Surgical Audit of Orthopaedics patients operated in COVID-19 pandemic: Do COVID-19 positive patients had an increased complication rate?

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Authorship and contribution Declaration:
Each author of this article fulfilled ALL 4 Criteria of Authorship:
1. Conception and design or acquisition of data, or analysis & interpretation of data.
2. Drafting the manuscript or revising it critically for important intellectual content.
3. Final approval of the version for publication
4. All authors agree to be responsible for all aspects of their research work.

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ABSTRACT

Objective: To compare the frequency of surgical complications of COVID-19 positive patients with COVID-19 negative patients operated for Orthopaedic problems during the COVID-19 pandemic.

Methods: This retrospective Cohort study was conducted in Ghurki Trust Teaching Hospital Lahore. The medical record of all the patients fulfilling the inclusion criteria who underwent Orthopaedic surgeries in time period between 23rd March 2019 to 30th June 2020 were revived. Patients were divided into group A (COVID positive) and B (COVID negative) and demographic characteristics, types of surgeries and complication rates of both the groups were compared. Chi-square test was applied and *P* value calculated (*P* <0.05 was considered significant).

Results: The total number of patients were 2688.Male patients were 1829(68%) and female 859(32%).The mean age was 35.5±12.9 years. Group A had 71(2.6%) patients while group B had 2617(97.3%).The mean age of group A was 32.1±18.9 years and group B 40.6±26.9 years(*P* <0.05).The pre-operative American Society of Anaesthesiologists (ASA) grade 2 in 29(40.8%) patients in group A and 1231(47%) in group B. The commonest surgical procedures were fixation of the fractures around the hip in 12 (16.9%) patients and 562(21.5%) patients in group A and B respectively. Post-operative systemic infection was noted in 4(5.6%) patients in group A and 109(4.2%) in group B(*P* value > 0.05) while local infection was reported in 1(1.4%) patient in group A and 21(0.8%) in group B(*P* value > 0.05).The mortality rate was 4.2%(n=3) in group A and 2.3%(n=59) in group B(*P* value >0.05).

Conclusion: The post-operative complications and mortality rates of COVID-19 positive patients were not significantly greater than COVID-19 negative patients.

Keywords: Complication, COVID-19, Mortality.

This article may be cited as: Zaheer M, Hafeez U, Ahmad U, Ali A, Hizbullah, Aziz A. Surgical Audit of Orthopaedics patients operated in COVID-19 pandemic: Do COVID-19 positive patients had an increased complication rate?Pak Orthop Assoc. 2020;32(4):

INTRODUCTION

On 16th December 2020 there have been 80,846181 confirmed cases of COVID-19 including 17,62,319 deaths globally while in Pakistan there have been 479,715 cases reported and 10,105 deaths.[1] The sudden surge of COVID-19 has pushed health care systems in many countries to limits and exposed its weakness.[2-4]Following this pandemic, hospitals, medical personnel, and essential medical supplies have undergone major reorganization to allow for the high-acuity care of COVID-19 patients leading to a near full stop of non-urgent, elective procedures.[2-8]Surgical facilities have also been hampered due to healthcare staff sickness and reduced supply of surgical materials.[3,9,10] However, many emergency general surgical conditions and trauma cases still required immediate assessment and timely intervention.[2,3,8,9,11]Although various hospitals have designed and published their protocols

for dealing patients in need of emergency surgical care, there is minimal evidence regarding the outcome of surgical procedures in the COVID-19 era.[3,4,7,9-12] It has been reported that male gender, patient age 70 years and more, American Society of Anaesthesiologists (ASA) grade 3 or greater and major/emergency surgery has the highest mortality risk in patients who were COVID-19 positive seven days before surgery or 30 days after surgery.[13]

Ghurki Trust Teaching Hospital is a major tertiary care hospital and one of the busiest trauma and spine centre in Lahore. We reviewed the record of 2688 patients operated in Covid-19 pandemic. The objective of our study was to compare the frequency of surgical complications of COVID-19 positive patients with COVID-19 negative patients operated for different Orthopaedic problems during the COVID-19 pandemic. The results of our study would be useful in formulating guidelines for safe resumption of elective surgeries in other hospitals.

