

Challenges and Difficulties faced by Orthopedic Surgeons during the COVID-19 Pandemic: A Review of Modified Surgical Protocols

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Abstract

Introduction: Since the major outbreak of COVID-19 in March 2020, all hospitals and surgeons opted to postpone elective scheduled surgeries for personal and patient safety

Aim of this study: In this study of 45 consecutive patients, we changed the surgical protocols during this pandemic, our study highlights difficulties faced and how they were tackled.

Materials and Methods: 45 patients were included in this study operated by a single Senior Surgeon at a tertiary centre and their results were compared to similar surgeries performed in the pre-Covid era, in terms of length of hospital stay, duration of surgery, complications/mortality post operatively and overall risk of infection to the patients and hospital staff.

Results: It was found that the, mortality and morbidity in both times were same in Covid-19 negative patients, overall time taken for the surgery was increased, the hospital stay was increased, usage of resources was increased, difficulties faced were not only by the patients but also the health workers.

Keywords: COVID-19, protocols, donning in, doffing off, operation time, aerosol,

Introduction

Since the outbreak of COVID-19 (SARS-Cov-2) in March 2020, all hospitals and surgeons opted to postpone or cancel elective scheduled surgeries. Due to this pandemic there is an acute shortage of health care workers in surgical fields as Hospitals were focused towards the care of COVID-19 patients, resulting in many Orthopedic surgeons being deployed to perform COVID duties^{1,2}.

There are approximately 20,000 orthopaedic surgeons available to cater to a population of approximately 1.25 billion, i.e. one surgeon for every 62,500

people.² The infrastructure (including intensive care) for critically ill patients and routine Orthopedic patients requiring surgery were at a stretch, most of the time.^{3,4}

Due to the lockdown, the incidence of road traffic accidents had significantly reduced, however domestic falls and other causes of injury were reasons for Orthopedic procedures.

As our institutes focus shifted towards the treatment of COVID-19 patients, all orthopedic outdoor clinics were stopped and all the patients were largely attended to in the emergency department. Initially there were no known protocol to receive such patients, at the onset even a single positive patient would put the entire hospital, ward staff and OT personnel at risk. A compulsory quarantine of 14 days would result in further shortage of health

care workers.^{5,6}

Availability of N-95 masks and PPE kits were also scarce. Designated areas had to be figured out for donning in and doffing out of the operation theatre. Daily changes and adjustments to protocols had to be addressed to and managed at every step. COVID swabs of all the patients were done and only after the report was negative, further pre-op work-up was done. The patients who tested positive were shifted to a COVID hospital.

The aim of this study was, to put forward the protocols that were followed for patients taken up for surgery in the Operation theatre, and to put forward the various challenges that one faces in their regular practice and dealing with them.

Material and methods

Our study included 45 trauma patients, operated between 20th March 2020 to 25th July 2020. All surgeries were

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Figure 1: a) 84 years female with left side supracondylar fracture- planned for conservative management, b) one week post-slab pus discharge lateral aspect, c) check xray showing sinus tract with marker, d) introperative wound debridement, e) final fixation

amputation and 1 Patella fracture. Prior to admission, a fixed set of questionnaires were answered by each patient.

In the clinical History: 1) Any symptoms- cough, fever, breathlessness 2) Single symptoms as anosmia, loss of taste, diarrhoea 3) Any travel history 4) Any contact history with a SARS-Cov-2 patient 5) Any family member is working in essential services 6) Whether patient comes from a highly infected/populated area.

All patients preoperatively underwent COVID-19 swab testing (nasal and throat). Patient was kept in an isolation ward awaiting the report. The minimum waiting period was 24 hrs. A change in the protocol of doing a pre-discharge COVID-19 test was made from 15th April. This was done to keep a track of the false negatives and to rule out possible hospital acquired infection.

Results and outcomes

Except for one patient aged 25 years and 5 patients aged 50+ years, all patients were of the age group between 65 – 89 years. The average age being 65 years in

performed by a single surgeon at a tertiary institute. The results were noted and randomly compared to the similar type of surgeries performed by the same primary surgeon in the same hospital prior to 20th March 2020.

