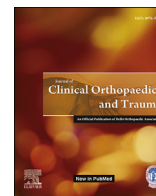




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## Original article

## Has the time to reinstate elective orthopedic procedures come?

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## ABSTRACT

**Background:** The coronavirus pandemic changed how we manage and operate patients in orthopaedic practice. Although elective orthopaedic procedures were halted to prevent spread of the disease as well as sustain supplies of essential protective equipment and healthcare workers, trauma services were continued. We studied the orthopaedic trauma cases operated over 6 months of the pandemic, and discuss the protocols used to minimize disease spread.

**Methods:** Data was collected for all orthopaedic emergency cases operated at our centre from 1 st March – 10 th August 2020. During this time specific protocols were used for first aid, pre-operative care, inside the operation theatre, post-operative stay as well as for follow ups.

**Results:** A total of 851 patients were operated. A sharp decline in surgeries was seen during the lockdown. Average stay in the hospital was 4 days. Only 44% of the patients came for follow-up visits. None of the contacted patients or their relatives developed symptoms or tested positive for COVID after discharge.

**Conclusion:** Multiple waves and various mutant strains of COVID-19 have made this pandemic longer than expected. Elective orthopaedic cases cannot be ignored for forever, as it leads to poor quality of life and an increasing burden of such patients. We suggest, that using the protocols used at our centre, we have successfully operated on cases without risking spread of the virus. Thus, we believe it's time to reinstate elective orthopaedic procedures, in a phased manner.

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## 1. Introduction

COVID-19 was declared as a pandemic by WHO on 11<sup>th</sup> March 2020. As a part of pandemic preparedness, the Indian Government evoked a 123 year old Epidemic Disease Act, 1987 to combat the spread of this virus.<sup>1</sup> This was followed by a strict lockdown and discontinuation of all non-essential surgeries and movement of people and goods, which extended over the next 3 months. Learning lessons from China and other severely affected countries, Indian Orthopedic Association and British guidelines advised to halt the elective orthopedic procedures. This was considered essential not only to avoid spread of COVID19, but to also use the highly precious equipment, PPE and healthcare manpower in a more efficient way in the time of a pandemic with better relocation. Dulce et decorum est pro patria mori” (it is sweet and befitting to die for the homeland) has become the most appropriate description for the sacrifice of healthcare professionals.<sup>2</sup>

Heeding to these developments, all elective orthopedic surgeries were cancelled and postponed at our tertiary care referral centre.<sup>3</sup> Only cases considered emergency, or those which would lead to significant morbidity if delayed, were considered for admission and surgery. Thus, we continued the essential orthopedic care for trauma cases. Following stringent pre-operative, intraoperative and post-operative protocols, we managed to operate almost all appropriate emergent patients. We hypothesized this study in order to analyze the protocols in place for patients operated during the pandemic, and to find out if these were adequate enough to control the COVID19 infection rates. This would help us to guide in the process of reinstating or initiating elective procedures in this era of the new normal and to also, be better prepared and avoid halting of elective care during the forthcoming predicted waves or re-emergence of COVID19 or other novel contagion in the future.

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## 2. Material and methods

### 2.1. Study design

This retrospective, observational cohort study was carried out at a Level I tertiary trauma centre. Study protocol was approved by the institutional ethical committee for data collection.

### 2.2. Inclusion criterion

All patients who presented with a recent traumatic injury (<7 days old) and were managed operatively by the Orthopedic trauma team, at the institute between 01 March 2020 to 10 August 2020 were studied.

Data collected included – age, sex, mode of injury, fracture type, open vs closed injury, surgery done, post-operative complications, debridement if needed during admission and follow up details (in-person vs telephonic preference).

We reviewed the data, analyzed and contacted the patients at 30 days from their date of discharge to find out the outcomes. (COVID infectivity, surgical site infection and surgery related complications).

