

# The effect of the COVID-19 pandemic on the epidemiology of distal radius fractures

## Radius distal uç kırıklarının epidemiyolojisine Covid-19 pandemisinin etkisi

Sefa Aktı<sup>1</sup>, Deniz Çankaya<sup>2</sup>

<sup>1</sup> Orthopedics and Traumatology Department, Aksaray University Education and Research Hospital: Aksaray, Turkey

<sup>2</sup> Orthopedics and Traumatology Department, Aksaray University Education and Research Hospital: Aksaray, Turkey

**Corresponding author:** Sefa Aktı, MD, Orthopedics and Traumatology Department, Aksaray University Education and Research Hospital: Aksaray, Turkey

**E-mail:** sefa.akti@gmail.com

**Received/Accepted:** December 23, 2020 /January 22, 2021

**Conflict of interest:** There is not a conflict of interest.

### SUMMARY

**Objective:** Distal radius fractures are one of the fracture types seen most often in the Emergency Department. Therefore, the incidence of distal radius fractures could be of guidance in determining how fracture incidence is affected by a reduction in a normal community activity. The aim of this study was to compare the epidemiology of distal radius fractures in a 6-month period of the COVID-19 pandemic with an equivalent time period in the year before the pandemic and to reveal changes associated with the pandemic.


**Method:** A comparison was made of patients who presented at our hospital with a distal radius fracture between 1 April 2020 and 30 September 2020 during the COVID-19 pandemic and those who presented in the equivalent period in 2019, in respect of epidemiology and treatments applied. The demographic data were examined and patients were evaluated with respect to the presence or not of COVID-19.

**Results:** The number of distal radius fractures was determined to have statistically significantly decreased from 108 patients in 2019 to 71 in 2020 ( $p<0.001$ ). The ratio of patients treated conservatively was found to have statistically significantly increased in 2020 ( $p<0.05$ ). No statistically significant difference was determined between 2019 and 2020 in respect of age groups and ASA scores ( $p>0.05$ ).

**Conclusions:** The most important finding of this study was that the number of patients with a distal radius fracture decreased significantly in the pandemic period in 2020 compared to the equivalent 6-month period in 2019. Although the efficacy of conservative treatment remains controversial, the increase in the rate of conservative treatment applied during the pandemic provided the advantage of patients avoiding potentially fatal complications of novel coronavirus infection.

**Keywords:** Corona virus, Radius fracture, Pandemic

 Sefa Aktı

 Deniz Çankaya

ORCID IDs of the authors:

S.A. 0000-0001-8873-1358

D.Ç. 0000-0002-8139-8780

### ÖZET

**Amaç:** Radius distal uç kırıkları acil serviste en sık görülen kırık tiplerinden biridir. Bu nedenle normal toplum aktivitesi azalmasının, kırıkların insidansını nasıl etkileyeceğini belirlemede distal radius kırıklarının insidansını yol gösterici olacaktır. Çalışmamızda; pandeminin 6 aylık dönemindeki distal radius kırıkları epidemiyolojisini, bir önceki yıldaki aynı zaman aralığına göre karşılaştırmayı ve pandemiye bağlı değişiklikleri ortaya koymayı amaçladık.

**Yöntem:** Çalışmamızda 1 Nisan 2020 ile 30 Eylül 2020 tarihleri arasındaki pandeminin 6 aylık süresi zarfında hastanemize başvuran distal radius kırıkları ile 2019 yılının aynı döneminde hastanemize başvuran distal radius kırıkları, epidemiyolojileri ve uygulanan tedaviler yönünden karşılaştırıldı. Hastaların demografik verilerine bakıldı. Pandemi döneminde radius distal uç kırığı ile başvuran hastaların eşlik eden COVID 19 enfeksiyonu olup olmadığı değerlendirildi.

**Bulgular:** 2019 yılında 108 hasta tedavi edilirken 2020 yılında 71 hasta tedavi edilmişti. 2020 yılında distal radius kırık sayısı istatistiksel olarak anlamlı bir şekilde düşmüş olarak bulundu ( $p<0.001$ ). Konservatif tedavi yapılan hastaların oranı da anlamlı olarak artmış bulundu ( $p<0.05$ ). 2019 ve 2020 yılları karşılaştırıldığında yaş grupları ve ASA skorları açısından istatistiksel olarak anlamlı fark saptanmamıştır ( $p>0.05$ ).