We operated 12 patients of Intertrochanteric/Subtrochanteric Femur fracture, 8 patients with Neck of Femur fracture (a total hip arthroplasty was done), 4 Ankle

Bimalleolar/Trimalleolar fractures for which ORIF with plating was done, 4 Distal Humerus fracture for which ORIF with Plating was done, 5 Femur Shaft fractures fixed with intramedullary nailing/plating, 4 Tibia Shaft fractures were fixed with Expert Tibial Nails, 1 Acetabular Bi columnar plating, 1 Broken implant was removed, 1 radial head reconstruction, 3 humerus shaft fractures fixed with nailing, 1 above knee

Table 1: Age, length of stay and operating time		
	COVID-19 TIMES	NORMAL TIMES
AGE (average years)	65 years	61 years
Admission to Surgery (average days)	2.0 days	0.9 days
Admission to Discharge (average days)	6.5 days	4.7 days
Time of Surgery	3:09 hrs	2:37 hrs

Table 2: Surgical timing comparison of every particular surgery		
Surgical Procedure / Time	COVID-19 TIMES	NORMAL TIMES
PFNA2 for IT fracture	2:22 hrs	2:10 hrs
THR for NOF fracture	2:59 hrs	2:38 hrs
Ankle Bimalleolar/Trimalleolar fracture	2:55 hrs	2:35 hrs
Elbow Distal Humerus fracture	4:10 hrs	3:00 hrs
Femur fracture Plating/nailing	3:01 hrs	2:35 hrs
Tibia fracture nailing	2:50 hrs	2:25 hrs
Other trauma	2:43 hrs	2:29 hrs

