

WHAT HAS CHANGED IN ORTHOPAEDIC EMERGENCY ROOM DURING COVID - 19 PANDEMIC: A SINGLE TERTIARY CENTER EXPERIENCE

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ABSTRACT

Introduction: During COVID- 19 pandemic, changes and restrictions in daily life activities brought many differences in mechanism of injury presented to orthopedic emergency. The purpose of this study was investigation the effect of COVID-19 pandemic on incidence and characteristic features of patients with presented to orthopaedic emergency room.

Materials and methods: Patients with consulted orthopedic emergency room between 11 March – 11 May 2020 and the same time window in 2019 were selected for study. Medical records of patients were retrieved retrospectively and analyzed for demographic features (Age and gender), mechanism of injury and pattern of bones fractured. Patients were divided into three groups based on age: 0-18, 18-64, ≥65 years. Mechanism of injury included trauma, destructive and metabolic.

Results: 1108 patients were evaluated with consulted orthopedic emergency room between 11 March and 11 May in 2020 and 2019. Falling was the most seen injury type in both seasons. There was decrease in falling from height 66.7% for adult but increase 25% for pediatric group. Hit by car injury was decreased 72% in pandemic season compared to normal season in all age groups. Bicycle accident was also increased 100% in both pediatric and adult groups during pandemic season. In adult group punching injury was increased 44,4% during pandemic season compared to normal season. Other injuries (soft tissue injury, foreign bodies, implant insufficiency, dog bites, destructive and metabolic were decreased naturally in pandemic period.

Conclusion: There were 51,1% decrease in fracture during pandemic season. In both seasons falling low – energy was the most common injury mechanisms. New rules in social life for pandemic increased the percentage of personal vehicle accidents, home accidents, punching injury and soft tissue injuries while decreased the percentage of work accidents, out of car accidents and falling from height.

Keywords: COVID-19, Coronavirus, Fracture, Injury Mechanism, Orthopaedic Emergency, Trauma.

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Introduction

The pandemic of coronavirus disease 2019 (COVID-19) has become a major issue to threaten the public health in all over the world. COVID-19 is the cause of infection with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)⁽¹⁾.

The social distancing and self-isolation/quarantine are the necessity of the pandemic situations that restrain to the spread of disease worldwide.

Governments and health care organizations are the responsible for implementing these protective measures on societies⁽²⁾.

In Turkey, March 11 was the date of first case seen, government firstly imposed on curfew to 65 and older years age and then expanded this decision to include for those younger than 20 years age. The places like, schools, mosques, restaurants, shopping malls where disease can be transmitted many people easily were closed.

Most of workplace switched their program to shift work. Curfews were also applied on the weekends, public and religious holidays regularly. Entrance restrictions were applied for 30 metropolitan cities⁽³⁾.

Changes and restrictions in daily life activities brought many differences in mechanism of injury presented to orthopedic emergency. It had been announced that number of COVID-19 cases were decreasing and normalization process in Turkey could be started in beginning of May 2020⁽⁴⁾.

It could have been anticipated that the decrease in orthopedic emergency cases during pandemic period comparing last year. However, the distribution of diagnosis and etiology of orthopedic emergencies may differ in pandemic area. The aim of this study was to investigate the differences between the characteristic features of orthopedic emergency cases presented in 11 March - 11 May 2020 and the same time period for 2019.

Material methods

Ethical Approval

This study was approved by Dokuz Eylül University Non interventional Clinical Research Ethics Board with protocol number 2020/13-08 on June 15, 2020 and Ministry of Health of Turkey.

Data Collection

All patients with consulted tertiary care hospital of orthopedic emergency room between 11 March - 11 May 2020 and the same time window in 2019 were selected for study. 43 patients in 2020 and 2019 who had problems with cast were excluded. Medical records of patients were retrieved retrospectively and analyzed for demographic features (age and gender), mechanism of injury and pattern of bones fractured.

Study Variables - Groups

Patients were divided into three groups based on age: 0-18, 18-64, ≥ 65 years. Because curfews rules were applied differently according to age. Mechanism of injury included trauma, destructive (characterized by destruction of cartilage and bone) and metabolic. All medical records and radiographic examinations were analyzed by two orthopedic surgeons to discuss if there was any inconsistency.

Trauma injuries were divided into seven types: Industrial injury, motor vehicle accident, bicycle accident, home accident, fall, assault and other injuries (soft tissue injury, implant insufficiency, foreign body penetration, animal bite). Traffic accident was classi-

fied as hit by car, in-car and motorcycle accidents. Fall injuries included low energy falling (ex. in bathroom, from chair or bed etc...), fall from height and fall from stairs. Assault was classified as punching and gunshot injury.

