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# A comparative study of abdominal wall hernia surgery before and after the COVID-19 pandemic: Results from a 2-year observational period

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## Abstract

**BACKGROUND:** Abdominal wall hernia surgery is among the most common procedures in general surgery. It is thought that postponing elective hernia surgeries due to the pandemic will increase emergency presentations of hernias, but different data have been published in the literature.

**OBJECTIVE:** This study aimed to evaluate the effect of the coronavirus disease 2019 (COVID-19) pandemic on emergency and elective hernia operations.

**MATERIALS AND METHODS:** Patients who underwent hernia surgery in the Istanbul Sultanbeyli State Hospital between March 2018 and March 2022 were retrospectively analyzed. March 11, 2018–March 11, 2020, and March 12, 2020–March 12, 2022, were categorized as prepandemic and pandemic periods, respectively, and were evaluated as 1-year periods. All abdominal wall hernia operations performed in the hospital were examined.

**RESULTS:** A total of 1,644 patients underwent hernia operations. Patients' ages ranged from 18 to 87 years; the mean age was  $47.5 \pm 13.6$ . A total of 1,319 (80%) of patients were men. There was a 50% decrease in the number of surgeries during the pandemic, but there was no significant increase in emergency surgeries ( $P = 0.49$ ). Incisional and ventral hernia procedures declined dramatically over the COVID-19 pandemic compared with the prepandemic period, whereas inguinal hernia surgeries increased proportionally ( $P = 0.002$ ).

**CONCLUSIONS:** While a decrease was observed in total abdominal hernia surgeries performed during the COVID-19 pandemic compared with the prepandemic period, no significant increase was found in emergency abdominal hernia surgeries. Patients with ventral and incisional hernias can be followed up to be operated on under optimal conditions.

## Keywords:

Abdominal hernia, coronavirus, COVID-19, emergency surgery, hernia

## Introduction

The coronavirus disease 2019 (COVID-19) pandemic caused the postponement of elective surgeries worldwide and affected emergency and cancer-related surgeries.<sup>[1,2]</sup> As our knowledge and experience of the COVID-19 pandemic and surgery increased, guidelines were published, and surgeries were started again.<sup>[3-6]</sup>

The first COVID-19 case in Turkey was detected on March 10, 2020, and elective operations were restricted as of March 19. Although some restrictions were lifted after the first wave lost its effect, the cancellation of elective operations (excluding surgical oncology procedures) had to be reinstated in the peak waves of COVID-19. Delays in the timely execution of elective operations and the tendency of the public to avoid going to the hospital have increased emergency admissions.<sup>[1]</sup>

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Abdominal wall hernia surgery is among the most often performed procedures in general surgery. It is thought that postponing elective hernia surgeries will increase emergency presentations of hernias, but different data have been published in the literature.<sup>[7-15]</sup>

The statements made at the beginning of the pandemic raised the question of where the hernia-related emergencies went during the COVID-19 pandemic after the number of emergency hernia-related operations did not increase. Data from Herniamed, where thousands of hernia cases are registered, confirm that more than 70% of elective hernia repairs were not performed during the peak weeks of the COVID-19 pandemic, resulting in no general increase in the rate of emergency repair.<sup>[1,9,13]</sup>

This study aimed to evaluate the effect of COVID-19 pandemic on emergency and elective hernia operations in our hospital by comparing it with the pre-pandemic periods.

## Materials and Methods

We conducted a retrospective analysis of patients who had hernia surgery at the General Surgery Clinic at Istanbul Sultanbeyli State Hospital between March 2018 and March 2022.

This study was performed in line with the principles of the Declaration of Helsinki. The Istanbul Kartal Dr. Lutfi Kırdar City Hospital Clinical Research Ethics Committee (Number: 2022.514.219.8) and The Ministry of Health COVID-19 Scientific Research Evaluation Commission (Number: 2022-03-04T20\_49\_32) approved this study.

March 11, 2018–March 11, 2020, and March 12, 2020–March 12, 2022, were categorized as pre-pandemic and pandemic periods, respectively. Pre-pandemic and pandemic periods were evaluated as 1-year periods. All abdominal wall hernia operations performed in the hospital were examined. In the 1<sup>st</sup> year of the pandemic, elective surgeries were suspended in our hospital for a total of 3 months.

We collected data using patient files and hospital records. Demographic data, date of surgery, classification of abdominal wall hernia, types of surgery (elective/emergency), (epigastric/umbilical/inguinal/incisional), number of surgeries, and surgical technique (open/laparoscopic) were analyzed. Primary umbilical and epigastric hernias were grouped as ventral hernias for statistical analysis. Patients who presented to the emergency department with signs of obstruction and underwent surgery were classified as an emergency.

The primary outcome of this study was to determine the impact of the COVID-19 pandemic on elective and emergency hernia operations and compare it with the literature.

## Statistical analysis

Using the Statistical Package for Social Sciences, we conducted statistical analysis (Version 25 Armonk, NY: IBM Corp. for Mac, IBM Corporation). The mean and standard deviation are the descriptive measures used for continuous variables. The frequencies procedure is used on categorical variables. The Chi-square test was used to compare categorical variables. The acceptable confidence range for statistical significance is 95%, and a bilateral *P* value is 0.05.