All patients planned for admission and surgery were testing using RT-PCR for COVID-19 and only the negative cases were immediately admitted to ward and taken to Operation Theatre (OT) depending on availability of anaesthetists and operating team. Those who were positive, were shifted to a dedicated COVID centre, and if possible, operated only once they tested negative, adhering to the then present guidelines, thus causing delay in surgery. All cases were operated by a fellowship trained orthopedic surgeon. We hypothesized that longer delay to surgery due to COVID prevention protocols and mandatory testing as well as post-operative stay in the hospital would lead to higher incidence of COVID-19 positivity in this cohort of patients. All these patients were contacted and followed up via telephonic conversation and details were sought regarding the patient or their family, presenting with any symptoms of flu, cold or respiratory distress or if any of them had tested positive for COVID-19 during their hospital stay or after discharge. The data was compiled in Microsoft Excel© for Macintosh and analyzed using ©SPSS version 24 for Macintosh (IBM Inc., Chicago, IL, USA).

No funding was received from any internal or external sources for the above study.

## 3. Results

A total of 851 cases were operated from 1<sup>st</sup> March 2020 to 10<sup>th</sup> August 2020, by the Orthopedic Trauma Department. 66/851 (7.7%)

**Table 1**

Patient demographics in the two groups, Group 1 are the patients tested positive on day of presentation, Group 2 are the patients who tested negative.

	COVID Positive (66)	COVID Negative (785)
Age (years)	46.74	49.56
Sex Distribution (Male: Female)	64:36	58:42
Fractures (Most common)	Hip – 66% Distal radius – 15% Proximal tibia – 6%	Shaft femur – 26% Distal radius – 9%
Compound Fractures	7	78
Post-operative fever	11	23
Infection	14	21
Average hospital stay (Days)	12	3
Lost to follow up	15	81
In person follow up	28	346
COVID + on follow up	None	None

were diagnosed COVID-19 positive on RT-PCR testing where as 92% were negative (Table 1). The average age in the positive group was 46.74 years and in the negative group, it was 49.56 years. The sex ratio was 64:36 and 58:42, male: female in both the groups respectively. The most common fractures in the positive group were hip fractures (66%) whereas in the negative group was shaft of femur fractures (26%). There were 7 compound/open fracture cases in the positive group whereas there were 78 such in the other group. Post-operative fever was reported by 11 patients in positive group and 23 patients in negative group. 14 (21%) infections were reported in the positive group and 21 (2%) in the negative group. This incidence was significantly higher in the COVID positive cases (p < 0.05). Average hospital stay was 14 days for the COVID positive group and only 3 days for the negative group. 15 cases of the positive group as well as 81 from the negative group were lost to follow up. All 851 patient were telephonically contacted after retrieving their contact details from hospital records. 87 (10%) of total patients either did not respond to the call or their contact details were wrong. 9 (1%) of the recipients, either did not live with the patient or did not know of the patients present state. Time from admission to surgery varied from a minimum of 7 days to a maximum of 21 days for the COVID positive patients with an average of 11.6 days. The COVID negative patients were operated within the next 24–48 h 16 (1.8%) patients who developed fever in the post-operative period, were all tested for COVID19 post-operatively, but none turned out to be positive. 7/16 of these had open fractures at index trauma. 3 had to undergo debridement while their initial stay in the hospital. 5 (7%) patients from the COVID positive group and 13 (2%) patients from the negative group had to be readmitted for debridement due to infection. 36/851 patients complained of discharge from wound site on telephonic follow up which was reduced by daily dressing and oral antibiotics (Fig. 1).

Of the remaining 785 (92%), none of the patients had passed away, nor did they develop symptoms suggestive of COVID19. Patients did have other complications like discharge from wound (36, 4.2%), or joint stiffness (59, 7%). Only 374 (44%) patients had yet come to the hospital for follow-up till 30 days post-operatively. Rest of the patients did not come for follow up due to fear of virus spread and uncertainty about hospital services being run or not at present. These patients were followed up only using the tele consult services of the department. 21 (2.4%) patients had a stay of more than 14 days in the hospital.