The location of bone fractures were categorized as proximal, middle (shaft) and distal fracture for each limb long bones (humerus, radius, ulna, femur, tibia, fibula), spine, pelvis (pelvic ring and acetabular), hand (phalanges, metacarpal, carpal), foot (phalanges, metatarsal, tarsal), clavicle - scapula and patellar fractures.

Statistical Analysis

Age, sex, mechanism of injury, pattern of fractured bones were subjected to statistically analysis. Continuous variables were represented by mean and standard deviation (SD) and the categorical data were represented as number and percentage (%). Continuous variables were evaluated by student t test and Chi - square test was performed for categorized data. IBM SPSS Statistics Software was used for analysis.

Results

Patient Characteristics

744 patients for 2019 (normal season) and 364 patients for 2020 (pandemic season) totally 1108 patients were evaluated with presented to orthopedic emergency room between 11 March and 11 May. The total patient ratio in normal season was two-fold according to pandemic season (2.04). Mean patient admittance at one day in normal season was 11.81 and in pandemic season was 5.78. There were 402 male and 342 female in normal season and, 220 were male and 144 were female in pandemic season.

Mean age was $40,8 \pm 28$ for normal season and $39,1 \pm 28$ for pandemic season. Age of males was $33,7 \pm 25$ younger than age of females ($45,9 \pm 30$) in pandemic season. Age of males was $34, 6 \pm 25$ younger than age of females ($48,9 \pm 30$) in normal season also. Detailed demographic features were demonstrated in Table 1. Ratio of male/female was more than one except elder group in both seasons.

Injury Characteristics

Distribution of injury types according to patient age groups for both normal and pandemic season were demonstrated detail in Table 2. Falling was the most seen injury type in both seasons. Proportion of low - energy falling was 56,6 % and 53 % for normal and pandemic season respectively. Falling from height was decreased 66,7% in adult and elder groups but in pedi-

atric group it was increased 25 %. Industrial injuries were only seen in adult groups in both seasons. Among traffic accident, hit by car injury was decreased 72% in pandemic season compared to normal season in all age groups but in - car injury was increased in pandemic season for pediatric groups compared to normal season. There were similar case numbers of motorcycle accident in both seasons. Home accidents were increased in both pediatric and adult groups during pandemic season. Bicycle accident was also increased 100% in both pediatric and adult groups during pandemic season. The ratio of falling low energy normal to pandemic season was 2,6, 2,9 and 2,2 in pediatric, adult and elder groups respectively. There was one case increase in falling from stairs in pediatric group in pandemic season. In adult group punching injury was increased 44,4% during pandemic season compared to normal season. Other injuries (soft tissue injury, foreign bodies, implant insufficiency, dog bites, destructive and metabolic were decreased in pandemic period.

	2019 (Normal Season)			2020 (Pandemic Season)		
	Pediatric - Adolescent (<18 age)	Adult (19 - 64 age)	Elder (>65 age)	Pediatric - Adolescent (<18 age)	Adult (19 - 64 age)	Elder (>65 age)
N	230	328	186	120	169	75
Patient per day	3,65	5,21	2,95	1,90	2,68	1,19
Age (Mean ± Standard Deviation)	9,31 ± 4,67	41,75 ± 14,08	77,8 ± 9,17	7,27 ± 4,86	41,75 ± 13,79	78,42 ± 7,62
Sex						
Male	149 (64,8)	184 (56,1)	69 (37,1)	75 (62,5)	121 (71,6)	24 (32)
Female	81 (35,2)	144 (43,9)	117 (62,9)	45 (37,5)	48 (28,4)	51 (68)

Table 1: Demographic features of patients presented to orthopedic emergency room in normal and pandemic season periods.

All values reported as number of case (percentage in group) N(%).

