы жизни и увеличила количество осложнений, заболеваемость и риск смерти после операции. Данное исследование позволит определить послеоперационные осложнения пневмонии, вызванной COVID-19, у пациентов, перенесших хирургические вмешательства.

Цель. Оценить послеоперационные осложнения бессимптомной, легкой и тяжелой форм инфекции COVID-19 у пациентов, перенесших вмешательство.

Материалы и методы. Ретроспективное исследование пациентов, инфицированных COVID-19 и перенесших вмешательство. Настоящее исследование проводилось в хирургической больнице Аль-Захрави в период с июня 2022 года по май 2023 года. Всего были исследованы 155 пациентов с COVID-19. Выборку разделили на три группы в зависимости от формы COVID-19: бессимптомная (n=31), легкая (n=69) и тяжелая (n=55). Данные были собраны из отчетов отделения интенсивной терапии, в палатах послеоперационного наблюдения, операционных и включали возраст пациентов, пол, тяжесть COVID-19, типы хирургических вмешательств, сепсис, смерть, госпитализацию, продолжительность пребывания в отделении интенсивной терапии и любые послеоперационные осложнения.

Результаты. Умерших было больше в группе пациентов с тяжелыми случаями заболевания (n=23), чем в легких и бессимптомных группах, с высокой статистической значимостью (p=0,002). Пациенты группы с тяжелым COVID-19 оставались в отделении интенсивной терапии дольше ($8,1 \pm 3,3$ сут.), чем легкие и бессимптомные. В одномерной модели только сепсис оказывает значимое влияние (p=0,001). Одномерные и многомерные модели показали, что более тяжелое течение инфекции в сочетании с более тяжелой хирургической патологией связано с большей вероятностью летального исхода и тяжелых осложнений.

Заключение. Тяжелая пневмония, вызванная COVID-19, у пациентов, подвергающихся хирургическим операциям, имеет большую вероятность длительной госпитализации в отделения интенсивной терапии по сравнению с теми, у кого нет симптомов

или инфекция протекает в легкой форме. Во время пандемии COVID-19 все плановые хирургические процедуры следует отложить, а порог экстренных операций выше. Рекомендуется проводить поддерживающее лечение (в случаях, когда это возможно), чтобы отложить или избежать необходимости хирургического вмешательства.

Ключевые слова: COVID-19, заболеваемость, уровень смертности, смертность, хирургические вмешательства

■ INTRODUCTION

Globally, COVID-19 infection has accounted for more than 690 million cases and more than 6 million deaths [1]. Cases that require surgical operations during the pandemic period grow up. The postoperative risks of rising complications including morbidity and mortality are one of the challenges of surgery during a pandemic in cases with active COVID-19. The mortality rate rises to 19.1% and 26% for elective and emergency surgery, respectively [2].

COVID-19 cause multisystem illnesses with short and long-term sequels. These are myocardial dysfunction, pericarditis, chronic pulmonary dysfunction, psychological distress, depression disorders, renal failure, fatigability, and musculoskeletal disturbances [3]. These impacted directly the postoperative recovery period in those undergoing surgery [4]. When the symptoms of COVID-19 persistently lead to rising complications and risks of peri and postoperative sequels [5].

■ PURPOSE OF THE STUDY

To assess the postoperative complications of asymptomatic, mild, and severe COVID-19 infection in patients undergoing surgery.

■ MATERIALS AND METHODS

Study Design and Setting

A retrospective study on participants undergoing surgery infected with COVID-19. The present study was conducted at Al-Zahrawi Surgical Hospital during a period from June 2022 to May 2023. Totally, 155 COVID-19 patients collected. The sample was divided into three groups: Asymptomatic (n= 31), Mild (n=69), and Severe (n=55) according to the severity of COVID-19.

Participants

All participants infected with COVID-19 during the pandemic who underwent surgery due to COVID-19 or other cases planning for surgery as an elective or emergency during the pandemic were enrolled.

Inclusion Criteria

1. Hospitalized COVID-19 cases.
2. New positive COVID-19 infection.
3. Seven days before surgical intervention.
4. One month postoperative.



5. Minimal invasive surgery.
6. Open surgery.

Exclusion Criteria

1. Loss of follow-up.
2. Uncooperative.
3. Unwilling.
4. Negative PCR.
5. Period postoperative more than a month.

Data Collection

These were collected from patient's reports and files in the Intensive care unit (ICU), recovery room, and operative theater which included the age of patients, gender, severity of COVID-19, types of surgery, sepsis, death, hospitalization, duration of ICU and any complication postoperative.

Statistical Analysis

These were done by SPSS V. 26. (IBM, NY, USA). The continuous variables were described as frequency and percentage while the categorical variables were described as mean and SD. The unpaired Student's *t*-test and the Chi-square test were used to compare between variables. Logistic regression analysis was used to describe the risk probabilities of variables on patients infected with COVID-19 undergoing surgery. Univariate and multivariate models were used to show the probabilities of the variables by Odds ratio. In all tests, a *p*-value of <0.05 was considered significant.