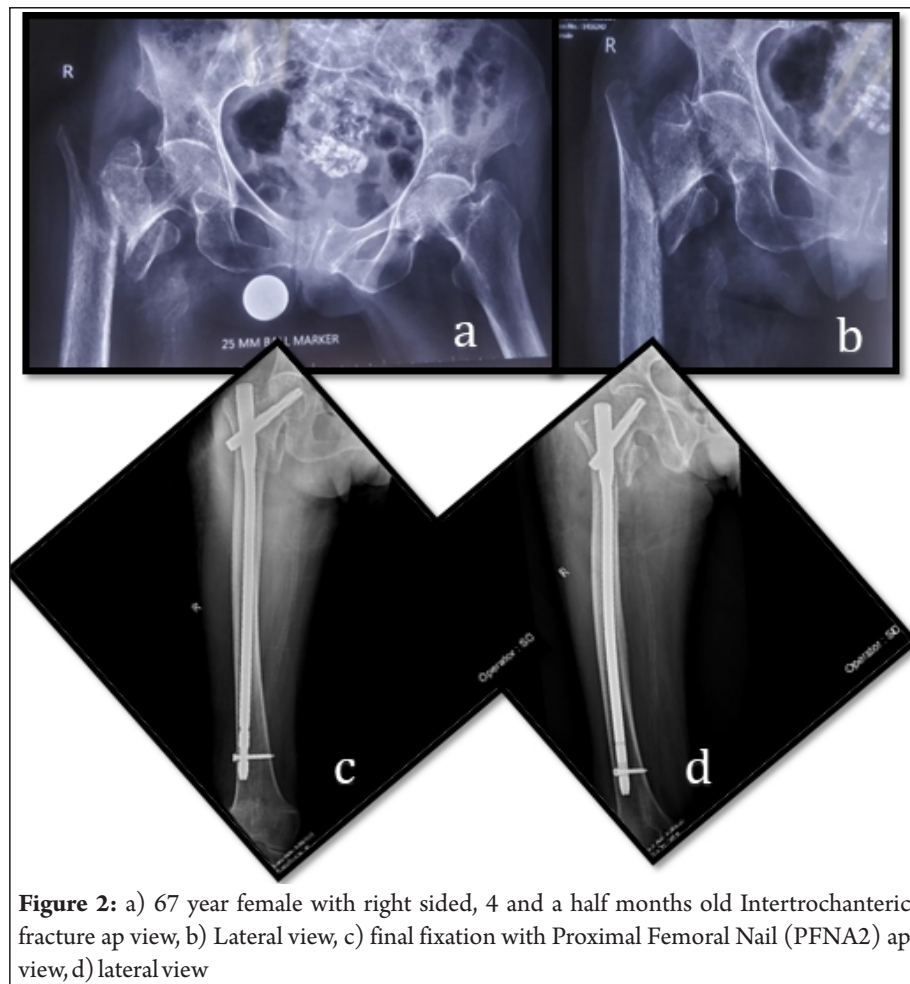


Figure 2: a) 67 year female with right sided, 4 and a half months old Intertrochanteric fracture ap view, b) Lateral view, c) final fixation with Proximal Femoral Nail (PFNA2) ap view, d) lateral view

the COVID period as compared to an average of 61 years prior to national lockdown. As the nationwide lockdown had restricted the road movement of people, most of the patients were elderly with a history of domestic fall at home/bathroom etc.

Time taken from the day the patient is admitted till he/she is taken for surgery had increased from less than a day in the pre-Covid days to an average of 2 days during the Covid period. The swabs for COVID-19 were sent for processing only the next day early morning, and so there was a delay of 24hrs for the report to come. Further testing like 2D-echo, chest X-ray, physician, cardiology and other fitness were done post the COVID report which increased the overall pre-operative stay.

Pre-operative counselling and explanation to the patient with respect to the delay due to COVID-19 RT-PCR testing, the morbidity and risk to surgery

due to it was the biggest challenge. Delay in the pre-op work up, change in the COVID-19 testing lab, arranging for implants during the lockdown, each challenge had to be tackled separately.

The average time taken from admission to discharge also had increased from an average of 4.7 days to 6.5 days in the COVID-19 times. There was an increase in the number of days of stay by the patient in the hospital, increasing in the overall usage of hospital resources hence an overall increase in expense to the patient.

The overall surgical timing had also increased from 2hr 37min during the normal days to 3hrs 9min in the COVID-19 pandemic days. The extra time taken by the anaesthetist for induction and extubation, also donning in and donning off of the surgeon, subcuticular suturing (to avoid exposure to operating team for an additional suture removal) all contribute to this.

During the course of these 2 and a half months, 2 members of our junior medical staff were quarantined due to suspected exposure and symptoms and were later found to be COVID-19 negative. But during this period, the senior medical staff was working with a skeletal team.

On our pre-operative screening, two asymptomatic patients tested COVID-19 positive and were shifted to an appropriate COVID centre for further management.

The treatment of majority upper limb fractures was conservative, the challenges faced were few and listed below including lower limb fractures: An 84 years female patient with Dementia and restlessness had left side supracondylar humerus (Figure.1) fracture which was decided to be managed conservatively with a splint. On a regular day, surgical option would have been suggested. After about a week the patient returned with severe itching and agitation. On examination, a pus discharging sinus wound over the lateral aspect was found. Due to this delay, the surgery was even tougher and longer as compared to fixing a fresh fracture.

Another 67 years female patient had a right sided Intertrochanteric femur fracture in the month of January-2020. Due to the lockdown she presented late (Figure.2). As her morbidity was increasing and on the X-ray there was no signs of union even after 4.5 months, the fracture was fixed with a proximal femoral nail A2 (PFNA2) (Figure.2).

Mortalities in two of our post-operative patients, neither of which were related to COVID-19 infection 77 years male patient with Left femur periprosthetic fracture with Recurrent Ca-tonsils and metastasis, Hypertension. On preop evaluation was COVID-19 negative underwent open reduction and internal fixation with long femoral locking plate + cerclage wires. Post op non weight bearing with walker mobilisation was done and was vitally stable at the time of discharge. Post-op COVID-19 test was

also negative. Patient was brought to casualty 2 days post discharge with h/o sudden onset breathlessness and passed away due to pulmonary embolism. Another 77 years male patient with Left Neck of Femur fracture with chronic cough since a year and dementia, underwent Left side total hip replacement with a DUAL Mobility Implant. Post-operative he was sent to the ICU and developed septic shock due to LRTI and passed away due to cardiorespiratory arrest. In both the above patients a possibility of a false negative Covid-19 test cannot be ruled out.