## 4. Discussion

The COVID19 pandemic has affected all realms of life, with healthcare systems taking the hardest toll of all. Orthopedics although not directly related to the infection, has also been affected in multifold ways. All spheres of orthopedics, from trauma care, to elective surgeries as well as pre and post-operative management and patient follow up protocols needed to be redesigned according to various guidelines by Indian Orthopedic Association, British Orthopedic Association as well as American Association of Orthopedic Surgeons to fit the pandemic scenario. Almost all guidelines had advised a complete halt of all elective surgeries at the beginning of the pandemic.<sup>3,4,5</sup>

At the same time, orthopedicians were de-specialized, worked on the frontline and did non-surgical tasks. Those operating on emergency trauma patients, were constantly threatened with self-infection due to high aerosol production in orthopedic procedures, leading to aggravated stress and anxiety amongst these healthcare providers.<sup>6,7</sup> To add to this vicious mix, all academics and skill learning courses for orthopedic trainees came to a complete halt.<sup>8</sup>

Lockdown in India, was initiated on 25<sup>th</sup> March 2020, when all non-essentials activities were halted for the general public.<sup>9</sup>

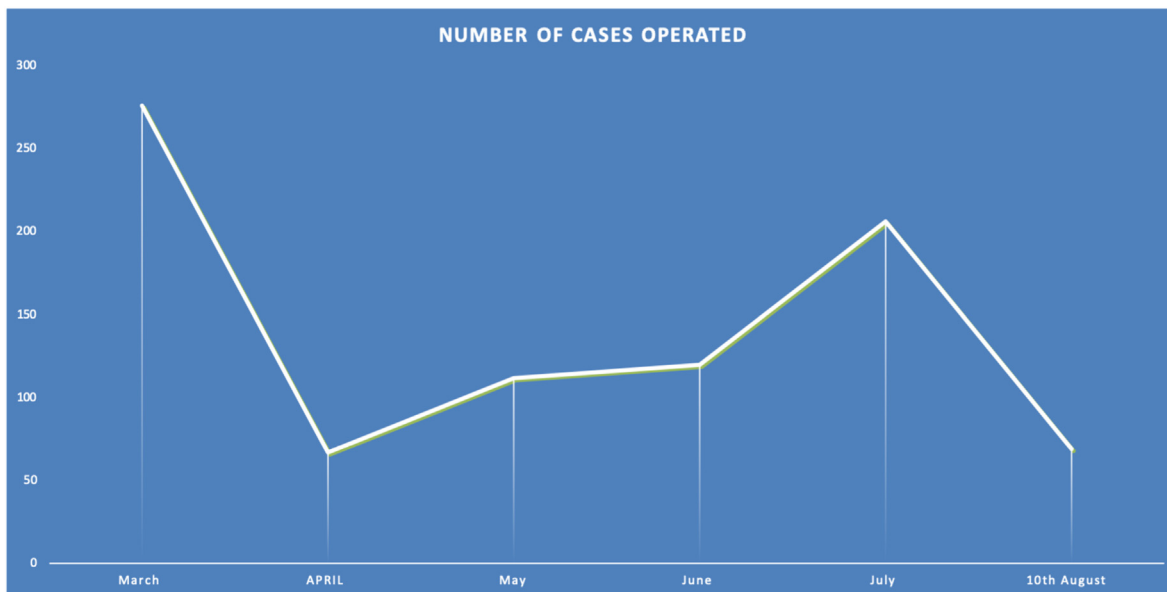


Fig. 1. Number of cases operated.