**Sonuç:** Çalışmamızın en önemli bulgusu 2020 yılında pandemi döneminde Radius distal uç kırığı olan hasta sayısının 2019 yılına göre anlamlı derecede düşmesidir. Bu dönemde cerrahi tedaviye göre konservatif tedavi oranının artmış olması, yapılan tedavinin etkinliğini tartışmalı hale getirirse de, yeni tip corona virüs enfeksiyonunun ölümcül komplikasyonlarından kaçınmak için hastalara avantaj sağlamaktadır.

**Anahtar sözcükler:** Korona virüs, radius kırıkları, pandemi, epidemiyoloji

## INTRODUCTION

Following the outbreak of the novel coronavirus (SARS-CoV-2) determined as an agent of pneumonia resulting in death, Wuhan, China, in December 2019, the coronavirus disease 2019 (COVID-19) spread rapidly around the world and was declared a global pandemic by the World Health Organisation on 11 March 2020<sup>1</sup>. The first case in Turkey was recorded on 11 March 2020. With no preventative vaccination or definitive treatment, Turkey and the whole world started to implement quarantine precautions with the closure of public spaces and curfews<sup>1</sup>.

The COVID-19 pandemic caused by the SARS-CoV-2 virus had a significant effect on life throughout the whole World<sup>2</sup>. People had to abandon various social habits because of quarantine, and by spending more time at home, activity levels significantly decreased<sup>3</sup>. Studies in literature have reported that the reduced incidence of extremity fractures was associated with the decreased activity level<sup>1,4,5</sup>.

When human activity and movement increases, so there is an increase in the rates of extremity fractures, and the incidence of fractures is known to vary seasonally<sup>6</sup>. The adoption of more sedentary lifestyle habits of people under prolonged quarantine conditions leads to a reduction in body muscle mass, and an increase in the fat ratio<sup>7,8</sup>. Another result of reduced physical activity is osteoporosis and osteopenia<sup>9</sup>. Increased weight together with a weaker bone structure are factors increasing the possibility of fracture resulting from a fall<sup>10</sup>. Distal radius fractures are seen most often as the result of a fall<sup>11</sup>. Therefore, revealing how decreased community activity beyond normal habits and the normal seasonal period affected fracture incidence will play a key role in determining the incidence of distal radius fracture in the 6-month period of the pandemic.

The aim of this study was to compare the epidemiology of distal radius fractures in a 6-month period of the pandemic with the equivalent 6-month period in the previous year, to determine changes related to the COVID-19 pandemic.

## MATERIAL AND METHODS

Approval for the study was granted by the Local Ethics Committee. The first case of COVID-19 in Turkey was recorded on 11 March 2020, and from that date, quarantine precautions started to be implemented throughout the whole country. In the study, patients who presented at our hospital with a distal radius fracture in the 6-month pandemic period of 1 April 2020 – 30 September 2020, were compared with patients who presented in the equivalent period in 2019 in respect of epidemiology and the treatments applied.

The study included all patients aged >18 years who presented at our hospital within the defined study dates with a distal radius fracture of type 23A, 23B, and 23C according to the AO/OTA classification. Patients with a pathological fracture, or delayed fracture diagnosis were excluded from the study. The patients were separated into 3 age groups of 18-44 years, 45-64 years, and  $\geq 65$  years.

The patients were evaluated in respect of age, gender, body mass index (BMI), date of presentation, fracture side and fracture type. The treatment methods applied to the patients were also examined (conservative or which surgical method), the American Society of Anaesthesiologists (ASA) scores of the patients treated surgically, time from admission to surgery, and anaesthesia type. Patients who presented with a distal radius fracture during the pandemic were also evaluated in respect of the presence or not of COVID-19 infection. The diagnoses of these patients were confirmed with findings on pulmonary tomography.