There have been other patients with even severe co-morbidities who have made it through the surgery and hospital stay. A few highlights in the comparison between the surgeries performed during the COVID pandemic and prior to the pandemic are mentioned here

Discussion

This study was compared to the recently published article in the JBJS and their findings were comparable in terms of operative time, pre-operative testing, donning and doffing, outdoor clinic etc.⁷ It was a questionnaire by the International Consensus group (ICM) and the American Associations of Hip and Knee Surgeons.

The mortality and morbidity in the pre-covid era and in the Covid period were comparable and similar when the patients were tested negative for COVID-19. But as the studies showed the in a COVID-19 positive patient the mortality in 20-30% higher and so 3 surgeries were postponed till the patient became COVID-19 RT-PCR negative and was then taken up for surgery.^{9,10}

We followed strict operating theatre protocols and a few listed by Ricardo Rodrigues et al summarised below^{11,12} and has worked for us. Similar procedures were seen being used in other articles as well.^{7,8}

A dedicated DONNING area in the OT complex : Changing into the OT Scrubs, Fresh disposable gloves, 1st layer of N95 masks, caps, goggles & shoe cover.

Heading towards the theatre: Emphasis was given to the use of 2-propanol+1-propanol+Mecetronium Ethyl Sulphate (Sterillium) at most of the stages, wearing Lead jackets (use sterillium), disposable plastic gowns over the lead jackets (use sterillium), second layer Hood caps, 3-ply surgical mask, adjust the eye goggles.

Preparing the theatre: Fixing of the fracture table, information board, templating & anaesthetist preparation) was done before the patient is brought in. The patient is brought in with a mask and cap. No personal other than the anaesthetist were allowed in the OT while the patient was being anaesthetised. Spinal Anaesthesia was preferred over a General Anaesthesia for obvious reasons.¹² Sterile disposable scrubs & 2 sterile gloves were the final layer of protection.

Dedicated DOFFING area in the OT complex: Once the surgery is done, the surgeon descends. remove the second layer gloves now (use sterillium), remove the disposable scrub gown (use sterillium), remove plastic gown (use sterillium), remove lead jacket (use sterillium), remove the second layer mask, second layer caps, remove the shoe covers (use sterillium), remove the first layer gloves, wear disposable gloves & head to the changing room. During extubation no personal were allowed to remain in the OT.

Intraoperative Modifications in Techniques: Because of the concerns of aerosols, many modifications in our surgical steps were undertaken from time to time, of which a few are mentioned here.^{2,13,14} Use of diathermy was widely reduced unless necessary for haemostasis. No usage of pulse lavage. In a total hip replacement: - the acetabulum

and the femoral stem are first templated and a rough estimate size is established. Acetabulum reaming: For example, we have templated the acetabulum cup to 54. After delivering the head, we measure the head size – say 48, and start reaming with this size first for the outer table and the templated 54 size reaming is done for the inner table and then fix the cup. Sequential size reaming is avoided, hence reducing the risk of aerosol formation. Femur shaft rasping: Similar steps are followed during the rasping of the femoral shaft for the femoral stem. In a long bone nailing procedure and PFNA2, sequential reaming was deferred. Just the starter no 8.5 and then directly 1.5mm larger than the desired nail diameter was done. At the time of closure, subcuticular absorbable sutures were used for all patients, so that they could be seen directly after a month.

Conclusion

Elective patients, emergency patients, their relatives all are prone to have asymptomatic COVID-19 infections. In this situation of the pandemic, a fixed protocol and adaptation to new protocols should be incorporated and vigilantly looked upon. The overall usage of hospital resources, OT resources have significantly increased.

The mortality and morbidity in a COVID-19 negative patient is not much different in the two groups, but in a Covid-19 positive patient is seen to be 20-30% higher. Hence, we suggest preop and pre discharge COVID-19 screening test to be doubly sure keeping in mind the false negative reports, also use of double masks, caps, gowns and gloves as a routine in the OT. "Keeping in mind our new set of protocols, each patient was given adequate care and excellent treatment, keeping the fear of COVID-19 infection and its untoward outcomes in mind."

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