RESULTS

Table 1 listed the demographic, surgery details, hospitalization, complications, and death findings. Age, gender, surgery types, selectivity, sepsis and stay in the hospital

Table 1
Variables of the study

Variable		Asymptomatic (n= 31)	Mild (n=69)	Severe (n=55)	P-value
Age (years)		37.2±15.6	40.2±14.4	55.6±12.4	0.05
Gender	Male	19	35	31	0.59
	Female	12	34	24	
Surgery	Open	11	21	13	0.47
	Minimal invasive	20	48	42	
Electricity	Elective	22	40	38	0.3
	Emergency	9	29	17	
Sepsis	Yes	3	7	13	0.07
	No	28	62	42	
Death	Yes	2	19	23	0.002
	No	29	50	32	
Hospitalization (days)		4.6±2.2	6.5±2.5	14.8±4.6	0.73
ICU duration (days)		1.5±1.4	4.2±3.2	8.1±3.3	0.05
Complications	Yes	6	22	39	<0.0001
	No	25	47	16	

Table 2
Logistic regression of death and complication.

Variable	Univariate	Multivariate
	Odds ratio, 95%CI, P-value	
Age	1.43, 30.45–45.58, 0.67	2.22, 25.34–44.56, 0.07
Male: Female	0.68, 1.34–2.24, 0.88	0.78, 0.98–1.56, 0.92
Minimal invasive to Open	1.67, 3.65–4.55, 0.06	1.88, 2.98–5.57, 0.08
Elective to Emergency	1.45, 1.98–2.55, 0.69	2.04, 3.05–7.48, 0.7
Sepsis	4.63, 1.75–20.44, 0.001	2.65, 1.55–3.56, 0.06
Hospitalization	1.75, 0.95–1.58, 0.93	1.87, 1.69–3.86, 0.85
ICU duration	5.46, 3.75–17.55, 0.01	3.08, 2.66–8.84, 0.05

were not significantly different among groups of this study. However, dead subjects were more in the severe illness cases (n=23) than in mild and asymptomatic groups with a high statistical difference (p=0.002). Although, severe cases stayed more days in ICU (8.1±3.3 days) than mild cases (6.5±2.5 days) and asymptomatic (1.5±1.4 days) with a significant difference (p=0.05).

Table 2 showed the regression analysis of the study regarding death and complications. Only sepsis has a significant effect in the univariate model (p=0.001), which that means when the patient developed sepsis, he nearly has a probability to pass or expose to complications in OR=4.63 folds than that without sepsis. Furthermore, univariate and multivariate models revealed that a more severe course of infection, together with more severe surgical pathology, is associated with a greater likelihood of death and severe complications (OR=5.46 and 3.08) with a significant difference (p=0.01, 0.05).

■ DISCUSSION

It is well known that patients with COVID-19 pneumonitis undergoing surgery have a great probability of morbidities and mortalities. That is why surgeons must be careful when deciding whether do surgery or not.

The immune system of the body is the most determinant of COVID-19 severity and individuals with immune dysfunction, are more liable to expose to high mortality post-COVID-19 pneumonitis [6]. Surgical procedures can lead to immediate impairment in the immune system [7] and even induction of releasing systemic inflammatory mediators and responses [8, 9].

During the pandemic, the goals of whole government over the world was to save as many as patients life, by let beds in hospitals and ICUs empty for new critical cases of COVID-19, drop unnecessary pressure on hospitals, anesthesia, and surgeons staffs ready for any intervention and to prevent the spreading possibility of COVID-19 pneumonitis among other patients, medical staffs and visitors [9].

In our locality, emergency procedures include head injuries, abdominal traumas, perforated and acute appendicitis, road traffic accidents, and burns. The priority in this matter for COVID-19 infection. Depending on these strategies, those detected with COVID-19 underwent minor surgical procedures.

These included chest tube insertion, central line administration, drainage tube insertion, and/or necrosis debridement [10]. These were referred to as short surgical



procedures which were done usually under local anesthesia. That does not require postoperative resuscitation in the ICU. These were acquired for supporting or saving life [11]. These approaches are also supported by Lei et al. [12] study.

Morbidity and mortality are great in severe COVID-19 cases compared to other groups. This is similar to Doglietto et al., [8] and Inzunza et al. [13].

In this study, age, gender, surgery types, selectivity, sepsis, and stay in the hospital were not significantly different among the groups of this study. This is similar to Lei et al., [15] findings.

The death rate was high in this study; this indicated that subjects with COVID-19 pneumonitis are at higher risk of mortality when undergoing surgical procedures. This rate was higher than that of the global prevalence of perioperative mortality among surgical patients with COVID-19 which was documented by Abate et al. [14].

