

# Impact of the First Six Months of the Covid-19 Pandemic on Orthopedic and Hand Trauma Surgery

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## ABSTRACT

Reduced mobility due to COVID-19 prevention measures caused major changes in the number and types of orthopedic trauma cases. This study aimed to compare the profile of trauma-related general orthopedic surgery and hand surgery cases between the first six months of the COVID-19 pandemic and the corresponding periods of previous years in order to determine strategies for managing orthopedic traumas in unusual circumstances such as pandemics.

Patients over 18 years old who underwent orthopedic surgery due to trauma were grouped according to surgery date as pre-pandemic group 1 (G1, March 16–September 18, 2018), pre-pandemic group 2 (G2, March 18–September 20, 2019), and the pandemic group (G3, March 19–September 21, 2020). Between-group differences with  $p < 0.05$  were considered significant.

The study included a total of 3522 patients: 1351 in G1, 1427 in G2, and 744 in G3. There was a significant decrease in the number of patients in G3 compared to the other groups ( $p = 0.001$ ), while the number of hand surgeries did not differ significantly between the groups. As a result, the ratio of hand trauma surgeries to general orthopedic traumas was significantly higher in G3 ( $p < 0.05$ ).

During the COVID-19 pandemic, there was a decrease in orthopedic trauma surgeries and an increase in hand trauma surgeries. In this period of increased hand traumas, hand surgeons should be encouraged to intervene remotely using technology (telemedicine).

**Keywords:** Covid-19, Orthopedics, Hand surgery, Orthopedic trauma

## Introduction

The emergence of the novel coronavirus SARS-CoV-2 (COVID-19) from Wuhan, China and its global spread have resulted in significant changes in all areas of life (1). Initially, the basic public health approach of isolation, social distancing, and hygiene rules was recommended because the behavior of the virus was not fully known and therapeutic drugs or preventive vaccines against the virus were not yet available (2). After the World Health Organization (WHO) declared COVID-19 a pandemic, all institutions (particularly health systems) reorganized their operations to address the pandemic. Restrictions on professional and social life, lockdowns, and encouragement to work from home reduced the number of hospital admissions, and mobility restrictions also decreased the number of orthopedic traumas. As elective surgeries were postponed, there were substantial changes in the

number and demographic profile of patients presenting to the orthopedics and traumatology outpatient and emergency departments. A decrease in orthopedic emergency and outpatient cases was observed worldwide. In the literature, a study conducted in the United Kingdom during the COVID-19 pandemic showed a decline in orthopedic surgeries. The types of surgery also changed, with marked increases in young patients and lower-energy traumas especially (3). Similarly, a study conducted in Australia demonstrated a decrease in general traumas and in the number of patients requiring orthopedic surgery during the pandemic (4). In a study conducted in Turkey, it was determined that the number of traumas in children and young people had decreased dramatically compared to before the pandemic (5). In accordance with the recommendations of the Turkish Ministry of Health, orthopedic emergency and tumor surgeries have continued during the COVID-19 pandemic. In addition, elective

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procedures were performed at a very limited capacity, particularly during the summer, with necessary precautions taken in our department. Although it is clear that the number of general orthopedic trauma patients has decreased, studies examining the demographic profile of trauma patients are limited (6,7).

The aim of the present study was to evaluate the number and type of trauma-related orthopedic surgeries performed during the first six months of the COVID-19 pandemic compared to the same periods in previous years. Our hypothesis was that despite the lower number of trauma-related orthopedic surgeries during the pandemic, there would be no decrease in the number of hand trauma surgeries. We hope that our findings will help identify strategies for orthopedic and hand surgery management during extraordinary periods such as pandemic.

## Materials and Methods

**Data Collection:** The study data were collected from the hospital's digital archives, central operating room archives, and ward records after obtaining the necessary administrative permission. The cases were classified according to the 10th edition of the International Statistical Classification of Diseases and Related Health Problems (ICD-10) codes.

**Patient Selection:** Patients over 18 years of age who underwent surgery in our hospital during the first six months of the pandemic in Turkey and during the corresponding six-month periods of 2019 and 2018 were categorized as trauma and non-trauma (elective procedures, nontraumatic emergency, and oncology) cases. The trauma cases were subdivided into hand traumas and non-hand traumas. Hand traumas were further categorized as fractures (metacarpal and phalanx), soft tissue injuries (tendon, neurovascular, and muscle/fascial injuries), stump closure, and reimplantation surgery. The data were analyzed separately and the patients' demographic profile, number of surgeries, and surgery types were compared.