METHODS

This retrospective Cohort study was conducted in Ghurki Trust Teaching Hospital Lahore. The medical record of all patients of either gender and ages with pre-operative screening for COVID-19 who underwent Orthopaedic surgeries in time period between 23rd March 2019 to 30th June 2020 were revived. All the patients had minimum of four weeks post-operative record (Personnel/ (telephonic) available for analysis. The study protocol was approved by the Ethical Review Board of our hospital. Preoperative symptomatic COVID-19 patients (High temperature, continuous cough, anosmia, dyspnea, flue) and those treated in other centers were excluded. Patients with positive nasopharyngeal swabs for SARS-CoV-2 viral RNA were placed into group A (COVID positive) and negative into group B (COVID negative). A uniform standard protocol of surgical technique was adopted for both the groups. The demographic characteristics, American Society of Anaesthesiologist (ASA) status, types of surgeries, complications and mortality rates of both the groups were compared.

Data was entered and analyzed in SPSS version 22. Categorical variables were represented in terms of frequencies, whereas mean and standard deviations were used for continuous variables. Important study variables were compared and Chi-square test was used to calculate *P* value ($P < 0.05$ was considered significant). Data presented in tables where necessary.

RESULTS

We operated 2688 patients during the time period extending from 23rd March 2019 to 30th June 2020. Male patients were 1829(68%) and female 859(32%).The mean age was 35.5±12.9 years. Group A(COVID positive) had 71(2.6%) patients while group B(COVID negative) had 2617(97.3%) patients. The clinic-demographic details of both the groups are compared in table I.

Table I: Clinico-demographic profile of our patients.

Variable	COVID-19 POSITIVE (n=71)	COVID-19 NEGATIVE (n=2617)	*P* value
Age	32.1±18.9	40.6±26.9	0.008
Male	39(54.9)	1790(68.4)	0.016
Female	32(45.1)	827(31.6)	
ASA grade 1	17(23.9)	479(18.3)	0.052
ASA grade 2	29(40.8)	1231(47)	
ASA grade 3	13(18.3)	669(25.6)	
ASA grade 4	12(16.9)	238(9.1)	
Hypertension	18(0.25)	375(0.14)	0.015
Diabetes Mellitus	12(0.16)	280(0.10)	0.12
Asthma	4(0.05)	73(0.02)	0.14
COPD	3(0.04)	92(0.03)	0.73
Ischemic heart disease	1(0.01)	146(0.05)	0.18
Nil	33(0.46)	1651(0.63)	0.005
General Anaesthesia Vs Spinal Anaesthesia	20: 51	635: 1982	0.48
Operative Time(hours)	1.8±0.23	2.3±0.54	0.0001

The mean age of group A was 32.1±18.9 years and group B 40.6±26.9 years (*P* <0.05).The pre-operative American Society of Anaesthesiologist (ASA) grade 2 in 29(40.8%) patients in group A and 1231(47%) in group B. Except for prevalence of hypertension which was higher in group A (*P* <0.05), the groups did not differ significantly in terms of presence of other co-morbid conditions. Operative time was significantly higher in group B *(P* value <0.0001).

Lower limb trauma constituted more than half of workload. The commonest surgical procedures were fixation of the fractures around the hip in 12 (16.9%) patients in group A and 562(21.5%) patients in group B as shown in table II. Elective surgeries comprising primarily of joint Arthroplasty, arthroscopic surgeries and procedures for degenerative spine collectively accounted for 8.4% and 8.9% of cases in group A and B respectively.

Table II: Distribution of surgical procedures.

Procedure	COVID-19 POSITIVE (n=71)	COVID-19 NEGATIVE (n=2617)
IM Nail	12(16.9)	546(20.9)
DCP	4 (5.6)	258(9.9)
Hip (Neck Of Femur, Inter Trochanteric)	12 (16.9)	562(21.5)
Pelvis/ Acetabular	2 (2.8)	33(1.3)
Illizarov	9 (12.7)	147(5.6)
Elbow Recon	5 (7)	27(1)
AO Fixator	8 (11.3)	139(5.3)
LCP	3 (4.2)	79(3)
MUA POP	2 (2.8)	179(6.8)
K-Wire	1 (1.4)	134(5.1)
TBW Patella	3 (4.2)	71(2.7)
TPSF	4 (5.6)	209(8)
Spine	2 (2.8)	81(3.1)
Arthroplasty	1 (1.4)	44(1.7)
Arthroscopy ± ACL	3 (4.2)	71(2.7)
Pediatric Cases	--	37(1.4)

Table III shows comparison of post-operative outcomes in COVID positive and negative patients. Post-operatively number of patients requiring admission to ICU was significantly higher for patients who were COVID positive (*P* value 0.002). However, patients needing mechanical ventilator support did not differ between the groups. Due to institutional policy all COVID positive patients completed their isolation period in hospital and therefore had a significantly longer hospital stay. Surgical site infection occurred in only 1(1.4%) patient in group A and 21(0.8%) patients in group B (*P* value 0.44). Systemic infection, including chest infection and urinary tract infections occurred equally in two groups. In 30 day post-operative period 3 (4.2%) COVID positive and 59 (2.3%) COVID negative patients died (*P* value 0.22).