### Statistical Analysis

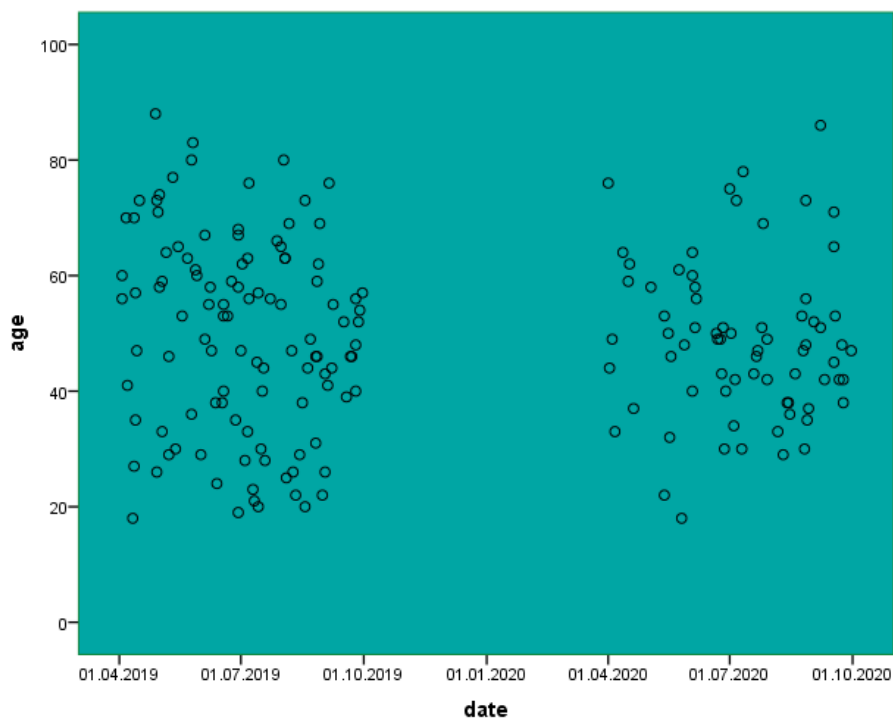
Data obtained in the study were analyzed statistically using SPSS Statistics for Windows, Version 25.0 software (IBM SPSS, Armonk, NY, USA). Conformity of the data to normal distribution was assessed with the Shapiro-Wilk test. For the comparison of variables between groups of non-parametric data, the Mann Whitney U-test was applied. The Chi-square test was used for the comparison of categorical data. A value of  $p < 0.05$  was accepted as statistically significant.

### RESULTS

A total of 185 patients were treated for distal radius fracture in the defined periods in 2019 and 2020. Due to the lack wrist radiograph at the time of presentation, BMI data, or operation data, 6

patients were excluded from the study. Evaluation was made of 108 patients treated in 2019 and 71 patients in 2020. The number of distal radius fractures was found to be statistically significantly lower in 2020 ( $p < 0.001$ ).

The demographic data of the patients are shown in Table 1. The patients treated in the study period of 2019 comprised 37% in the 18-44 years age group, 42% in the 44-65 years group, and 20.4% in the  $\geq 65$  years group. In the 2020 patient group, 39.4% were in the 18-44 years age group, 47.9% in the 44-65 years group, and 12.7% in the  $\geq 65$  years group. No statistically significant difference was determined between 2019 and 2020 in respect of age group distribution ( $p = 0.407$ ). A graphic representation of the patients according to age and the date of presentation is shown in Figure 1.



When the patients who presented at the Emergency Department with a distal radius fracture in 2019 and were planned to undergo surgical treatment were evaluated in respect of ASA scores, ASA 1 was determined in 29 (26.9%) patients, ASA 2 in 14 (13%), ASA 3 in 12 (11.1%), and ASA 4 in 1 (0.9%). In 2020, the ASA scores were ASA 1 in 15 (21.1%) patients, ASA 2 in 8 (11.3%) and ASA 3 in 3 (4.2%). No statistically significant difference was determined between the two year groups of patients in respect of ASA scores ( $p = 0.232$ ). Of the

patients who presented during the pandemic in 2020, COVID-19-positivity was determined in 8 (11.3%) patients.

Of the patients with a positive COVID-19 test result, 3 patients with a mean age of 36 years were tested again and on obtaining a negative result, were operated on at mean 14.3 days later. The other COVID-19 positive patients were treated conservatively. The results of the patients treated in 2019 and 2020 are summarized in Table 2.