**Study Groups:** Patients who underwent surgery in our orthopedics and traumatology center were grouped according to surgery date as pre-pandemic group 1 (G1, March 16–September 18, 2018), pre-pandemic group 2 (G2, March 18–September 20, 2019), and the pandemic group (G3, March 19–September 21, 2020). Within each of these groups, hand trauma cases were evaluated

as separate subgroups (Sg1, Sg2, and Sg3, respectively).

**Ethics Committee Approval:** The study was conducted in accordance with the Declaration of Helsinki after obtaining approval from the hospital ethics committee (Date: 04.12.2020, number: 2020/09-11).

**Statistical analysis:** IBM SPSS 20.0 package program was used for statistical analysis. It was determined by Shapiro-Wilks that numerical data were distributed normally. The numerical data was expressed as mean  $\pm$  standard deviation (SD). One way ANOVA was used to determine whether the difference between groups and Tukey's HSD was used for post hoc analysis. Chi-square test and Fisher's exact test were used in the analysis of categorical data.  $p < 0.05$  is considered statistically significant.

## Results

Of the patients included in the study, 3118 underwent surgery for reasons other than hand trauma. The mean ages and sex distributions of these patients are presented in Table 1. The demographic data of the 404 patients with and trauma are given in Table 2. When the demographic profile of surgical patients was compared between the pre-pandemic period (G1 and G2) and the pandemic period (G3), there was no significant difference in the male-to-female ratio. Mean age was lower in the pre-pandemic patient groups than the pandemic group, but the difference was not statistically significant (Table 1).

Comparison of the demographic profiles of surgical patients before and during the pandemic revealed no significant difference in mean age. Male patients accounted for a significantly greater proportion of hand trauma surgeries both before and during the pandemic (Table 2).

There were a similar number of surgical patients in G1 and G2, while this number was significantly lower in G3 ( $p < 0.05$ ). However, there was no significant difference in the number of surgeries due to hand trauma before and during the pandemic.

There was no significant difference in the total number of hand trauma surgeries performed during the pandemic compared to the pre-pandemic period. However, the ratio of hand trauma surgeries to total orthopedic trauma surgeries was 16.3% in G1, 15.3% in G2, and 26.4% in G3 (Table 3).

**Table 1.** Demographic data of orthopedic surgical patients other than hand trauma cases by periods.

	G1	G2	G3	P value
Age (years)	46.8±18.1	45.9±19.6	54.0±22.6	0.232
(min-max)	(16-82)	(16-93)	(16-91)	
Males, % (n)	52.8% (646)	51.9% (668)	53.2% (323)	0.773
Females, % (n)	47.2% (577)	48.1% (620)	46.8% (284)	

**Table 2.** Demographic profile of hand trauma patients by periods.

	Sg1	Sg2	Sg3	P value
Age (years)	39.1±14.5	41.9±17.33	37.5±18.6	0.532
(min-max)	(16-58)	(16-61)	(16-55)	
Males, % (n)	58.5% (75)	57.5% (80)	59.1% (81)	0.932
Females, % (n)	41.4% (53)	42.4% (59)	40.8% (56)	

This increase in the rate of hand trauma surgeries during the pandemic was found to be statistically significant ( $p < 0.05$ ). Hand fractures accounted for a significantly smaller proportion of hand trauma surgeries in Sg3 than in Sg1 and Sg2 ( $p < 0.05$ ). In contrast, surgeries for hand soft tissue injury increased significantly in Sg3 compared to Sg1 and Sg2 ( $p < 0.05$ ). (Table 4).

## Discussion

The global spread of COVID-19 has impacted all industries and systems, particularly the health system. Serious measures were taken in Turkey after the first case of COVID-19 was confirmed in our country on March 11, 2020, the same day the WHO declared the pandemic. These measures, which included implementing curfews and lockdowns, reducing mobility, encouraging work-from-home arrangements, and restricting the use of recreational spaces and sporting activities, have naturally and expectedly lowered the incidence of trauma. Many studies in the literature have demonstrated significant decreases in the number of orthopedic traumas during the pandemic (3-5, 7). Consistent with the literature, our study comparing surgeries performed before and during the pandemic revealed a significant decrease in the number of trauma surgeries during the pandemic. In accordance with recommendations to postpone elective procedures, there was a marked reduction in the number of elective surgeries. However, with the partial decrease in COVID-19 case numbers in the summer season, elective surgeries continued to be performed, albeit at a much reduced capacity.

