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Pattern of Orthopedic Trauma during COVID-19 Crisis in Saudi Arabia: Report from Level I Trauma and COVID-19 Center

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ABSTRACT

Objectives: The aim of this study was to provide the pattern of orthopedic trauma catered at our center during the lockdown to stop the spread of SARS-CoV-2 and compare it during the same period in the preceding year.

Methods: A retrospective study of all trauma patients operated during partial and total lockdown during March–July 2020, was conducted at the orthopedic department of King Fahd Hospital of the University, Al-Khobar. The data collected were age, gender, reason for hospital admission, date of injury and presentation, length of stay, and treatment provided. The exposure and transmission of the COVID-19 to healthy orthopedic staff were recorded.

Results: During the lockdown, there were 71 admissions compared to 110 the year before, with a drop of 39 (35.4%) patients. The drop in the number of women and children was statistically significant ($P < 0.05$ and < 0.001, respectively). The majority of injuries were sustained from domestic accidents and road crashes. There was a significant increase in fractures of the vertebral column and distal radius ($P < 0.002$ and < 0.05, respectively). In the pre-COVID-19 period, the average time to discharge was 18.90 ± 12.74 days and the average time to discharge in COVID-19 period was 4.28 ± 3.52 days. Four orthopedic staffs were exposed to COVID-19-positive patients and one of the surgeons became positive.

Conclusion: The COVID-19 pandemic decreased orthopedic trauma admissions by 35% during the lockdown period and early surgery and discharge of the patients was possible due to proper planning.

Keywords: COVID-19, Emergency, Fractures, Orthopedic surgery, Pandemic, SARS-CoV-2

INTRODUCTION

The World Health Organization declared COVID-19 a pandemic on March 11, 2020. This caused disruptions and lockdowns in many countries. COVID-19 is a viral illness caused by coronavirus 2 (SARS-CoV2), which affects mainly the respiratory system,[1,2] with high morbidity and mortality. The disease was highly transmissible and presented in different ways from respiratory system involvement, fever, myalgia and fatigue, to headache, and diarrhea.[3] On March 2, 2020, the Ministry of Health confirmed the first case in Saudi Arabia (SA).[4] To

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stem the spread of the virus, health authorities in the SA acted quickly by controlling the movement of people living in SA and those entering its borders. On March 8, 2020, the SA government announced that it was temporarily halting all transport in and out of the areas of the epicenter. On March 24, 2020, a nationwide curfew was put into place with movement restricted to between 7 p.m. and 6 a.m. In some areas, dawn to dusk, curfew was imposed.[5,6] The number of reported infections was rising and on April 6, 2020, a 24 h curfew was announced in the catchment area of the King Fahd Hospital of the University, Al-Khobar, with movement restricted only to approve essential travel.[7] Everyone was required to stay at home except for essential services, and people were under the lockdown. However, hospitals continued to receive emergency trauma cases. Patients presented to the emergency department with fractures that needed surgical fixation to avoid future complications.

Surgeons were under stress as it was suggested that coronavirus 2, can be transmitted as an aerosol,[8] which can happen during surgical incisions, drilling/reaming of bone, and wound irrigation before closing of the wound.[9] These are all common components of most orthopedic trauma procedures. Moreover, a recent report highlighted the risk to the surgeons and operating room personnel during blood transfusions and surgical procedures.[10] History indicates that during lockdown and restriction of movement of people, trauma admissions decrease. Literature indicated that in Belgium, trauma admissions decreased by 32%,[11] 50% in the United Kingdom,[12] and pediatric trauma cases decreased also in New Zealand.[13]

A literature review did not reveal any reports on changes in orthopedic emergencies patterns from the Middle East in general and SA in particular. This study aimed to study the pattern of emergency fractures and dislocations treated at a Level I trauma center and a COVID designated hospital during the period of restricted mobility of the general public in SA in comparison with the pattern in the same months during preceding year.