**Table 1:** Demographic data

Variable	2019		2020		P value
	Mean	SD	Mean	SD	
Mean age (years)	49.70	17	48.7	13	0.542
Number of patients	108		71		
Gender	48.1%	51.9%	47.9%	52.1%	0.973
	Male	Female	Male	Female	
Side	57.4%	42.6%	57.7%	42.3%	0.964
	Right	Left	Right	Left	
BMI (body mass index)	28.82	5.4	29.9	4.5	0.77

**Table 2:** Results for 2019 and 2020

Variable	2019		2020		P value
Fracture type					0.673
23A	71 (65.7%)		43 (60.6%)		
23B	6 (5.6%)		6 (8.5%)		
23C	31 (28.7%)		22 (31.0%)		
Treatment					<b>0.045</b>
Conservative	52 (48.1%)		45 (63.4%)		
External fixator	35 (32.4%)		14 (19.7%)		
Plate-screw	21 (19.4%)		12 (16.9%)		
Anaesthesia type					0.132
Regional (RIVA)	23 (21.3%)		10 (14.1%)		
General	33 (30.6%)		16 (22.5%)		
Time to surgery (days)	Mean	SD	Mean	SD	0.337
	2.34	1.35	3.69	4.14	

## DISCUSSION

The most significant finding of this study was a statistically significant decrease in the number of patients presenting at the Emergency Department with a distal end radius fracture during the COVID-19 pandemic in 2020 compared to the equivalent period in 2019. Lv et al reported that the incidence of fractures in general was lower in the pandemic compared to the previous year but a period of only one month was compared in that study<sup>4</sup>. In another study, the incidence of all fractures was examined by examining the data of a 2-month period during the pandemic, and the frequency of fractures was reported to have decreased compared to the previous year<sup>1</sup>. In a study by Nunez et al, the incidence of fractures in an 80-day pandemic period was compared with 4 periods of 20 days in the previous year, and while there was reported to be a decrease in traumatic fractures, there was not determined to be any change in the incidence of osteoporotic hip fractures compared to the previous year<sup>5</sup>. When studies in literature that have examined the pandemic period are examined, they have generally included relatively short periods and the longest study covered an 80-day period of the pandemic<sup>5</sup>.

A reduction in body muscle mass and an increase in fatty tissue as a result of the adoption of more sedentary lifestyle habits of people under prolonged quarantine conditions leads to an increase in BMI<sup>7</sup>. Another result of reduced physical activity is osteoporosis<sup>9</sup>. When increased BMI is defined as the only variable factor, there has been shown to be an increased risk of fracture in individuals with the same bone mineral density<sup>10</sup>. Although ageing is one of the factors most increasing the incidence of fractures, adult distal radius fractures are seen most often in females of advanced age. In addition, the incidence shows seasonal variability, with an increase in winter and summer months and a decrease in spring and autumn, and the increase in winter is greater than in summer<sup>6</sup>.

Studies that have investigated the pandemic period have reported a decrease in patients presenting at the Emergency Department with a diagnosis of fracture. Similarly, the incidence of radius fractures was seen to have decreased in the current study. Furthermore, although not statistically significant, the decrease seen in patients of an older age was less. The rate of severe, life-threatening complications in the treatment of distal radius fractures is relatively low. Patients with severe complications have been reported to be patients

with accompanying injuries, and the complications have been seen to be associated with these injuries.

A recent study showed that morbidity and mortality rates of hip fractures increased during the pandemic, and it was reported to be necessary to take precautions to shorten the length of stay in hospital for these patients<sup>12</sup>. That there was no significant increase in mortality in the current study can be attributed to the fact that the surgical treatment of distal radius fractures is minor surgery and requires a shorter stay in hospital. In addition, there was a relative increase in patients with distal radius fracture who were treated conservatively during the pandemic. Iyengar et al reported that the treatment of fractures during the pandemic should be weighted towards conservative treatment as much as possible to be able to avoid fatal complications associated with coronavirus infection<sup>13</sup>.

According to the findings of the current study, we suggest some changes in daily clinical practice in the management of the radial fractures during the pandemic period. We preferred surgical treatment in patients who had no other treatment options other than surgical treatment to obtain acceptable wrist functions. However, before the pandemic period, we changed our preference in patients who preferred surgical treatment for early mobilization and early return to work. If sufficient reduction can be achieved with conservative treatment methods, we preferred conservative treatment.

