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Dr. Ashish Chopra
Senior Resident, Department of
Orthopaedics, Esi hospital,
Okhla, New Delhi, India

Dr. Sumit Saini
Head of the Department,
Department of Orthopaedics, Esi
hospital, Okhla, New Delhi,
India

Dr. Shikha Chopra
Senior Resident Pathology,
Department of Pathology, Ddu
hospital, New Delhi, India

Dr. Manas Gupta
Senior Resident, Department of
Orthopaedics, Esi hospital,
Okhla, New Delhi, India

Dr. Robin Jindal
Senior Resident, Department of
Orthopaedics, Esi hospital,
Okhla, New Delhi, India

Corresponding Author:
Dr. Ashish Chopra
Senior Resident, Department of
Orthopaedics, Esi hospital,
Okhla, New Delhi, India

Orthopaedic surgeon in Covid-19 pandemic: Indian scenario

Dr. Ashish Chopra, Dr. Sumit Saini, Dr. Shikha Chopra, Dr. Manas Gupta and Dr. Robin Jindal

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Abstract

COVID-19 pandemic has revolutionized global healthcare in an unprecedented way with unimaginable consequences. SARS-CoV-2 has spread worldwide and WHO declared it a pandemic on March 11th, 2020 [1, 2]. Hospitals have been restructured to provide the best care to COVID-19 patients while adhering to preventive strategies not to increase infection spread. Due to huge burden on healthcare services, COVID-19 has even affected specialities that are indirectly related to its clinical effects such as orthopaedic surgery. Healthcare providers have been recruited in COVID-19 management despite their original specialty. Indications for elective treatments have been reprioritized. Outpatient department protocols have been restructured to reduce contacts between patients and the hospital staff. Orthopaedic patient management has also been significantly affected by the pandemic. In this review, our aim is to analyze how Indian orthopaedic practice has been affected by COVID-19 pandemic crisis. Attention has been given to enlist surgical indication, perioperative care and safe management of both inpatients and outpatients.

Keywords: COVID-19, outpatient care, inpatient management, surgical indication, elective surgery

Introduction

In December 2019, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) broke out in Wuhan, China [3] & within small period of time most severe outbreaks were recognized in USA, India, Brazil, Russia & France. At the time of writing this article, until on November 30, 2020 the World Health Organization (WHO) declared the coronavirus disease 2019 (COVID-19) a global pandemic, with > 60,000,000 cases [4] and almost all countries infected with approximately 1,453,355 deaths⁴. To deal the covid 19 crisis effectively, restructuring of healthcare services have been done. With a massive burden on healthcare, COVID-19 has heavily affected all aspects of the medicine including specialities that are indirectly related to its clinical effects such as orthopaedic surgery. Most elective surgeries have been deferred. However, conditions such as severe trauma, musculoskeletal tumors and infections need to be attended on urgent basis. The risk of infection transmission during the surgical procedure is reasonably high [5] and therefore, orthopaedic practice needs to be reshaped on priority. The main aim should be to triage the patients as in a mass casualty scenario for maximum benefit. In this review, our aim is to analyze the effect of COVID-19 pandemic on orthopaedic surgery outlining the relevant surgical indications, outpatient follow ups, inpatient care protocols, physical therapy, containment and early discharge strategies.

SARS-CoV-2 transmission and protective measures

The major route of SARS-CoV-2 transmission is through respiratory droplets and contact with contaminated surfaces [6]. Respiratory secretions generated during aerosol-generating procedures (AGPs: non-invasive ventilation, cardiopulmonary resuscitation) may produce highly virulent airborne particles [7]. Primary source of infection are symptomatic patients but we can't ignore asymptomatic subjects which may also spread the infection [8]. Therefore, maintaining an interpersonal distance ≥ 1 m is essential [9]. SARS-CoV-2 may persist up to 3 hr in aerosols, 24 hr on cardboard and 2–3 days on plastic [10]. Therefore, aeration of closed environments, use of PPE, frequent hand hygiene and surface decontamination are mandatory. According to the WHO, all patients should wear a medical mask in public areas & standard

precautions should be followed [7]. Surgical masks can prevent intraoperative contamination but have not proven to protect from droplet spread in laboratory conditions [10]. However, the use of surgical masks has demonstrated to reduce the risk of influenza [11] and SARS-CoV [12] transmission, probably by arresting the diffusion of larger droplets. In a report from Ng K *et al*, 85% of the providers in close contact with a COVID-19 patient was wearing a surgical mask and none was infected [13]. A recent metanalysis, although with low evidence showed that surgical masks and N95 respirators may provide a similar protection against viral respiratory infections during non-AGPs [14]. Respirators are classified upon the percentage of filtered particles ≥ 300 nm defining protection against droplets and aerosols. Respirators are distinguished in filtering facepiece-1 (FFP1), FFP2 and FFP3 when filtering capacity is $\geq 80\%$, $\geq 94\%$ and $\geq 99\%$, respectively. Centers for Disease Control and Prevention (CDC) defines filter efficiency indicating the percentage of filtered particles in the device nomenclature (i.e. a N95 mask filters 95% of ≥ 300 nm particles) [10]. WHO recommends that all healthcare workers should wear a respirator (\geq FFP2/N95) when performing AGP while in other situations wearing a surgical mask is reasonably safe in treating COVID-19 patients, especially in case of respirator scarcity [15, 16].