In the present study, the mean age of orthopedic surgical patients was higher during the pandemic than before the pandemic, although the difference

was not significant. The literature also demonstrates an increase in the average age of patients, and this phenomenon has been attributed to the reduction in traffic accidents and sports activities lowering the rate of trauma among young people during the pandemic, while ground-level falls and home accidents cause fractures among older and osteoporotic patients in particular (8, 9). Some studies have shown that there was no decrease in hip fractures among older and osteoporotic patients during the first stage of the pandemic (10-12). We attribute the lack of a significant increase in mean patient age in the present study to the higher proportion of hand traumas, which occur more frequently in young patients. Changes in the demographic profile of patients have been reported with the decrease in trauma case numbers (7, 13-15). In the present study, the main changes observed in our patient profile were related to the number and types of hand trauma cases. There was no decrease in hand trauma surgeries during the pandemic when compared with the pre-pandemic period. Before the pandemic, patients with hand trauma accounted for 17.4% and 16.5% of the total number of trauma surgeries in 2018 and 2019, respectively. However, this rate was 26.4% in 2020. This demonstrates a statistically significant increase in the proportion of surgeries performed due to hand trauma. Consistent with our findings, two studies conducted in Italy and the UK during the pandemic also showed an increase in the rate of hand trauma (6, 16). Although patients with hand trauma during the pandemic had a lower mean age than before the pandemic, the difference was not statistically significant. There was a higher rate of hand traumas among the male patients during the pandemic in our study, similar to

**Table 3.** Distribution of types of surgical cases by periods.

	G1	G2	G3	P value
Non-trauma surgery, % (n)	43.2% (619)	41.0% (588)	15.8% (227)	0.0002
Non-hand trauma surgery, % (n)	35.9% (604)	41.6% (700)	22.5% (380)	0.0001
Hand trauma surgery, % (n)	31.7% (128)	34.4% (139)	33.9% (137)	0.775
Hand/Total trauma surgeries	17.4%	16.5%	26.4%	

**Table 4.** Distribution of types of hand trauma surgeries by periods.

	Sg1	Sg 2	Sg3	P value
Fractures, % (n)	38.1% (29)	42.1% (32)	19.7% (15)	0.003
Soft tissue injury, % (n)	29.8% (87)	31.2% (91)	38.8% (113)	0.003
Stump closure, % (n)	33.3% (7)	42.8% (9)	23.8% (5)a	0.564
Reimplantation, % (n)	31.2% (5)	43.7% (7)	25.0% (4)a	0.645

previous reports (6). In terms of the type of hand traumas, there were significantly fewer hand fractures during the pandemic than before the pandemic ( $p < 0.05$ ). We also observed a significant increase in the number of surgeries for hand soft tissue injuries during the pandemic. The causes of these injuries may be low-energy traumas associated with increases in activities such as crafting and landscaping at home during lockdowns, economic stresses, and the stress of being confined to the home for long periods of time. During the pandemic, a consensus report on the approach to patients was prepared based on data obtained from surveys of hand surgeons worldwide (17). Hand trauma was approached in accordance with this concept in our center. With the general increase in hand traumas, the referral of hand trauma cases from primary and secondary hospitals to our center resulted in a serious increase in workload. At the same time, increased patient circulation also posed a risk for viral spread. During such periods, we believe it would be more efficient for orthopedists who are not hand surgeons to perform surgeries that do not require expertise in hand surgery, such as simple (uncomplicated) hand injuries, in their own centers with assistance from the nearest hand surgeon via telemedicine. This would reduce the backlog of hand trauma surgeries in certain regions and lower the risk of viral spread by both reducing healthcare workers' workload and avoiding patient transport.

Our study has certain limitations. Firstly, we recognize the retrospective nature of this study is a limitation. Secondly, our hospital is one of the two centers in our region with the highest patient potential, and data from the other hospital was not included in our analysis. Thirdly, some

patients were excluded from the study due to missing diagnostic (ICD-10) code data as a result of the fast-paced and stressful environment created by the pandemic. The key to fighting effectively in extraordinary situations like a pandemic is to identify good strategies. It is also important to utilize available resources in the right place, at the right time, and as necessary. In such periods, hand surgeons should use technology to continue both specialty and inter specialty training via telemedicine. Given the increase in hand traumas, hand surgeons should be encouraged to coordinate amongst themselves regionally and nationally to enable local intervention. This will reduce patient circulation and ensure both a balanced workload distribution and a safer working environment for patients and healthcare professionals.

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