



Management of the Orthopedic Fractures in the COVID-19 Pandemic

Covid-19 Pandemisinde Ortopedik Kırıklarının Yönetimi

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ABSTRACT

Objectives: To report our multidisciplinary approach to the orthopedic fracture with increasing COVID-19 diagnoses by comparing the cases within two months before and after COVID -19 pandemic in our hospital.

Methods: Fracture cases admitted to our emergency department and consulted to the orthopedic clinic were included in this study two months before pandemic (Group 1) and after the first (Group 2) two months. The number of cases, types of fractures, duration of hospitalization, waiting times for surgery and post-surgery discharge times were compared between the two groups. Approach to fracture, operating room usage and equipment selection were compiled after the pandemic. The number of cases with COVID-19 positive infection detected by PCR was recorded. Data were compared.

Results: The number of patients included in our study was 388. Patients were divided as Group 1 for two months before Pandemic and Group 2 for two months after. 292 (75.3%) patients were included in Group 1 and 96 (24.7%) patients were included in Group 2. Of the patients being operated, 102 (75%) were Group 1, 34 (25%) were Group 2. The duration of hospitalization was 9.54 ± 4.28 days in Group 1 and 7.82 ± 3.64 days in Group 2. The waiting time for surgery was 7.28 ± 3.79 days in Group 1 and 7.23 ± 4.37 days in Group 2. The discharge times were 3.02 ± 1.75 days in Group 1 and 2.62 ± 1.54 days in Group 2. There was no statistically significant difference between the groups in all evaluated parameters ($p=0.14$), ($p=0.97$) ($p=0.42$).

Conclusion: Our approach to fracture cases should be applied more rationally, optimally and rapidly within the principles of orthopedics. We must strictly follow the precautions to protect against COVID-19 infection.

Keywords: COVID-19; coronavirus; fractur; orthopedic surgery; pandemic.

ÖZET

Amaç: Hastanemizde COVID-19 pandemisinden önceki ve sonraki 2 ay içindeki vakaları karşılaştırarak artan COVID-19 tanılarını ile ortopedik kırığa multidisipliner yaklaşımımızı bildirmek.

Yöntem: Pandemi öncesi (Grup 1) 2 ay ve sonrası ilk (Grup 2) 2 ay içinde acil servisimize başvuran ve ortopedi kliniğine konsülte edilen kırık vakaları çalışmaya dahil edildi. Vaka sayıları, kırık tipleri, yatış süreleri, ameliyat bekleme süreleri ve ameliyat sonrası taburcu süreleri her iki grup arasında karşılaştırıldı. Pandemi sonrası kırık hastalarına yaklaşım, ameliyathane kullanımı ve ekipman seçimi derlendi. PCR sonucu ile Covid-19 pozitif enfeksiyonu tespit edilen vaka sayıları kaydedilerek, bu hastalara yaklaşım açısından bilgiler derlendi.

Bulgular: Çalışmamıza dahil edilen hasta sayısı 388'dir. Pandemi öncesi 1 ay Grup 1, sonrası 1 ay Grup 2 olarak ayrıldı. 292 (%75,3) hasta Grup 1, 96 (%24,7) hasta ise Grup 2'ye dahil edildi. Opere edilen hastaların 102 (%75)'i grup 1, 34 (%25)'si Grup 2 idi. Yatış süresi Grup 1'de 9.55 ± 4.28 , Grup 2'de $7.82\pm 3,64$ gün idi. Ameliyat bekleme süresi Grup 1'de 7.28 ± 3.79 , Grup 2'de ise 7.24 ± 4.37 gün idi. Taburculuk süreleri ise Grup 1'de $3.02\pm 1,75$ gün, Grup 2'de ise 2.63 ± 1.54 gün idi. Tüm değerlendirilen parametrelerdegruplar arasında istatistiksel olarak anlamlı fark saptanmadı ($p=0.14$), ($p=0.97$) ($p=0.42$).

Sonuç: Kırık vakalarına yaklaşımımız ortopedi prensipleri içerisinde daha akılcı, optimal ve hızlı bir şekilde uygulanmalı; Covid-19 enfeksiyonundan korunmak için önlemleri titizlikle uygulamalıyız.

Anahtar sözcükler: COVID-19; Koronavirüs; ortopedik cerrahi; pandemi; kırık.

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The new type of coronavirus disease (COVID-19) first appeared in Wuhan, China, in Hubei province in December 2019.^[1-4] As reported, COVID-19 infection may easily carry the risk of transmission in areas where contact is likely.^[5-7] Hospitals are one of the places where contact risk increases, both in emergency and inpatient services.^[8,9]

Orthopedic fractures are an important part of emergency room admissions. It is observed that the increase in social isolation and the duration of stay at home together with the pandemic affects the number and distribution of fracture patients admitted to the emergency department. During the pandemic period, fractured patients with COVID-19 requiring surgical treatment were treated with a multidisciplinary approach.

