Original Research

Prevalence Characteristics and Early Prognosis of Covid-19 Infection in Traumatic Patients Undergoing Surgeries: A Cross Sectional Study

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Abstract

Introduction: In trauma patients, stress from fractures and surgical treatment can cause inflammatory and oxidative stress responses and reduces the immune response. We aimed to determine the prevalence and complications of the COVID-19 disease among hospitalized orthopedic traumatic patients which underwent surgery.

Methods: In a retrospective study all patients admitted to Imam Khomeini Hospital of Sari from February 20 to April 20 ,2020, whom underwent surgery were enrolled.

Results: The data from 101 patient was collected. 29 patients had covid-19. seven patients got COVID-19 during hospitalization and 20 patients were infected after surgery. length of hospitalization and complications was significantly higher in patients with COVID-19. patients with novel corona virus had more chronic non-communicable disease(P=0.01) and orthopedic surgery showed more side effects in these patients(P=0.009).

Conclusion: The present study documented those patients with fracture especially with underlying health conditions are in greater risk of CIVID-19 disease and surgery comes with more adverse effects.

Keywords: COVID-19; Trauma; orthopedic surgery; complication

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Introduction

COVID-19 is a new member of coronavirus disease started in China in December 2019 and has become a pandemic disease and also a threat to global health(1, 2). COVID-19 In contrast to seasonal flu is more widespread and more dangerous and It is more fatal than SARS(3-6). The clinical symptoms of this disease are fever, sore throat, cough, shortness of breath, headache and gastrointestinal symptoms(7, 8).

This virus causes a multisystem disease involving the lungs, liver, kidneys, and digestive system that regulate 1,25(OH) Vit D3 and we all know this can affect bone tissue and its healing power(9). Also, due to the ability of the virus to survive on iron, plastic and other surfaces, it can cause biofilm on orthopedics implants and its proven that bacterial

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biofilm can cause failure in our devices. However, unlike bacterial biofilm, there is not enough evidence for viral biofilm(10). Studies have shown that patients with fractures especially those with lower-limb fracture and limited ambulatory capacity have high susceptibility to pulmonary infection (11).

In trauma patients, stress from fractures and surgical treatment can cause inflammatory and oxidative stress responses and reduces the immune response(12, 13). Therefore, it can be assumed that patients with COVID-19 have a higher risk of mortality and morbidity. The purpose of the present study was to determine the prevalence and complications of the COVID-19 disease among hospitalized orthopedic traumatic patients which underwent surgery.

Methods

Study Design and Participants:

In a retrospective study all patients admitted to Imam Khomeini Hospital of Sari (Referral hospital of COVID-19 patients) from February 20 to April 20 ,2020, whom underwent surgery were enrolled. The local medical ethics committee approved the study and the written informed consent was provided for all patients.

Data Collection:

Primary data included Demographic data, clinical characteristics, evidence of Novel coronavirus infection, signs and symptoms, results of laboratory tests, type of fracture, time of disease onset, underlying comorbidities, chest X-ray and computed tomographic (CT)scans, treatment, hospital length of stay and clinical outcome and surgery complications. The date of disease onset was defined as the date which symptom was noticed. The data were provided with use of a customized data-collection form by reviewing of medical records and patients interview. Novel coronavirus disease diagnosed according to World Health Organization interim guidance

Statistical Analysis:

SPSS software (version 22.; IBM) was used for statistical analysis of primary data. Categorical variables were described as frequency rates and percentages, and continuous variables were described using mean and standard Deviation.

Results

The data from 101 patient was collected. the mean (SD) of age was 37.36(15.52) ranged from 9 to 90 years of age. 86 patients were male. 14 patients had past medical history which ischemic heart disease was the most common disease. The mean (SD) of Length of hospital stay was ۴٫۴۱ (۴٫۸۳) days.

29 patients had covid-19 confirmed by RT-PCR. Mean (SD) of age of patient with COVID-19 was ۳۹٫۸۹ (18.84). mean (SD) of Length of hospital stay in these patients was ۷٫۶۵(۷٫۰۳) and 25 patients were men. Cough was the most common symptom among patients (12 patients) and ۹ patients had fever and 7 had dyspnea and 8 patients had sore throat. 12 patients (۴۱٫۴٪) had radiologic sign of the disease. all of patients except one patient recovered from disease.20 patients (69%) infected after discharge.9 patients had impaired lab test(**table1**).

comparison of gender, cause of surgery, past medical history of chronic disease and surgery complications between patients with and without COVID-19 was shown in **table 2**. patients with novel corona virus had more chronic non-communicable disease(P=0.01) and orthopedic surgery showed more side effects in these patients(P=0.009), also there was no significant difference in sexuality and cause of surgery between them.no patients died during study period but one patient with COVID-19 and hip fracture admitted to ICU because of pulmonary thrombo-emboli.

the mean (SD) of age of patient with COVID-19 was ۳۹٫۸۹(۱۸٫۸۴) and ۳۶٫۳۴(۱۳٫۹۸) in patients without COVID-19. independent T test analysis showed that COVID-19 patients significantly stay longer in hospital (۷٫۶۵±۷٫۰۳ VS ۳٫۱۱±۲٫۷۱ p=۰٫۰۰۲)

Discussion

The current study presents the prevalence of COVID in orthopedic traumatic patients which underwent surgery within two months at the time of the highest outbreak of novel coronavirus. Among all cases which included in this study 28.7% of patients had COVID-19.

Previous investigations have documented development of COVID-19 pneumonia in patients with fracture can lead to severe adverse outcomes and increase mortality(14).In this study patients with COVID-19 significantly showed more adverse effects.