Inzunza et al. [13], Rivett et al., [3], Doglietto et al., [8] and Di Martino et al., [15] recorded lower death rates. These discrepancies could be due to advanced and development facilities, in addition, to excellent training staff in that countries in comparison to Iraq, which was exposed to three Wars during the past periods of three decades. In China, Cai and co-authors reported a high mortality rate, yet this might be attributed to the large population and crowd in that country [16].

The pandemic period, pandemic severity, different protocols, variations in health policies, amount of resources, and different countries are the possible reasons for the observed discrepancies in the mortality and morbidity rates among different studies [13].

■ CONCLUSION

Severe COVID-19 pneumonitis undergoing surgery has a great possibility of prolonged hospitalization and ICU when compared with those who are asymptomatic or have a mild infection. All elective surgical procedures should be postponed during the COVID-19 pandemic. The threshold of emergent surgeries is higher in the COVID-19 pandemic period. As a result, we recommend promoting supportive treatment wherever possible, to delay or avoid the requirement for the surgery.

■ REFERENCES

1. World Health Organization. WHO Coronavirus Disease (COVID-19) Dashboard. 2023. <https://covid19.who.int> (accessed 04/05/2023).
2. COVID Surg Collaborative. Mortality and pulmonary complications in patients undergoing surgery with perioperative SARS-CoV-2 infection: an international cohort study. *Lancet*. 2020 Jul 4;396(10243):27–38.
3. Rivett L., Sridhar S., Sparkes D., et al. Screening of healthcare workers for SARS-CoV-2 highlights the role of asymptomatic carriage in COVID-19 transmission. *Elife*. 2020 May 11;9:e58728.
4. Machhi J., Herskovitz J., Senan A.M., et al. The Natural History, Pathobiology, and Clinical Manifestations of SARS-CoV-2 Infections. *J Neuroimmune Pharmacol*. 2020 Sep;15(3):359–386.
5. COVID Surg Collaborative; Global Surg Collaborative. Timing of surgery following SARS-CoV-2 infection: an international prospective cohort study. *Anaesthesia*. 2021 Jun;76(6):748–758.
6. Chen N., Zhou M., Dong X., et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. *Lancet*. 2020 Feb 15;395(10223):507–513.
7. Amodeo G., Bugada D., Franchi S., et al. Immune function after major surgical interventions: the effect of postoperative pain treatment. *J Pain Res*. 2018 Jul 10;11:1297–1305.
8. Doglietto F., Vezzoli M., Gheza F., et al. Factors Associated With Surgical Mortality and Complications Among Patients With and Without Coronavirus Disease 2019 (COVID-19) in Italy. *JAMA Surg*. 2020 Aug 1;155(8):691–702.
9. Stawicki S.P., Jeanmonod R., Miller A.C., et al. The 2019–2020 Novel Coronavirus (Severe Acute Respiratory Syndrome Coronavirus 2) Pandemic: A Joint American College of Academic International Medicine-World Academic Council of Emergency Medicine Multidisciplinary COVID-19 Working Group Consensus Paper. *J Glob Infect Dis*. 2020 May 22;12(2):47–93.

10. Wu Z., McGoogan J.M. Characteristics of and Important Lessons From the Coronavirus Disease 2019 (COVID-19) Outbreak in China: Summary of a Report of 72 314 Cases From the Chinese Center for Disease Control and Prevention. *JAMA*. 2020 Apr 7;323(13):1239–1242.
11. Kumar P., Renuka M.K., Kalaiselvan M.S., Arunkumar A.S. Outcome of noncardiac surgical patients admitted to a multidisciplinary intensive care unit. *Indian J CritCare Med*. 2017;21(1):17–22.
12. Lei S., Jiang F., Su W., et al. Clinical characteristics and outcomes of patients undergoing surgeries during the incubation period of COVID-19 infection. *EClinicalMedicine*. 2020 Apr 5;21:100331.
13. Inzunza M., Romero C., Irarrázaval M.J., et al. Morbidity and Mortality in Patients with Perioperative COVID-19 Infection: Prospective Cohort in General, Gastroesophageic, Hepatobiliary, and Colorectal Surgery. *World J Surg*. 2021 Jun;45(6):1652–1662.
14. Abate S.M., Mantefardo B., Basu B. Postoperative mortality among surgical patients with COVID-19: a systematic review and meta-analysis. *Patient Saf Surg*. 2020 Oct 12;14:37.
15. Di Martino M., Septiem J.G., Gonza'lez R.M., et al. (2020) Elective surgery during the SARS-CoV-2 pandemic (COVID-19): morbidity analysis and recommendations on patient prioritization and safety measures. *Span Surg*. 98(9):525–32.
16. Cai M., Wang G., Zhang L., et al. Performing abdominal surgery during the COVID-19 epidemic in Wuhan, China: a single-centred, retrospective, observational study. *Br J Surg*. 2020 Jun;107(7):e183–e185.