The aim of this retrospective study is to distribute fracture cases and treatment approach to our emergency department two months before and two months after the COVID-19 pandemic was declared in our country. To compare and report the appropriate treatment approaches of these cases as multidisciplinary with increasing COVID-19 diagnostics.

Methods

This retrospective clinical study was performed with the approval of the Fatih Sultan Mehmet Education and Research Hospital Review Board with the ethical principles of the Declaration of Helsinki. In this study, the files of the patients who applied to the Orthopedics and Traumatology Clinic between January 2020 and May 2020 were scanned.

The cases of orthopedic fractures that were admitted to our emergency department within two months before the pandemic was announced in our country and after the two months and consulted to us were included in the study. Patients, who were diagnosed with fractures but were admitted to the emergency service for control and those who had multiple fractures and those who were diagnosed with fractures but were followed up by other clinics due to hand pathologies were excluded from the study.

Both periods were divided into groups and evaluated as Group 1 before the pandemic and Group 2 after the pandemic. The demographic characteristics of the cases were recorded. The number of cases, types of fractures, duration of hospitalization, waiting times for surgery and post-surgery discharge period were recorded and compared between the two groups. Approach to fracture patients, operating room usage and equipment selection were compiled after the

pandemic. PCR (RT PCR Rotor-Gene 6000) result recorded the number of cases with COVID-19 positive infection, and the information was compiled for the approach to these patients.

Statistical Analysis

Analysis was performed with SPSS 22.0 software package. Descriptive statistics were presented with frequency, percentage, average and standard deviation values. In this study, χ^2 (Chi-square) analysis was used for proportional comparisons of hospitalization before and after pandemic, and independent sample t-test and correlation analysis were used to examine the difference of hospitalization time, waiting time for surgery, and discharge time measurements. In this study, p-values less than 0.05 were considered statistically significant ($p=0.05$).

Results

The total number of patients included in this study was 388. The mean age of the patients included in this study was 51.62 ± 25.31 (3-94). Two-hundred-ten (54.1%) of the patients were male, and 178 (45.9%) were female. Two-hundred-ninety-two (75.3%) of the patients were included in Group 1, and 96 (24.7%) were included in Group 2. Two hundred-fifty-two (64.9%) of all patients were treated conservatively, while 136 (35.1%) were operated. Of the operated patients, 102 (75%) were included in Group 1, 34 (25%) were included in Group 2 (Table 1).

According to the incidence of fractures in Group 1, 104 (35.6%) were wrist, 64 (21.9%) hip fracture, 28 (9.6%) crus,

Table 1. Demographic data of patients included in this study

Demographic Data	n (%)
Gender	
Male	210 (54.1)
Female	178 (45.9)
Number of Patients	
Group 1	292 (75.3)
Group 2	96 (24.7)
Treatment	
Conservative	252 (64.9)
Surgical	136 (35.1)
Distribution of Operated Patients	
Group 1	102 (75)
Group 2	34 (25)

26 (8.9%) hand bones, 24 (8.2%) ankle fracture, 18 (6.2%) femoral shaft, 16 (5.5%) humerus, 12 (4.1%) were found to have forearm fracture. According to the incidence of fractures in Group 2, 50 (52.1%) of the wrist, 24 (25%) of the hip fracture, four (4.2%) crus, 12 (12.5%) of the hand bones, two (2.1%) of the ankle and four (4.2%) had femoral shaft fractures (Fig. 1).

The findings showed that 16 (16.6%) of the patients in Group 2 were COVID-19 positive (+).

The ratio of patients operated in Group 1 was 34.9% (n=102) and 35.4% (n=34) in Group 2. There was no statistical difference between the two groups (p=0.92) (Table 2).

The mean hospitalization time of all patients was 9.12±4.17 (1-19), and the waiting times for surgery were 7.27±3.91 (1-16) days. The mean discharge time after surgery was 2.92±1.69 (1-7) days. The mean hospitalization time in Group 1 was 9.54±4.28 (1-19) and 7.82±3.64 (2-16) days in Group 2. There was no statistically significant difference between Group 1 and 2 in hospitalization periods of patients (p=0.14). The waiting times for surgery were 7.28±3.79 (1-16) days in Group 1 and 7.23±4.37 (1-15) days in Group 2. No statistically significant difference was found between the two groups (p=0.97). The duration of discharge was 3.02±1.75 (1-7) days in Group 1, and 2.62±1.54 (1-6) days in Group 2. No statistically significant difference was found between the two groups during discharge time (p=0.42) (Table 3) (Fig. 2).