MATERIALS AND METHODS

The retrospective study was conducted at the orthopedic department of King Fahd Hospital of the University, Al-Khobar. The hospital admitting and operating logs were reviewed. All consecutive patients who were admitted during the lockdown period due to SARS-CoV-2 coronavirus were included in the study. The inclusion criteria were all patients who came to the emergency room directly or were referred from another hospital in the region. The digital charts of the included patients (QuadraMed Inc., Texas, USA) were reviewed, and various data points were collected, including patient's age and gender, the reason for hospital admission, mechanics of injury, treatment offered, and length of hospital stay. Only patients who were symptomatic had COVID-19 test. The patients' COVID-19 test status was reviewed. All complications related to the surgical and non-surgical treatment were recorded, including the exposure and transmission of the COVID-19 to healthy orthopedic staff. Surgical procedures were recorded and if the same patient was operated multiple times, each procedure was considered as one episode. Even though outpatients fracture clinics were functioning at a low capacity, any admissions from the fracture's clinic were excluded, as those were not directly admitted from the hospital emergency room.

This cohort of patient was then compared to a cohort of patients admitted and surgically treated during the same period of the previous year.

Statistical comparison of the clinical results was made using SPSS version 27.0 for Mac (IBM SPSS Statistics, Armonk NY: IBM Corp). Means and standard deviations were used to describe all data. Student's *t*-test was used to compare the averages between the two groups. $P < 0.05$ was considered statistically significant.

RESULTS

There were no missing data, as all data were extracted from the QuadraMed Patients Records. All consecutive patients admitted during the COVID-19 lockdown period who required surgical treatment were included in the study. During this period, there were 71 admissions compared to 110 patients who were admitted from the emergency room over the same period in 2019; a drop of 39 (35.4%) patients. Out of 71 patients, 54 were male, 13 female patients, and 10 children compared to the non-COVID period, out of 110 patients, there were 57 males, 28 females, and 25 children. The drop in the number of patients was seen in women and children were statistically significant ($P < 0.05$ and < 0.001, respectively). Table 1 gives the demographic data of patients in COVID-19 and pre-COVID time. The majority of the injuries were sustained due to fall at ground level, 41 injuries occurred at home (57.7%) and 16 (22.5%) on the road. Table 2 shows the case mix of the patients who sustained skeletal injuries.

Of the 23 different injuries seen in both periods, there was a significant increase in the fractures of the vertebral column and distal radius ($P < 0.002$ and < 0.05, respectively). Fractures of the humerus in adults and supracondylar fractures in children were significantly reduced. In the pre-COVID period, average time to discharge was 18.9 ± 12.74 days and average time to discharge was 4.38 ± 3.52 days ($P < 0.001$) [Table 3].

Twenty patients (24.4%) were tested for COVID-19 and 4 (16.4%) tested positive with COVID-19. Four orthopedic

Table 1: Demographic data of pre-COVID and COVID-19 periods.

	Pre-COVID	COVID period	*P* value
Number of patients	110	71	
Average age±SD	30.7±28.8	37.3±19.4	
Adult males	60	54	0.8
Adult females	23	8	0.05
Children	27	9	0.001

Table 2: Pattern of fractures and other injuries in the two study periods.

Injuries	Pre-COVID-19	COVID-19	*P* value
Proximal femur	9	10	0.05
Femur	14	7	0.1
Ankle	9	3	0.03
Forearm	9	8	1
Hand	4	0	1
Pelvis	3	2	0.5
Humerus	11	4	0.01
Foot	9	6	0.1
Amputation	1	0	0.1
Tibia	17	9	0.2
Patella	1	1	1
Foreign body	2	1	0.1
Dislocated shoulder	2	0	0.1
Cut tendons	3	2	1
Fracture spine	1	3	0.002
Dislocated hip	1	0	0.1
Septic arthritis	2	2	0.1
Distal radius	5	8	0.05
Supracondylar fracture humerus	7	5	0.001
Total	110	71	

Table 3: Time of surgery and discharge of patients.