## Results

Between 2018 and 2022, 1,644 patients underwent abdominal wall hernia operations. Patients' ages ranged from 18 to 87 years; the mean age was  $47.5 \pm 13.6$  years. A total of 1,319 (80%) of patients were men. Inguinal hernias form the majority of the procedures. A total of 52 individuals required emergency surgery. Only 72 patients underwent laparoscopic surgery. During the COVID-19 period, approximately 50% was decreased in the number of surgeries [Table 1].

The patients were divided into groups based on their operation time. The number and type of hernia according to the period are given in Figure 1. In terms of gender and types of surgery, no differences were found (*P* = 0.46 and

**Table 1: Characteristics of patients**

Parameters	<i>n</i> = 1,644 (%)
Age (years)	
Mean (standard deviation)	47.5 (13.6)
Minimum–maximum	18–87
Gender	
Male	1,319 (80.2)
Female	325 (19.8)
Classification of abdominal wall hernia	
Ventral	330 (20.1)
Incisional	56 (3.4)
Inguinal	1,258 (76.5)
Types of surgery	
Elective	1,592 (96.8)
Emergency	52 (3.2)
Period of operation <sup>a</sup>	
Pre-pandemic	1,047 (63.7)
Pandemic	597 (36.3)
Surgical technique	
Laparoscopic	72 (4.4)
Open	1,572 (95.6)
Time periods <sup>b</sup>	
2018–2019	538 (32.7)
2019–2020	509 (31)
2020–2021	225 (13.7)
2021–2022	372 (22.6)

<sup>a</sup>March 11, 2018–March 11, 2020, and March 12, 2020–March 12, 2022, were categorized as pre-pandemic and pandemic periods, respectively.

<sup>b</sup>Pre-pandemic and pandemic were evaluated as 1-year periods

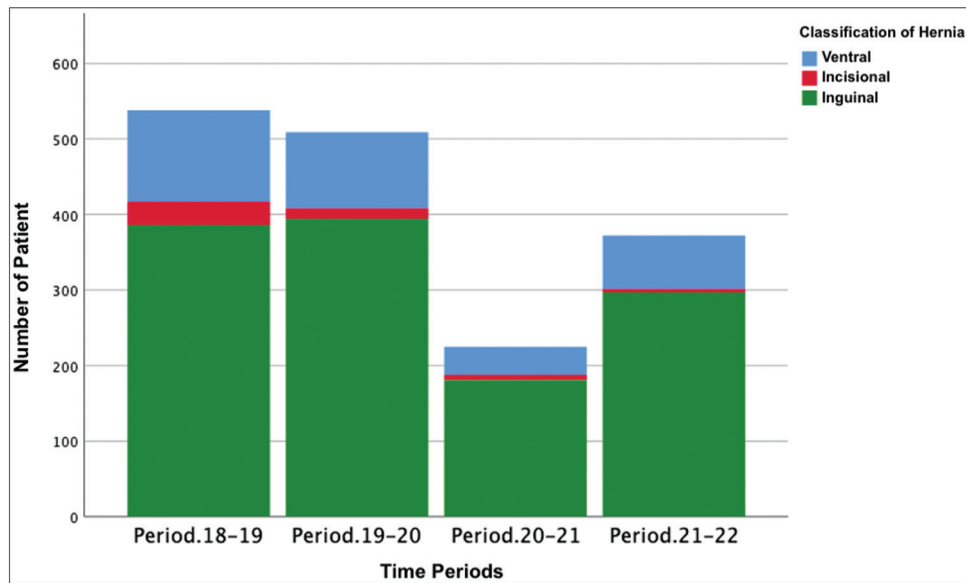


Figure 1: The number and type of hernia according to the period

Table 2: Comparison of patients according to the period

Parameters	Prepandemic period <sup>a</sup>		Pandemic period <sup>a</sup>		P value
	2018-2019	2019-2020	2020-2021	2021-2022	
Age (years): mean (standard deviation)	47.2 (13.35)	48.2 (13.52)	45.1 (12.9)	48.2 (14.54)	0.023
Gender, n (%)					
Male	425 (79)	403 (79.2)	187 (83.1)	304 (81.7)	0.46
Female	113 (21)	106 (20.8)	38 (16.9)	68 (18.3)	
Types of surgery, n (%)					
Elective	519 (96.5)	497 (97.6)	219 (97.3)	357 (96)	0.49
Emergency	19 (3.5)	12 (2.4)	6 (2.7)	15 (4)	
Classification of abdominal wall hernia, n (%)					
Ventral	121 (22.5)	101 (19.8)	37 (16.4)	71 (19.1)	0.002
Incisional	31 (5.8)	14 (2.8)	7 (3.1)	4 (1.1)	
Inguinal	386 (71.7)	394 (77.4)	181 (80.4)	297 (79.8)	

<sup>a</sup>March 11, 2018–March 11, 2020, and March 12, 2020–March 12, 2022, were categorized as prepandemic and pandemic periods, respectively, and were evaluated as 1-year periods

$P = 0.49$ ). However, there was a difference in age and type of hernia operation between the periods. Incisional and ventral hernia procedures declined dramatically over the COVID-19 period compared with the prepandemic period, whereas inguinal hernia surgeries increased proportionally ( $P = 0.002$ ) [Table 2].