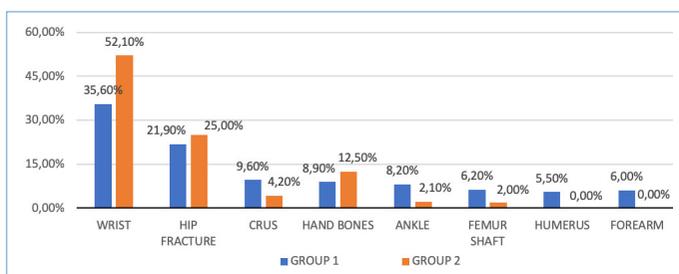


Figure 1. Distribution of fractures before and after pandemic.

Table 3. Statistical analysis of the time between hospitalization and discharge before and after pandemic

	Pandemic	Meant±SD (Min-Max)	p
Duration of Hospitalization	Group 1	9.54±4.28 (1-19)	0.14
	Group 2	7.82±3.64 (2-16)	
Surgery Waiting Period	Group 1	7.28±3.79 (1-16)	0.97
	Group 2	7.23±4.37 (1-15)	
Discharged after Surgery	Group 1	3.02±1.74 (1-7)	0.42
	Group 2	2.62±1.54 (1-6)	

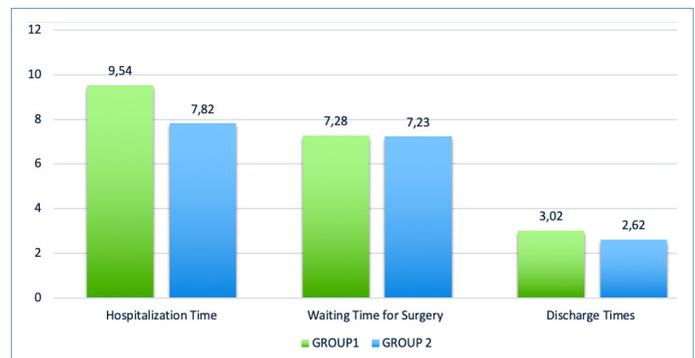


Figure 2. Duration of hospitalization before and after pandemic, duration of surgery, post-surgical discharge.

Discussion

The number of patients diagnosed with COVID-19 60 days after the first case occurred, was 139,771 and 3841 of these patients were lost.^[10]

Precautions Taken in Hospitals with the Beginning of Pandemic

With the first incident of COVID-19 outside China, medical supplies, equipment and devices were stocked in all health-care facilities. All healthcare professionals were trained on

Table 2. Distribution of operated patients between hospitalization and discharge

Patient characteristics	Pandemic				p
	Pandemic Before (n=292)		Pandemic After (n=96)		
	n	%	n	%	
Surgery					
Yes	102	34.9	34	35.4	0.92
No	190	65.1	62	64.6	

COVID-19 infection. In hospitals with infectious diseases and internal medicine specialists and intensive care units pandemic services were created.

The first Case and Changes in the Followed Process in our Hospital

Due to the low number of cases, pandemic services were taken care of by the relevant branch physicians in the early days. With the increase in the number of patients, all services of the hospital were converted into pandemic services. Only one service was reserved for cases other than COVID-19 infection. Depending on this situation, a joint study list was created with doctors from all branches working in pandemic services. The treatment of the patients was planned under the leadership of the doctors in the Department of Pulmonology and Infectious Diseases. Information about daily changing literature information, treatment algorithms and patient conditions were shared with networks created via smart phones. Service teams were created from nurses, assistant doctors and specialized doctors. Working hours are determined as three shifts. All personnel in the services were ensured to work under the necessary protection measures.

Day and Day Change of the Orthopedic Team's Patient Approaches in Emergency Room and Service

The condition of patients admitted to the emergency room in the COVID-19 pandemic is more critical and severe than the patients who applied before the pandemic. There have been significant psychological changes that we have noticed in our observations. Especially depending on the hospital environment, the fear of transmission of COVID-19 infection caused severe anxiety. In our approach to the treatment of fractures, we made decisions by considering the health status of our patients and the conditions of our hospital. Given the increase in the burden on the health system day by day, we prioritized appropriate conservative treatments. We considered the need to maintain bed capacity for more urgent cases, given that conservative treatment would reduce operating room use, patient' hospital stay and risk of transmission.