Table III: Comparison of early post-operative outcomes in COVID-19 positive and negative patients.

Outcome Variables	COVID-19 Positive(n=71)	COVID-19 Negative(n=2617)	*P* value
Need For Mechanical Ventilation	2(2.8)	28(1.07)	0.19
Need For ICU	10(14)	122(4.7)	0.002
Length of hospital stay	15.2±2.9	3.35±1.25	0.0001
Systemic infection	4 (5.6)	109 (4.2)	0.54
Local infection	1 (1.4)	21 (0.8)	0.44
Mortality	3(4.2)	59 (2.3)	0.22

DISCUSSION

In our study post-operative systemic infection was noted in 4(5.6%) COVID positive patients and 109(4.2%) COVID negative patients (*P* value > 0.05) while local infection was reported in 1(1.4%) COVID positive patient and 21(0.8%) COVID negative patients (P value > 0.05).The mortality rate was 4.2% (n=3) in COVID positive group and 2.3%(n=59) in COVID negative group. (*P* value >0.05). Burton[14] conducted a comparative analysis of the surgical outcome of 56 Orthopaedic patients operated just before COVID-19 pandemic and 46 patients operated during the COVID-19 pandemic. He documented four complications and one death in pre-COVID-19 patients and six complications and two deaths in patients operated during COVID-19 pandemic. Burton is of the opinion that complex Orthopaedic surgery can be performed safely in areas where the prevalence of COVID-19 is low. Hall and colleagues[15] published a multicentre study documenting the impact of COVID-19 on thirty-day mortality of 317 patients with acute hip fractures. They established that only 7 (26%) patients had significant symptoms out of 27 (8.5%) patients who had a positive COVID-19 test. Taking 30-day survival into account COVID-19-positive patients were markedly higher when compared to those without COVID-19 (64.5%, 95% confidence interval (CI) 45.7 to 83.3 vs 91.7%, 95% CI 88.2 to 94.8; p < 0.001). As a matter of fact surgical intervention had played a key role in recovering hip fractured patients by assisting respiratory function. A retrospective analysis of clinical data of 34 patients who undergone elective surgeries (including 6 Orthopaedic surgeries) during the incubation period of COVID-19 in Wuhan showed that all developed COVID-19 pneumonia in perioperative period. About 15(44.1%) patients needed ICU treatment and the mortality was 20.5%(n=7) including 2 patients with total hip replacement.[16] Price and colleagues[17] in their Cohort study of 96 COVID negative patients with 100 urgent and emergent Orthopaedic surgeries during the time period extending from 17th March 2020 to 3rd May 2020 noted 30 day mortality rate of 3%(n=3).These authors concluded that COVID negative Orthopaedic patients turning positive in the peri operative period carried a higher risk of morbidity and mortality.

Contrary to the above studies Claudio and Gianluca[18] performed elective Orthopaedic surgeries in 614 patients in Negrar di Valpolicella Italy during the lock down period from 11th April to 2nd June 2020.They documented no post-operative ICU admission and no complication. They concluded that elective Orthopaedic surgeries could safely be performed during COVID-19 pandemic.

Our study had few limitations. The number of COVID-19 positive patients were less for comparison with negative patients. Our follow up period was short. We were not able to document the exact cause of mortality in our patients nor we document any conversion of COVID-19 negative patients to COVID-19 positive status in the follow up period.Pre COVID-19 surgical audit was not considered for comparison. Further well designed studies are therefore recommended to address all such limitations.

CONCLUSION

The post-operative complications and mortality rates of COVID-19 positive patients were not significantly greater than COVID-19 negative patients. Emergent and urgent Orthopaedic surgeries can be performed during COVID-19 pandemic but strict precautionary measures are mandatory to avoid contracting and spreading the infection.