In present study 7 patients got COVID-19 during hospitalization and 20 patients were infected after surgery and discharge from hospital and only 2 patients had novel coronavirus before admission. The stress associated with the fracture and surgical treatment can trigger a series of oxidative stress

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responses and excessive inflammation which may lead to decrease the immunity of the patients(12), and make them susceptible to COVID-19. In pulmonary complications have been reported in 4.9% of patients after the surgical treatment of a hip fracture(15).

In our study all COVID-19 positive patients had at least one symptom include fever, cough, dyspnea or sore throat.as it was shown in researches that adults with COVID-19 infection most commonly manifest fever, cough and fatigue, runny nose, headache and other symptoms. Additional symptoms such as diarrhea are less common(16).

Table I: Clinical Characteristics of patients

variable	frequency	percent
sex		
male	86	٨٥,١
female	15	١٤,٩
Cause of surgery		
Upper limb Fx (open fx)	٢١(3)	٢٠,٨ (8)
Lower limb Fx (open fx)	٣٤ (15)	33.7(14.9)
Upper and lower limb fx	١١	10.9
Laceration and crush injury	34	33.7
other	١	٠,٩
PMH		
Air way disease	١	١
DM	٥	٥
HTN	6	٦
IHD	١٠	١٠
complication		
PTE/DVT	١	٠,٩
Infection	٥	٤,٩
Novel coronavirus		
infected	29	28.8
Non-infected	72	71.2
COVID-19 Sign & symptom		
fever	٩	٨,٩
cough	١٢	١١,٩
Sore throat	٨	٧,٩
dyspnea	٧	٦,٩
Lab test		
lymphopenia	٧	٦,٩
thrombocytopenia	٣	٢,٩
Abnormal ESR/CRP	٩	٨,٩
Imaging (Pneumonia)		
Chest x-ray	٣	٢,٩
CT	١٢	١١,٩
Disease onset		
Before admission	2	١,٩
during hospitalization	7	٦,٩
After discharge	20	١٩,٨
COVID-19 current status		
recovered	٢٨	27.9
In hospital	١	0.9

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Table 2: Comparison of Clinical Characteristics of patients with &without COVID-19

variable	COVID-19	NO COVID	P-Value
sex			
male	٢٥	٦١	٠,٨٤
female	٤	١١	
Cause of surgery			
Upper limb Fx (open fx)	٤(1)	١٥ (٢)	٠,٠٦
Lower limb Fx (open fx)	١٤ (٥)	٢٠(١٠)	
Upper and lower limb fx	٥	٦	
Laceration and crush injury	٥	٢٩	
other	١	٠	
PMH			
Air way disease	١	٠	0.012
DM	٤	١	
HTN	٣	٣	
IHD	٧	٣	
complication			
PTE/DVT	١	٠	٠,٠٠٩
Infection	٤	١	

Present study was showed that underlying health conditions such as diabetes mellitus, chronic airway disease, and cardiovascular disease was significantly higher in patients with COVOID-19 disease. Similar to these results Reports about Characteristics of COVID-19 patients from China and Italy suggest that older age and the presence of at least one of several underlying health conditions are considered as risk factors for severe disease, similar to what happened with SARS and MERS (17, 18) .Based on U.S. data, those aged ≥65 years and particularly those aged ≥85 years and persons with underlying health conditions such as diabetes mellitus, chronic lung disease, and cardiovascular disease, appear to be at higher risk for severe COVID-19–associated disease than persons without these conditions(19, 20). Emami et al. in a systematic review of the data of 76993 patients presented in 10 articles reported that hypertension, cardiovascular diseases, diabetes mellitus, smoking, chronic obstructive pulmonary disease (COPD), malignancy, and chronic kidney disease were among the most prevalent underlying diseases among hospitalized COVID-19 patients(21). Mirsoleymani et al. in a retrospective study, collected information of 105 patients with severe COVID-19 pneumonia hospitalized in Iran, reported that hookah smoking played a crucial role in spreading COVID-19 in younger people. They reported in addition to higher age, immunosuppressive effects of Metformin probably made diabetic patients, who have impaired immune systems, more vulnerable to improve severe COVID-19 pneumonia.(22)

As there was no significant difference in age between patients with and without COVID-19(٣٩٫٨٩±١٨٫٨٤ COVID patients VS ٣٦٫٣٤±١٣٫٩٨ non COVID patients p=٠٫٣) It is assumed that the cause of more complications in patients is related to their underlying diseases. In a study which was done by Mi et al. among 10 patients with both novel coronavirus and fracture 1 patient died 11 days after surgery and 3 patients died 8 days after admission without surgery being performed. and 3 others had developed severe pneumonia and they concluded that patients with a fracture may be at a higher risk of COVID-19 pneumonia(14).

So, it is recommended that strict infection-control actions should be implemented for patients with fractures, particularly those undergoing surgical treatment, especially older age with underlying disease. patients with a fracture and COVID-19 pneumonia had at great risk of morbidity and mortality and intensive surveillance and treatment is recommended. In our orthopedic department we prefer nonoperative treatment for older patients with minor fractures and postpone the surgery after the end of disease outbreak. Time of necessary surgery for patients with a fracture and COVID-19 pneumonia should be decided base on all the circumstances

Conclusion

The present study documented that patients with fracture especially with underlying health

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conditions are in greater risk of CIVID-19 disease and surgery comes with more adverse effects

Conflict of Interest Disclosures

The authors declare that they have no competing interests.

Ethical Statement

The study was conducted as per the ethical principles of the Helsinki Declaration.

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