Keeping in tune with the lockdown, our Level-1 Trauma Centre saw an almost linear decline in the number of emergency surgeries from March to April, when the lockdown and the virus spread were at its peak (Fig. 2). Following these few months, Unlock 1.0 was announced in our country from 1<sup>st</sup> June 2020 onwards, when phased reopening of services and public movement was to be started.<sup>10</sup> We saw an almost linear rise in number of emergency cases, with maximum number of surgeries being done in the month of July (206). Trauma care was never stopped at our centre, irrespective of the phase of the pandemic. Also, a dedicated COVID facility along with a trauma centre, allowed us to keep the poly-trauma or compound fracture cases that were COVID positive admitted, till they could be operated. This led to a smaller number

of neglected trauma cases, malunited fractures, delayed unions, technically challenging fracture reductions as well as higher blood loss or infections due to delayed surgery. Such pooling of cases, due to either inability to access the trauma centre or halted services, leading to grave consequences have been shown in some of the studies.<sup>11</sup>

With such sudden and drastic changes in work conditions, returning back to normalcy is bound to be a bumpy and a prolonged process. A study conducted in USA, showed that up to 61% of the participant patients, were concerned about contracting COVID19, primarily during check in and waiting periods or during interaction with hospital staff.<sup>12</sup> Vaishya et al. have also echoed a similar tale, with a fall of 71% in outpatient attendance and a fall in orthopedic

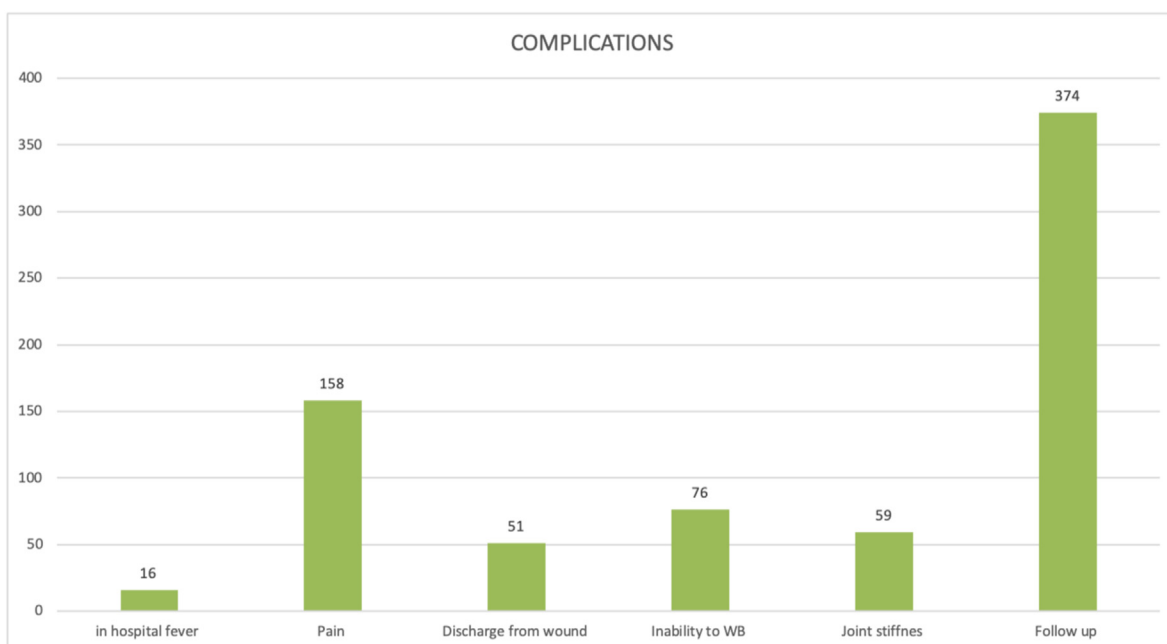


Fig. 2. Complications.

admissions by 59% in the COVID pandemic year.<sup>13</sup> This could also be seen with only 44% of our patients coming back for in person follow-ups. Such deep-seated fears need to be battled with substantial research, data and protocols to make hospital care a safe experience for patients again. Multiple studies have attempted to pave a roadway to successful return to elective surgeries once the pandemic nears its end, which seems far as of now.<sup>2,14,15,16</sup>