	Pre-COVID	During COVID-19	*P* value
Average days from admission to surgery	4.29±3.51	1.5±0.08	0.001
Average duration of hospital stay (days)	18.90±12.74	4.28±3.52	0.001

staffs were exposed to COVID-19-positive patients and one of the surgeons tested positive.

DISCUSSION

Our experience at a tertiary care hospital showed that emergency orthopedic trauma admissions were reduced by 35% during the COVID-19 period when compared to the same months in the pre-COVID-19 time of 2019. Most of the injuries recorded were either secondary to road traffic accidents (RTAs) or accidents at home. There were no sports or recreational accident-related injuries during the COVID-19 period. The decrease in the trauma figures in our study is the lowest reported compared to other studies of 32% to 50% in adult trauma.[11,12] In our study, the reduction in the adult trauma admissions was only 10.84%, while the pediatric admissions reduced by 70.4%. The observed reduction in our study was higher in comparison to the study of Hamill and Sawyer.[13] We believe the significant reduction in the pediatrics admissions, reflect high compliance to the restrictions among children going to school, playing grounds, and outdoor activities and that they were probably engaged at home with non-physical recreational activities such as computer-related games and use of other devices.

In the regular period, admissions due to RTAs form the bulk of admissions in any given hospital in SA. Alghnam *et al.* in 2014[14] reported that 61% of the orthopedic trauma admissions in Riyadh were due to RTAs. During restricted mobility of the citizens, 22.5% of trauma patients who required admission were the result of RTAs. Even though there were fewer vehicles on the roads, accidents still happened probably due to two issues. One, there was definitely over speeding and second, there was probable anticipation of the drivers that there are no other vehicles on the road. A recent report by the police department from the United Kingdom revealed that during the COVID-19 lockdown, there was an increase in the incidence of speeding, which caused accidents.[15] The mean time from admission to the surgery was significantly reduced in the COVID-19 period. This was probably due to the shutdown of some of the other hospital services and due to suspension of elective surgeries. This led to increased availability of operative rooms for timely surgical interventions. This also led to the early discharge of patients, which was reflected in a reduced average total length of hospital stay. An additional factor for this significant decrease in time to surgery and duration of admission was patients themselves who also requested early discharge due to apprehension from the COVID-19 status of the hospital.

Proximal femur fragility fractures marginally increased in number in comparison to the pre-COVID-19 period, but astonishingly, most of the patients presented at least a week later from the time of fall due to apprehension of the transmission of the COVID-19 infection. All these fractures took place at home from minor falls. As fragility fractures usually occur at home most of the time, hence we did not see any drop in the prevalence during the lockdown period.

Our study has limitations as this is a single hospital report and may not represent the whole country during the lockdown,

but it does give a preview of what must have happened at other centers. This study shows the trend of orthopedic trauma in the restricted mobility of the population and helps in planning for the future care of orthopedic trauma if such situation arises.

CONCLUSION

Movement restriction during COVID-19 period did leave an impact on orthopedic trauma. The numbers of trauma admissions did fall but the fall was lower compared to the reported literature. Every patient who required trauma care was given care in the appropriate time and discharged home.

RECOMMENDATIONS

Lockdowns may happen in future and a plan should be kept in place, which should be made in consultations with all levels of the staff.

AUTHORS' CONTRIBUTIONS

MSA conceptualized the study, did the literature review, and wrote the first draft. DAD, ASO, SAA, and AKO did the literature review and collected data. DAB, SMQ, and FMA analyzed and interpreted data. HNS revised the manuscript critically for important intellectual content. All authors have critically reviewed and approved the final draft and are responsible for the manuscript's content and similarity index.

ETHICAL APPROVAL

Obtained from the IRB of Imam Abdulrahman Bin Faisal University, Dammam. 1950/2020, dated January 19, 2021.

Declaration of patient consent

The authors certify that they have obtained all appropriate patients consent forms. In the form, the patients have given their consent for 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.

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Conflicts of interest

There are no conflicts of interest.

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