Outpatient care guidelines

During the pandemic, face-to-face visits should be limited to urgent cases and post-operative care which include wound check, suture removal, evaluation of fracture reduction, highly symptomatic patients suspected for healing-related complications and follow-up visits that might change the case management [17]. All patients should wear a face mask and undergo temperature check. In case of flu-like symptoms or exposure to confirmed or suspected cases, patients should be redirected to the emergency department for further evaluation [18]. Except for non-ambulatory and disabled patients, attendants should not be allowed. All providers should perform frequent and accurate hand hygiene, adopt droplet precautions and wear appropriate PPE (a disposable gown, non-sterile gloves, a face shield or goggles, a FFP2/N95 respirator or a surgical mask if unavailable) [18]. In all cases not needing urgent face-to-face visits, telemedicine may be employed as a useful adjunct to minimize the spread of COVID-19 while ensuring continuous care [19]. Burden on radiological services can be reduced by careful assessment of the patient by the Orthopaedic team. Use of CT scan should be judicious as this is the investigation of choice for coronavirus pneumonitis. To reduce follow-up, removable splints & casts can be used. Routine follow ups must be avoided & follow-up imaging should only be performed when necessary.

Management of specific injuries-Indian Orthopaedic association guidelines [20]

- Closed reduction of joint dislocations should be done in the emergency department wherever possible & if post reduction joint is stable, patient should discharged with appropriate follow up.
- Most upper limb fractures (clavicle, humeral and wrist fractures) have high rates of union with conservative management and may be managed non-operatively, keeping the possibility that some patients may require late surgical management.
- Knee ligament injuries may be managed with bracing in

preference to early ligament reconstruction.

- Penetrating injuries or stab wounds to limbs which are clean with no neuro-vascular deficit may be sutured in the casualty.
- Abscesses in patients without systemic sepsis may be incised and drained under local anaesthetic in the emergency department.

Inpatient management Indian orthopaedic association guidelines [20] & Surgical indication during covid 19

Clear guidelines have been issued by Indian orthopaedic association for inpatient management during covid 19 with salient features as highlighted below –

- Patients with multiple injuries, pelvic & acetabular fractures with major haemorrhage, open fractures, compartment syndrome require emergent resuscitation and management.
- Alternative techniques for patients who require soft tissue reconstruction to avoid multiple surgeries or the need for critical care input.
- Consider early amputation in patients for whom limb salvage has an uncertain outcome and is likely to require multiple operations and a prolonged inpatient stay.
- Surgeons may need to base decisions about vascular injuries on clinical assessment alone if imaging is not readily available.
- Hip and femoral fractures should remain an urgent surgical priority. Hemiarthroplasty rather than total hip replacement can be offered in order to facilitate early surgery.
- Complex fractures should have planned surgery to minimise duration of stay. If a staged approach is used, aim to discharge and readmit the patient if possible.
- Consider day-care treatment of simple peri-articular fractures and foot & ankle injuries.
- Patients with upper limb fractures that require surgery (e.g. forearm fractures) should be managed as day cases.
- Wrist fractures may be treated with removable casts or splints to reduce unnecessary follow-up.
- Use absorbable sutures and warn patients of the small risk of a mild inflammatory reaction to the sutures.
- Consider non-operative management and bracing of patients with spinal fractures
- Non-union of upper limb fractures may be managed in a delayed fashion. Non-union of lower limb fractures with failed implants or increasing deformity and a significant impact on daily function may require relatively urgent treatment.
- Cauda equina syndrome with impending neurological deficit requires emergency treatment.
- Septic arthritis, prosthetic joint infection, infected fractures and features of systemic sepsis require emergency treatment. Those who are not septic may be managed as out-patients in appropriate clinics. Suppression therapy should be considered.
- Most paediatric fractures can be managed conservatively minimum interventions.
- All the major elective Orthopaedic and Spinal surgery should be deferred

According to the guidelines proposed by the American Academy of Orthopaedic Surgeons (AAOS) [21, 22] and the American College of Surgeons (ACS) [23], elective surgeries should be judiciously postponed considering the local prevalence of COVID-19 and availability of resources (PPE,