	2019 (Normal Season)			2020 (Pandemic Season)		
	Pediatric - Adolescent (<18 age)	Adult (19 - 64 age)	Elder (>65 age)	Pediatric - Adolescent (<18 age)	Adult (19 - 64 age)	Elder (>65 age)
N	230	328	186	120	169	75
Mechanism of Injury						
Trauma	0 (0)	15 (4,6)	0 (0)	0 (0)	7 (5,8)	0 (0)
Industrial Injury	7 (3)	11 (3,4)	7 (3,8)	1 (0,8)	2 (1,2)	3 (4)
Motor Vehicle Accident	0 (0)	8 (2,4)	2 (1,1)	2 (1,6)	7 (4,1)	1 (1,3)
Hit by car	2 (0,9)	10 (3)	1 (0,5)	2 (1,6)	9 (5,3)	1 (1,3)
In - car	2 (0,9)	1 (0,3)	2 (1,1)	8 (6,7)	2 (1,2)	0 (0)
Motorcycle	3 (1,3)	0 (0)	0 (0)	4 (3,3)	0 (0)	0 (0)
Home accident						
Bicycle	188 (81,7)	252 (70,7)	92 (49,5)	72 (60)	79 (46,7)	42 (56)
Falling	4 (1,7)	24 (7,3)	6 (3,2)	5 (4,2)	10 (5,9)	0 (0)
Low - energy	0 (0)	3 (0,9)	1 (0,5)	1 (0,8)	3 (1,8)	1 (1,3)
From height						
From stairs	8 (3,5)	9 (2,7)	0 (0)	1 (0,8)	13 (7,7)	0 (0)
Assault	1 (0,4)	3 (0,9)	0 (0)	0 (0)	3 (1,8)	0 (0)
Punching						
Gunshot injury	10 (4,3)	5 (1,5)	2 (1,1)	19 (15,8)	20 (11,8)	18 (24)
Other injury	0 (0)	2 (0,6)	7 (3,8)	0 (0)	0 (0)	1 (1,3)
Soft tissue injuries						
Implants insufficiencies	4 (1,7)	3 (0,9)	0 (0)	5 (4,2)	3 (1,8)	0 (0)
Foreign bodies penetration						
Dog bite	1 (0,4)	0 (0)	0 (0)	0 (0)	1 (0,6)	0 (0)
Destructive (Septic arthritis)	0 (0)	10 (3)	2 (1,1)	0 (0)	7 (4,1)	2 (2,7)
Metabolic	0 (0)	2 (0,6)	10 (5,4)	0 (0)	1 (0,6)	6 (8)

Table 2: Distribution of injury types of patients presented to orthopedic emergency room in normal and pandemic season periods.

All values reported as number of case (percentage in group) N(%).

Bones Fractured

There were a total of 1108 patients with 1046 fractures, 334 fractures for pandemic season and 712 for normal season. 43 patients in 2020 and 103 patients in 2019 had two or more fractures.

Distribution of fractures types related to location was demonstrated in Table 3.

Fracture Location	2019 (n)	2020 (n)
Clavicle - scapula	41 (5,6)	28 (8,4)
Proximal humerus	44 (6,2)	20 (6)
Humerus shaft	4 (0,6)	3 (0,9)
Distal humerus	30 (4,2)	14 (4,2)
Proximal radius - ulna	14 (2)	9 (2,7)
Radius - ulna shaft	18 (2,5)	18 (5,4)
Distal radius - ulna	154 (21,6)	53 (15,7)
Hand	97 (13,6)	39 (11,7)
Thoracolumbar	75 (10,5)	35 (10,5)
Pelvis	27 (3,8)	18 (5,4)
Proximal femur	54 (7,6)	28 (8,4)
Femur Shaft	8 (1,1)	9 (2,7)
Distal femur	5 (0,7)	0 (0)
Patella	7 (1)	3 (0,9)
Proximal tibia - fibula	19 (2,7)	1 (0,3)
Tibia - fibula shaft	8 (1,1)	6 (1,8)
Distal tibia - fibula	57 (8)	19 (5,7)
Foot	50 (7)	31 (9,3)
TOTAL	712 (100)	334 (100)

Table 3: Comparison of number of fractures classified by location between 2019 (normal season) and 2020 (pandemic season).

All values reported as number of case (percentage in group) N(%).

In pandemic season, among 334 fractures, there were 53 fractures accounting for 15,9 % distal radius - ulna fractures followed by hand (39 cases 11,7%), clavicle - scapula and proximal femur with the same number cases (28 cases 8,4%). In low - energy falling injury distal radius was the most seen fracture type in all age. Hip fractures (13 cases per - trochanteric and 10 cases neck areas) were more commonly seen in elder groups in a percentage of 87%. Fifth metacarpal bone fractures are the most common fracture (41%) in hand. In adult population 13 cases had fifth metacarpal bone fracture related to punching. There were 4 cases of bicycle accidents come up with 2 distal radius fractures, 1 clavicle and 1 patella fractures. 19,4% of foot fractures (phalangeal, metatarsal, tarsal bones) were seen in home accidents. Distal femur and proximal tibia fractures were not seen in pandemic season. 5 of 6 cases of hit by car and 8 of 10 cases of in - car injuries had more than one fractures. Only femur shaft fractures were more common in pandemic season than normal season. All of other fractures were more common in normal season.