With the appearance of COVID-19, there was a significant decrease in simple trauma patients admitted to the emergency room. With the increase in the number of suspected COVID-19 patients in the ER, ER doctors began to concentrate on the diagnosis and treatment of these patients. As orthopedic physicians, we tried to reduce the workload in

our emergency room with daily procedures, and ensure that both ourselves and other healthcare personnel concentrate on pandemic patients. At the same time, as orthopedic physicians, taking part in the emergency room at the door, and not only orthopedic patients, but by looking at all the patients who applied to the emergency room, we made it possible for emergency physicians to give priority to pandemic patients. Working in the pandemic isolation room, we helped patients with COVID-19 infection to quickly transfer from the emergency room to the floors. Along with the trauma examination, the COVID-19 examination was also started. Patients with fractures and suspected COVID-19 were admitted to the pandemic service. Surgical treatment planning was organized without being distracted by the principles of orthopedics and infection.

Recent Status in Orthopedic Trauma Patients

With the recognition of the disease every new day, the protocols of treatment of COVID-19 positive cases began to change. Orthopedic trauma patients were affected by this change. On the 20th day of pandemic, the protocol of pre-operation preparation of COVID-19 negative patients was renewed with the treatment algorithm prepared by scientific committees. Accordingly, it was decided to consult anesthesia and pulmonology if the body temperature was $37.5 < ^\circ\text{C}$, cough, contact history, age < 50 and male patient.

Our Surgical Experiences

Operation planning was not affected by the viral status of the patients. The operations of patients who were considered emergency surgery were tried to be performed as soon as possible. Surgery for non-emergency trauma was performed at the appropriate time as a result of joint inter-clinic decisions. The results we obtained in our study showed that there was no difference between the duration of treatment of patients.

The surgeries were performed in different operating rooms prepared for COVID-19 negative patients and COVID-19 positive patients.

The rooms of COVID-19 negative patients are standard orthopedic surgery rooms. Surgical team clothes consist of goggles, turban headgear, double gloves, mask with visor and shoe covers.

The rooms of COVID-19 positive patients have negative pressure. In the preparation of the operation team, astronaut

head, protective glasses, whole body disposable clothing, shoe covers, double gloves equipment were used. The surgical team was kept to the minimum possible number. After the entire team wore the appropriate equipment, the patient was taken to the operating room. Entry-exit was not allowed, except for mandatory cases, since the patient entered the operating room. One individual was assigned specially for door control. After the end of the operation, appropriate equipment removal protocols were applied after the patient exit the room.^[11]

In our orthopedic practice, cases with lower extremity fractures and whose mobilization is restricted are gradually reduced lung capacity and have a predisposition to pulmonary infections.^[12] Especially after hip fracture surgery treatment, 4.9% lung-related complications may develop.^[13] Patients with fractures, which need to be treated by surgical methods, often need hospitalization. Hospitalization makes this population susceptible to COVID-19 infection. Therefore, if COVID-19 infection is detected at the same time in this group of patients, treatment with a multidisciplinary approach and best medical practices should be planned. Treatment planning of fracture cases diagnosed in the emergency room should be planned without delay, given the possibility of being affected by COVID-19 infection and mortality rates of infected patients.

High-quality treatment support for fracture patients should be maintained at the highest possible level during coronavirus pandemic and ensure that critical resources are must be ensured that it is protected. In fracture cases that can be followed up with conservative treatment, we must first force the reposition that can be accepted. It is inevitable that early surgical intervention will reduce the risk of disease transmission, facilitate nursing care, and reduce the burden on health and social care services in fractures requiring surgical treatment. We must speed up rehabilitation to minimize treatment and duration of stay to prevent preoperative delay. Our main goal should be the safety of patients and healthcare professionals, uninterrupted health service, sustainability of the system, adaptation to the pandemic process and protection of vital functions. As orthopedic surgeons, we should approach the treatment of fractures with a more rational approach in an optimal and fast manner and at the same time, we must carefully apply the measures to be taken to prevent COVID-19 infection.

There are some limitations in our study. Our study was in a retrospective design, and some fractures were treated by

emergency physicians because we were a consultant clinic in the emergency department, and our study period was short.

Conclusion

Given the high mortality, surgical treatment should be carefully planned in advance for patients with both fractures and COVID-19 infections. Our approach to fracture cases should be applied optimally and quickly with a more rational approach within the principles of orthopedics, and at the same time, we should rigorously implement the measures to be taken to prevent COVID-19 infection. In addition, such patients should pay particular attention to the possibility of the rapid deterioration of the general condition after surgical treatment of fractures. With all these approaches, we fully believe that we will be able to overcome the epidemic with the safety of healthcare personnel and the treatment of fracture patients in the current period of COVID-19 pandemics.

Disclosures

Ethics Committee Approval: This retrospective study was approved and consented to participate by the Ethics Committee of Fatih Sultan Mehmet Training and Research Hospital.

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Conflict of Interest: On behalf of all authors, the corresponding author states that there is no conflict of interest.

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