Conflict of Interest: None
Grants/Funding: None

REFERENCES

1. Coordination C-HAPbMoNHSRa. 2020. Available from: https://covid.gov.pk/.
2. Egol KA, Konda SR, Bird ML, Dedhia N, Landes EK, Ranson RA, *et al.* Increased Mortality and Major Complications in Hip Fracture Care During the COVID-19 Pandemic: A New York City Perspective. Journal of Orthopaedic Trauma. 2020;34(8):395-402.
3. Rodrigues-Pinto R, Sousa R, Oliveira A. Preparing to Perform Trauma and Orthopaedic Surgery on Patients with COVID-19. J Bone Joint Surg Am. 2020;102(11):946-50.
4. Kaye K, Paprottka F, Escudero R, Casabona G, Montes J, Fakin R, *et al.* Elective, Non-urgent Procedures and Aesthetic Surgery in the Wake of SARS-COVID-19: Considerations Regarding Safety, Feasibility and Impact on Clinical Management. Aesthetic Plastic Surgery. 2020;44(3):1014-42.
5. Placella G, Salvato D, Delmastro E, Bettinelli G, Salini V. CoViD-19 and Ortho and Trauma Surgery: The Italian experience. Injury. 2020;51(6):1403-5.

6. Maniscalco P, Poggiali E, Quattrini F, Ciatti C, Magnacavallo A, Vercelli A, *et al.* Proximal femur fractures in COVID-19 emergency: The experience of two Orthopedics and Traumatology Departments in the first eight weeks of the Italian epidemic. Acta Bio-Medica : Atenei Parmensis. 2020;91(2):89-96.
7. Doglietto F, Vezzoli M, Gheza F, Lussardi GL, Domenicucci M, Vecchiarelli L, *et al*. Factors Associated With Surgical Mortality and Complications Among Patients With and Without Coronavirus Disease 2019 (COVID-19) in Italy. JAMA Surg. 2020. ;155(8):1-14. doi: 10.1001/jamasurg.2020.2713.
8. Cakmak G, Ceyhan E, Demirtas Y, Berk H. The management of Orthopedics and Traumatology patients during SARS-CoV-2 pandemic. Acta Orthopaedica et Traumatologica Turcica. 2020;54(3):223-7.
9. Cheeyandira A. The effects of COVID-19 pandemic on the provision of urgent surgery: A perspective from the USA. J Surg Case Rep.2020(4): rjaa109. doi: 10.1093/jscr/rjaa109
10. Neradi D, Hooda A, Shetty A, Kumar D, Salaria AK, Goni V. Management of Orthopaedic Patients During COVID-19 Pandemic in India: A Guide. Indian Journal of Orthopaedics. 2020;54(3):402-7.
11. Sobti A, Memon K, Bhaskar RRP, Unnithan A, Khaleel A. Outcome of trauma and orthopaedic surgery at a UK District General Hospital during the Covid-19 pandemic. J Clin Orthop Trauma. 2020;11(Suppl 4): S442–S445.
12. Ashford RU, Nichols JS, Mangwani J. Annotation: The COVID-19 pandemic and clinical orthopaedic and trauma surgery. J Clin Orthop Trauma. 2020;11(3): 504–505.
13. COVIDSurg Collaborative. Mortality and pulmonary complications in patients undergoing surgery with perioperative SARS-CoV-2 infection: An international cohort study. Lancet. 2020;396(10243):27-38.
14. Burton H L, Burden E, King A, Kassam AA, Hubble MJ, Toms AD .Urgent Arthroplasty Interventions During the COVID-19 Pandemic: Operating Risks in Low-Prevalence Areas. Cureus.2020; 12(12): e12197. doi:10.7759/cureus.12197
15. Hall AJ, Clement ND, Farrow L, MacLullich AMJ, Dall GF, Scott CEH, *et al*. IMPACT-Scot report on COVID-19 and hip fractures. The Bone & Joint Journal. 2020;102-b(9):1219-28.
16. Lei S, Jiang F, Su W, Chen C, Chen J, Mei W, *et al*. Clinical characteristics and outcomes of patients undergoing surgeries during the incubation period of COVID-19infection. EClinicalMedicine 2020; 5;21:100331. doi: 10.1016/j.eclinm.2020.100331.
17. Price A, Shearman AD, Hamilton TW, Alvand A, Kendrick B. 30-day outcome after Orthopaedic surgery in patients assessed as negative for COVID-19 at the time of surgery during the peak of the pandemic. Bone Joint Open. 2020;1-8:474-480.
18. Claudio Z, Gianluca P, Daniele S, Simone N, Stefania M, Venanzio I. Elective Orthopaedic Surgery During COVID-19. A Safe Way to Get Back on Track. JBJS Open Access. 2020;5(4): p e20.00084 doi: 10.2106/JBJS.OA.20.00084.