In normal season, among 712 fractures, there were 154 distal radius - ulna fractures accounting for 21,6 % followed by hand (97 cases 13,6%) and thoracolumbar (75 cases 10,5%) fractures. Proximal humerus fractures were seen in all kind of injuries. In low - energy falling injury distal radius was the most

seen fracture type in all age. Hip fractures (29 cases per - trochanteric and 16 cases neck areas) were more commonly seen in elder groups in a percentage of 87,3%. Phalangeal bone fractures for foot and hand are the most common fractures related to industrial injuries. 8 of 25 cases of hit by car and 1 of 10 cases of in - car injuries had more than one fractures.

Discussion

COVID - 19 pandemic has changed almost all of daily activities by curfews, closing public areas like schools, restaurants, workplaces, blocking public organizations, intercity travels to decrease transmission of virus. All this changes had brought 51,1% reduction in cases of fractures in all age groups presenting to our center during COVID-19 pandemic period compared to one year before in the same period.

In literature, the mean age of occurrence of fracture in children at normal time was between 9,5 and 8,2^(5,6). In the present study, this value was 9.31 years for normal season and 7,27 years for pandemic season. During pandemic season, decrease in mean age of occurrence of fracture was related to restrictions in daily activities of children at outside of home. Because most of injuries are related to school, sport activities in pediatric population. The mean age of occurrence of fracture in adult and elder groups were similar in both seasons. Most of working group was formed by adult group and they continued their duties during pandemic season. In normal seasons most of fractures in elder group occurs in home and naturally curfews for them did not change the type of fractures.

In pediatric and adult groups most of cases were male while in elder groups this was female in both seasons. Being a female is one of risk factor for bone fractures and in our study it was coherent to literature⁽⁷⁾.

The COVID-19 pandemic has a significant effect on public transport. The use of public transport causes the spread of COVID-19⁽⁸⁾. In traffic accidents, ratio of injuries related to personal vehicle (motorcycle, bicycle) to total volume of fractures was increased from 3,6% to 7,7% in pandemic season comparing to normal season. In pandemic season, 81,2% of injuries related to car had more than one fracture but this ratio was 25,8% in normal season. This showed us that during pandemic season number of traffic accidents were decreased but had become more serious and lead to multi - fractures. Consequently health care providers must give more attention to patients with traffic accidents. Considering the 51,1% decrease in amount of fractures during pandemic, there was a two - fold in-

crease in the number of home accident cases. It was strongly related to curfews that applied on the weekends, public and religious holidays regularly. It can be suggested that personal care should be increased in home care in order to prevent home accidents during pandemic periods.

There was a dramatically difference in the number of hand fracture between two seasons (97 fractures in 2019 and 39 fractures in 2020) ($p < 0,05$). When it was analyzed in 2019, fractured bone type included hand had a wide range. Also most of cases had more than one phalangeal or metacarpal bone fractures. All carpal bones were included in 2019 but in 2020 only lunatum fracture was seen as a carpal bone fractures. In our opinion the reason of more fracture in 2019 was related to industrial injuries. Because work accidents includes high energy trauma leads to serious injuries.

COVID - 19 pandemic had also effected the mental health and psychosocial issues (9). Financial insecurity, quarantine, unemployment, fear, stress, and uncertainty have caused aggressiveness on people^(10, 11). We noticed that these factors had led to increase in assault injuries. Despite of 51,1% decrease in amount of fractures during pandemic, there was 44,4% increase in injury related to punching in adult population. Psychological help at home may be required during epidemic periods according to our results.

Soft tissue injuries that did not contain bone fractures were also increased during pandemic seasons. The reason may be the restrictions did not led major traumas that could cause fracture had occurred.

Ratio of destructive and metabolic cases in normal seasons to pandemic seasons was similar to ratio of total cases. These diseases like septic arthritis, diabetic foots had continued during pandemic season with the same incidence comparing to normal period. In our opinion these pathologies are progressive and health care providers must take the necessary precautions for them.

In this study there were several limitations. This study was retrospective in nature and analyzed one single center making it difficult to evaluate as a result of all country. We did not consider the patients who had fracture but not preferred our center because of being pandemic hospital to avoid the transmission of virus and also patients who could not go to hospital because of curfews. Factors that could affect bone fragility such as osteoporosis, medications were not considered for elder groups.

Conclusion

In conclusion there were 51,1% decrease in fracture during pandemic season. In both seasons falling low - energy was the most common injury mechanisms. New rules in social life for pandemic increased the percentage of personal vehicle accidents, home accidents, punching injury and soft tissue injuries while decreased the percentage of work accidents, out of car accidents and falling from height. Proportion of other trauma mechanism to total cases was similar in both seasons. This finding could be used as a reference for health care providers to take precautions to improve public health during COVID - 19 pandemic period.

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