ICU beds, respirators and personnel). The Ohio Hospital Association (OHA) defines elective surgeries which do not meet the following criteria “threat to the patient’s life if surgery or procedure is not performed, threat of permanent dysfunction of an extremity or an organ system, risk of metastasis or progression of staging, or risk of rapidly worsening to severe symptoms” [24, 25]. Patients with stable diseases (low or moderate risk of clinical deterioration) can be postponed, while patients with unstable disease (risk of short-term clinical deterioration) should be considered for surgery with precautions [26]. Fractures in the elderly population, especially at the lower limbs, are associated with increased susceptibility to pulmonary infections with increased risk of mortality. Mi *et al.* reported increased clinical severity and mortality after open reduction and internal fixation surgery of fractures in a retrospective study of 10 patients affected by COVID-19, Hence, conservative treatment for fractures in the elderly should be considered as first choice when appropriate [27].

Preoperative assessment should include COVID-19 risk profile and history of exposure [21]. Same-day admission should be encouraged to decrease risk of nosocomial infection. Patients should be contacted the day before surgery and investigated for COVID-19 risk factors [18]. Upon arrival,

temperature should be checked and a surgical mask provided to all patients [28]. All patients undergoing elective surgery should be preoperatively tested for COVID-19 [7]. In emergency cases the test should be readily performed [29]. An upper respiratory specimen obtained with a nasopharyngeal swab is required for covid19 testing. All asymptomatic patients undergoing surgical / non-surgical invasive procedures should be tested by RT-PCR & they should not be tested more than once a week during hospital stay). However, no emergency procedure should be delayed due to lack of testing [30].

Operative room setting and intraoperative precautions

Suspected or confirmed COVID-19 cases should be treated in a dedicated area [31]. Operative personnel should be reduced to the minimum and unnecessary movement in and out the operation theatre should be discouraged. Surgery should be performed in negative-pressure to avoid the dissemination of the virus outside. However, to reduce the risk of surgical contamination operation theatres are usually equipped with positive-pressure systems. Therefore, conversion to negative pressure require additional arrangements. If negative pressure cannot be obtained, positive pressure should be turned off and a portable high-efficiency particulate air.



Fig 1: Decisional algorithm for guiding surgical indication during the COVID-19 pandemic. IOA- Indian orthopaedic association ASA: American Society of Anesthesiologists; HT: hypertension; DM: diabetes mellitus; COPD: chronic obstructive pulmonary disease; CHD: cardiac ischemic disease

(HEPA) filtration system with frequent air changes should be used [32]. Rodrigues-Pinto *et al.* proposed a workflow to operate in COVID-19-dedicated operation theatre identifying 5 main areas [32].

1. **Entry dressing room:** Here essential PPE is donned [33]. Hand hygiene should be performed before proceeding.
2. **Anteroom:** Here patient positioning is done before hand scrubbing. When indicated, prone positioning is preferable to reduce viral transmission through respiratory droplets [34]. Unlike powered-air purifying respirators, surgical helmets mainly serve as liquid barriers and are not provided with HEPA filters [35]. All surgical personnel not needed should remain outside
3. **Operation theatre:** The most appropriate surgical approach to reduce operative time should be considered. Although electrosurgical and high-speed devices (e.g. saw, drill) utilized during orthopaedic surgery are known to generate aerosols [36], limited data is currently available regarding the risk of virus spread. Suction devices should always be employed to reduce surgical smoke and aerosols generated during motorized procedures [37].
4. **Exit room:** Before leaving the OR, the surgeon should remove sterile gown and gloves and perform an accurate hand hygiene.
5. **Exit dressing room:** Surgeons can change and exit the operative complex.

Postoperative care and inpatient management

After surgery, suspected or COVID-19+ patients should be transferred to an isolation room. In case of a negative test, patients may be routinely treated with standard precautions [7]. Utilizing long-lasting wound dressings may reduce the need for repeated visits. Massey *et al.* proposed to position monitors and machines for intravenous drug administration outside patient rooms, so as to manage vital parameters, fluids and medications without the need to touch the patients [29]. Visiting hours should be restricted. An early discharge strategy should be adopted whenever appropriate [28]. Following orthopaedic surgery, early physical therapy is required for joint mobility & function. However, due to close contact with patients physical therapists are at a particular risk. Therefore, it is recommended to suspend physical therapy except for trauma and post-operative immobilization. Telerehabilitation should be encouraged for all non-essential treatments.

Conclusion

Covid 19 pandemic is dynamically evolving thus needing careful monitoring. Surgical indication should be in accordance with both facility requirements and regulations from the authorities. Redeployment in COVID-19 units may be necessary. Safety of all health care providers must be guaranteed. The fight against a common evil is bringing the scientific community together with efforts never seen before.

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