There were some limitations to this study, primarily that it was conducted in a single centre and therefore the number of patients was relatively low. Further multicentre studies with a greater number of patients would be able to better determine the effect of the COVID-19 pandemic on the epidemiology of distal radius fractures seen during the pandemic. The inappropriate recording of ICD codes in the emergency diagnosis may have prevented the identification of some patients. As this study was retrospective, the bone mineral density values of the majority of patients could not be obtained, which could be considered a limiting factor. There was also no record of the mechanism of fracture, so no differentiation could be made between patients who had fallen in the home or outside, and no classification could be made of the fractures as high-energy or low-energy.

## CONCLUSION

Although prolonged pandemic conditions initially reduce fracture rates, even minor fractures, especially in the elderly population, prevent the effective implementation of quarantine rules and

increase the possibility of contracting coronavirus infection in the hospital environment. Despite controversy of the efficacy of conservative treatment compared to surgical treatment, the increased rate of conservative treatment during the pandemic provides an advantage for patients in avoiding the fatal complications of the novel coronavirus infection.

## REFERENCES

1. Turgut A, Arlı H, Altundağ Ü et al. Effect of COVID-19 pandemic on the fracture demographics: Data from a tertiary care hospital in Turkey. *Acta Orthop Traumatol Turc.* 2020 Jul;54(4):355-363.
2. Dilek H, Tonyalı M, Çolapkulu N, Alimoğlu O. (2020). The impact of Covid-19 on ethnicity, minorities and immigrants: Are we all in the same ship? . *Cumhuriyet Medical Journal* , 42 (3) , 236-238
3. Gallè F, Sabella EA, Ferracuti S et al. Sedentary Behaviors and Physical Activity of Italian Undergraduate Students during Lockdown at the Time of CoViD-19 Pandemic. *Int J Environ Res Public Health.* 2020 Aug 25;17(17):6171.
4. Lv H, Zhang Q, Yin Y et al. Epidemiologic characteristics of traumatic fractures during the outbreak of coronavirus disease 2019 (COVID-19) in China: A retrospective & comparative multi-center study. *Injury.* 2020 Aug;51(8):1698-1704.
5. Nuñez JH, Sallent A, Lakhani K et al. Impact of the COVID-19 Pandemic on an Emergency Traumatology Service: Experience at a Tertiary Trauma Centre in Spain. *Injury.* 2020 Jul;51(7):1414-1418.
6. Thompson PW, Taylor J, Dawson A. The annual incidence and seasonal variation of fractures of the distal radius in men and women over 25 years in Dorset, UK. *Injury.* 2004 May;35(5):462-6.
7. Moro T, Paoli A. When COVID-19 affects muscle: effects of quarantine in older adults. *Eur J Transl Myol.* 2020 Jun 17;30(2):9069.
8. Kortebein P, Ferrando A, Lombeida J, Wolfe R, Evans WJ. Effect of 10 days of bed rest on skeletal muscle in healthy older adults. *JAMA.* 2007 Apr 25;297(16):1772-4.
9. Johnell O. Advances in osteoporosis: better identification of risk factors can reduce morbidity and mortality. *J Intern Med.* 1996 Apr;239(4):299-304.
10. De Laet C, Kanis JA, Odén A et al. Body mass index as a predictor of fracture risk: a meta-analysis. *Osteoporos Int.* 2005 Nov;16(11):1330-8.
11. MacIntyre NJ, Dewan N. Epidemiology of distal radius fractures and factors predicting risk and prognosis. *J Hand Ther.* 2016 Apr-Jun;29(2):136-45.
12. Egol KA, Konda SR, Bird ML et al. NYU COVID Hip Fracture Research Group. Increased Mortality and Major Complications in Hip Fracture Care During the COVID-19 Pandemic: A New York City Perspective. *J Orthop Trauma.* 2020 Aug;34(8):395-402.
13. Iyengar K, Vaish A, Vaishya R. Revisiting conservative orthopaedic management of fractures during COVID-19 pandemic. *J Clin Orthop Trauma.* 2020;11(4):718-720.