In the past, the SARS-CoV pandemic spanning across 2002–04, was the most recent comparable event to the present pandemic.<sup>17</sup> Although the outbreak did not engulf the globe like COVID19, it did strike a few countries with full force. The Canadian experience with this virus, reported the use of negative pressure isolation rooms, N95 or higher level of respiratory protection, gloves, gowns and eye protection, and careful hand hygiene; as tools to control the spread.<sup>18</sup> In another systemic review, simple PPE was also found to be effective for adequate protection of HCW.<sup>19</sup> We can learn from these previous experiences and imbibe such practices in our fight against this continued viral disaster. Over the past 4 months, nCOVID-19 has become an essential part of healthcare systems. COVID-19 testing, like HIV/HBsAG and Hepatitis C testing has become a tool of self-defense for health care professionals. “Universal respiratory precautions” have become indispensable for surgeons.<sup>20</sup> A RTPCR report of COVID19 has become a standard test for most of the patients planned for admissions.<sup>21</sup> Similarly, adequate PPE in the form of impermeable gowns, N95 respirators, face shields and shoe covers in the operation theatre, irrespective of the COVID19 positive status of the patient, has become a routine. Surgeons have worked their way around in order to use masks for longer durations or to manage the heightened propensity of sweating in PPE suites in the form of shorter working shifts or more comfortable masks and face shields.<sup>22</sup> Similarly, standard donning off protocols have been instated into daily OT protocols.

The early strategy of judicious use of PPE to ensure “the one who needs it the most gets it first” has changed due to mass manufacturing of PPE including masks, gowns, shoe covers, PPE suits and gloves domestically.<sup>23</sup> The unrestricted supply of indigenous equipment has allowed us to operate all our trauma cases without any hindrance with respect to PPE.

Having a separate COVID isolation Centre, fully equipped with operation theatres and radiology helped us to operate emergency COVID19 positive patients in a separate facility from our trauma OT's.

Only one case, which had a femoral artery transection on the right side with left subtrochantric and tibia fracture who had tested positive on presentation and could not have been delayed till a negative report underwent external fixator application in the COVID dedicated OT in a COVID dedicated Centre from orthopedic point of view. These OT's had separate nursing and helping staff, Air Conditioning was turned off, and only the most needed instrumentation and minimal doctors and assistants were used. On testing negative twice, he was shifted to our trauma Centre, where definitive management of fractures was done after 20 days of the injury. Senior orthopedic surgeons, minimal required number of assistants, and one nurse were scrubbed in this case to keep exposure to a minimum. As also seen in one of the studies from United Kingdom, a COVID-19-free Centre is a prudent way of mitigating infection spread and providing adequate care.<sup>24</sup>

A joint committee of senior anesthetists and surgeons, decided that most of the trauma patients would be operated in regional anesthesia, either a spinal, epidural or neuromuscular blocks. General anesthesia and intubations were avoided, and when it was must, it was done by a senior anesthetist in the shortest time to avoid aerosol generation. Face shields were used by all doctors in the OR during these procedure.<sup>25</sup> This was done even though all our patients were tested COVID negative on CBNAAT or RTPCR, just to

ensure the notorious “asymptomatic positive patient” who might unknowingly end up infecting other patients or health care personnel (HCW). While operating, we used a standard protocol to use minimal electrocauterization, bone saw, low power setting of drilling and reaming in order to reduce aerosol generation.<sup>26</sup> Also, minimal invasive approaches like nailing over plating were preferred whenever and wherever possible. Post operatively, all patients were transferred on dedicated sterilized trolleys by personnel wearing PPE and these trolleys were sterilized with hypochlorite solution after every patient transfer.<sup>25</sup> Only one patient attendant was allowed in the wards till the time the patient was admitted. This attendant underwent a thermal temperature screening every time they entered the ward. In the wards a minimum distance of 1 m was maintained within beds, according to the present guidelines.<sup>27</sup>