## Discussion

The COVID-19 pandemic has had serious effects not only on those infected with the new coronavirus but also on surgical patients whose surgeries have been canceled or postponed.<sup>[16-18]</sup> Multicenter studies that compared the pre-COVID-19 and the COVID-19 periods showed an overall significant reduction of emergency surgical admissions during the outbreak of the COVID-19 pandemic.<sup>[19,20]</sup> There was a considerable decrease in the volume of gastrointestinal procedures performed during

the initial wave of the pandemic, including elective surgeries, urgent/emergency surgeries, and some cancer surgeries.<sup>[2,21]</sup>

In May 2020, the European Hernia Society recommendations were published for managing adult patients with hernias during the COVID-19 pandemic. It was emphasized that the recommendations for treating hernia patients during the COVID-19 pandemic would differ according to local opportunities. Hernia surgery is a procedure that can be postponed in most cases. It was stated that during any operation, we should take extra care to minimize the risk of virus spread and lung damage and shorten the hospital stay by adapting our surgical approach to patient, situation, and surgeon variables.<sup>[5]</sup>

As expected, the COVID-19 pandemic has caused the majority of hernia operations to be postponed

or canceled. Nevertheless, contrary to the general expectation, some publications revealed that emergency hernia repairs did not increase as expected but rather tended to decrease.<sup>[1,9,13]</sup> The main result of our study showed that our hernia operation numbers declined in the COVID-19 period compared with the previous period. However, no significant increase was observed in the number of emergent hernia surgery. The tendency to treat the patients who applied to the emergency department during the COVID-19 period with conservative methods and their reduction may have caused this situation. The limitations of articles examining the effects of the COVID-19 pandemic on emergency hernia surgery were that they only provide a snapshot of a few months of the pandemic.<sup>[12,19]</sup> Our study covers a broader period before, during, and after COVID-19, whereas most studies take snapshots of a period. As a result, the variation of abdominal hernias over time can be better analyzed.

This study showed that hernia surgery was dramatically reduced, especially in the first pandemic period (2020–2021), but the percentage of elective inguinal hernia repair was rather a little bit increase in the second pandemic period (2021–2022). This increase in the number of elective surgeries during the second pandemic period has been attributed to the decrease in the number of patients infected with COVID-19 in our country in the later stages of the pandemic and mostly normalization of the elective surgery program as a result of the decrease in the number of COVID-19 patients hospitalized in our hospital.

When abdominal hernia patients were examined in regards to age, no difference was found in the COVID-19 period.<sup>[22]</sup> In this study, however, we discovered that the mean age of patients with an abdominal hernia who underwent surgery during the pandemic period was significantly lower than in other periods. This result could be explained by the fact that elderly patients are advised to stay at home unless there is an emergency, and surgeons make more conservative decisions rather than operating on elderly patients during the pandemic.

In this study, inguinal hernia surgeries increased proportionally during the pandemic period compared with ventral and incisional hernia surgeries. Because patients with ventral and incisional hernias are considered to have a low risk of strangulation, the preference for more conservative treatment in these patients may explain this difference. Conversely, in the study, which reported an increase in emergency abdominal wall hernia operations during the COVID-19 pandemic, the authors informed no significant difference in mortality and morbidity rates, so

emergency hernia operations can be safely performed by taking necessary and adequate precautions during the pandemic.<sup>[7]</sup> However, high morbidity and mortality were reported in the study, in which COVID-19 patients with severe respiratory distress who underwent emergency surgery due to hernia and other abdominal conditions were examined. To prevent this, the importance of rapid evaluation and treatment by a special surgical team was emphasized.<sup>[23]</sup> Therefore, manual reduction came to the fore as a solution for incarcerated hernia patients. A review reports that manual reduction of hernia under analgesia/sedation (taxis) in the acute inguinal hernia is a helpful technique in COVID-19 times to reduce the need for emergency surgery.<sup>[24]</sup>

Our research has several limitations. It is a single-center, retrospective research. We do not know the number of patients who underwent taxis in the emergency room and did not undergo surgery and the COVID-19 status of patients who underwent emergency surgery. Also, we could not compare the complications and other perioperative parameters due to a lack of data.

## Conclusions

Compared with the prepandemic period, a decrease was observed in total abdominal hernia surgeries performed during the COVID-19 pandemic. Despite the preference for conservative treatment of patients with an abdominal hernia, a significant increase was not found in emergency abdominal hernia surgeries. Patients with ventral and incisional hernias can be followed up to be operated on under optimal conditions.

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published, and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

## Data availability statement

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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Nil.

## Conflicts of interest

There are no conflicts of interest.

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