Post-operative COVID19 testing was included in the basic fever workup for any patient who developed fever, even if there was a known cause like an SSI. All residents and consultants were briefed about COVID19 symptoms and how it could affect the post-operative course of patients, especially cytokine storm induced ARDS and MODS.<sup>28</sup> All residents were advised to shift any patient developing fever or respiratory symptoms into isolation and order COVID19 testing. There was stringent temperature monitoring of all patients admitted in the ward, to clinch COVID before it is fulminant. 16 (1.8%) patients who developed fever in the post-operative period, were all tested for COVID19. 7/16 were open fractures. None of them turned out to be positive. All had inflammatory changes or discharge from their wound sites. 3 had to undergo debridement whereas all others were managed successfully on antibiotics. On follow-up contacting, 36 patients complained of discharge from wound sites. This hints at the need of regular follow-up or wound inspection, especially for open fractures.

Absorbable sutures, early weight bearing and early discharge were *sin-qua-non* for all patients to reduce the number of revisits. Patient attendants were thoroughly counselled in person or over tele consult about physiotherapy guidelines.<sup>29</sup> Still, 344 patients had complaints ranging from pain in joints to stiffness of the affected or the surrounding joints. This emphasizes the need to have streamlined protocols for in-person follow-ups for operated patients with adequate social distancing measures. For follow up initially we tried to maintain a complete teleconsultation version, but patients needing cast change, complication of surgery or inability to follow basic guidelines of partial weight bearing walking needed to be seen in person. Only 374, of our patients had come for follow-ups, due to concerns related to the virus. Over the past few months, we have evolved our follow up services to call a fixed number of patients, by appointment on a fixed day in fixed time slots with all adequate social distancing measures. Patients who had felt unsatisfied with tele-visits were relieved in meeting the doctor in person which helped some of them recover faster. We feel this mixed model of teleconsultation and fixed appointments of a limited number of socially distanced patients is the way forward.<sup>30</sup> We feel, this is the way forward in the new normal world post coronavirus. Elective orthopedic cases cannot be neglected continuously, plagued by the fear of another wave. With the rising numbers of people with Knee and Hip arthritis, who have poor quality of life, this section of the population needs to be taken care of.<sup>31</sup> Furthermore, a sedentary lifestyle will add on to their other comorbid conditions like obesity, diabetes and hypertension and make them more susceptible to COVID 19. The freezing of elective cases is having a financial toll on corporate hospitals and doctors and making their survival difficult.<sup>32,33</sup> In a study from Taiwan, investigating the impact of SARS-CoV on hospital performance, it was found that outpatient visits in the year SARS emerged and in subsequent 2 years was 55%, 82% and 84%, emphasizing on the long

time it takes to brings numbers to normal.<sup>34</sup> Another study by Meena et al. has focused on the need to continue some essential arthroplasty services and have shown in detail the protocol that they have used in their hospital to successfully operate 147 arthroplasty cases.<sup>35</sup>

Reinstating elective surgeries with adequate precautions is the need of the hour. This would allow the mounting load of patients in need of urgent orthopedic intervention to have an improved life-style. Our series of trauma patients proves that this can be done without risking spread of this virus, which is bound to stay here for at least the next few months or maybe years. The reinstating of shoulder, knee and ankle arthroscopies (and other orthopedic procedures requiring 23 h of hospital stay) in Singapore is a recent example of the same.<sup>36</sup>

This study is retrospective in nature and presents data regarding trauma surgeries. Extrapolating this data to elective surgeries is not the best practice. But the large data set from our centre presents a unique insight into the ongoing trauma services throughout the pandemic, when most of the trauma centres had come to a halt. This gives a real time picture about management as well as successful surgeries of high load of trauma patients. Thus we feel, the measures described above, and followed at our centre, are tried and can be applied to elective surgeries safely.

## 5. Conclusion

Stringent pre-operative testing, adequate PPE, strict intra and post-operative protocols and novel ways of patient follow up, are ways of continuing adequate surgical care for patients as we recover from this pandemic. The new normal demands a modified plan to tackle this contagion. The above study helps to establishes that by following a strict protocol, we can successfully initiate elective surgeries and expect fair to good results, although the patients and the doctors need to thoroughly understand the increased risk that they face.

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