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Approach to dealing with orthopedic trauma patients at semi-urban centers during COVID-19 pandemic: An insight from a developing country

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Abstract:

Coronavirus disease 2019 (COVID-19) has wreaked havoc on global health care. Although tertiary care hospitals and major trauma centers in developing countries are well equipped to render trauma care safely, this is not the case in district or nonmetropolitan small centers. Herein, we intend to outline the problems currently being faced by these small peripheral centers and their carefully crafted strategy in managing trauma victims. We also proposed some recommendations that are hoped to boost the endeavor to work in a sound and effective milieu.

Keywords:

Coronavirus disease 2019, developing country, orthopedic, pandemic, trauma management

Introduction

Health care is under tremendous pressure during the present coronavirus disease 2019 (COVID-19) pandemic. Various nonemergency subspecialty works have been put on hold; elective orthopedic cases have been suspended across most centers.^[1] Although any definite consensus and guidelines are not yet clear, there is general agreement to operate upon only life- or limb-threatening emergency cases and also for time-sensitive cases where undue delay is believed to gravely compromise patient's functionality and wellbeing, till the time effective COVID testing and screening can be done in timely fashion.

Although premier institutions and major trauma centers in our country with modern infrastructure are able to upgrade their setup during this crisis with additional state-of-the-art equipments, the peripheral

health centers which are still working with the existing infrastructure that may not be well equipped to handle such unprecedented crisis. This article intends to focus on the work culture adopted by these nonmetropolitan urban health facilities amidst this pandemic to manage orthopedic trauma patients. There are no concrete data hitherto to prove or disprove the effectiveness of the measures taken so far. Till more evidences emerge, we believe that this piece will provide some useful insights from hinterlands of a developing country, which may be beneficial for everyone facing the same problems in the different parts of the world.

Gravity of Problems in Peripheral District or Nonmetropolitan Center

The health-care facilities worldwide stand on a tiered approach, while tertiary care facilities and major trauma centers usually deal with referral and complex trauma

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cases, most of the population, is dependent on peripheral health centers such as, community health centers, district hospitals, and nonmetropolitan medical colleges.^[2] These peripheral centers usually have many shortfalls in several fronts, like:

1. Shortage of workforce, nursing staff and even sanitary personnel; many centres have only a handful of orthopedic surgeons working round the clock
2. Standard infrastructure; proper ventilation in ward and operation theater (OT) might be an issue along with availability of laminar airflow, healthy ventilation and air-conditioning system or high-efficiency particulate air filter (HEPA) system
3. Acute shortage of personal protective equipments (PPEs); scarcity of N-95 respirator and even routine surgical masks is a reality. Powered air-purifying respirator are evidently beyond reach at peripheral centers
4. Scarcity of intensive care unit beds, ventilators, and multidisciplinary specialists
5. Nonavailability of advanced imaging facility such as computed tomography and/or magnetic resonance imaging scan at most centers
6. Scarcity of blood products, since blood donation has seen a major decline amidst this pandemic
7. Last but not the least, arranging orthopedic implant is becoming a major hurdle due to breakdown of supply chain, coupled with reluctance of people visiting hospital premises out of fear.

Herein, there are some measures and emergency response strategies, which are being practiced in general for efficient delivery of orthopedic trauma care by these peripheral centres amidst this global pandemic. The main thrust of all the measures in orthopedic trauma is to reduce the risks involved for the health-care providers and also the patients during their stay in the hospital.

Rational use of personal protective equipments

Risk stratification of the health-care providers is a must for the proper usage and provisions of PPE in resource constrained areas as per the various guidelines.^[3,4] For operation theater personnel, irrespective of COVID status (known or unknown) of patient, triple-layer medical mask or N-95 respirator, impervious gown, long boots with impervious shoe cover, goggles or face shield with waterproof apron or mackintosh, double gloves are being used. Reuse of scarce N-95 respirator (for maximum five times over a period of 20 days) is also being done as per the stipulated CDC guidelines.^[5]

Judicious selection of cases

There is a general trend of adopting conservative strategy of management as far as possible whenever the fracture pattern and condition of the patient dictate. Only patients who constitute absolute emergency and/or when

surgical treatment could be rendered in a time-bound manner are getting admitted. After initial few days of deliberations, a consensus was arrived at for the common orthopedic trauma situations faced, and guidelines put in place for the immediate and semi urgent indications of surgery which are enumerated in Table 1.

Emergency room management

All emergency room personnel are taking due personal protection as per risk stratification; triple-layer medical mask, face shield and pair of examination gloves constituting the bare minimum for areas as in emergency room, ward, doctor chamber, and radiodiagnosis facility.^[4] In some centers, portable radiology setup has been deployed in emergency rooms. All patients entering emergency are being provided with a surgical mask or homemade multi-layer cloth masks, as per the availability; their saturation is checked with a pulse oximeter to detect hypoxics (special finding of COVID-19). A separate reception desk has been designated to triage patients and segregate those who are having additional fever, flu symptoms or respiratory illness – these patients are being evaluated in a separate room, and should they satisfy criteria of COVID testing, then proper samples are being taken from emergency room itself and relevant authority are being notified. They are, irrespective of being treated conservatively or needing surgical management, being admitted in isolation facilities at designated COVID blocks of hospitals; in case a particular hospital does not have any COVID block, then they are being transferred to the nearest COVID hospital after adequate stabilization. Other patients, who are surgical candidates, are being admitted in orthopedic ward, provided the proper surgical care can safely be extended at that center and required expertise is available. Patients who are adjudged to be managed conservatively are being discharged from the emergency room with proper instruction and contact details for further follow-up.

Ward management

Physical distancing is being ensured by keeping at least 1 m distance between beds and adequate air circulation and ventilation (natural with or without mechanical exhaust fans) are being ensured as much as possible. Nursing counter, doctor's duty room, and ward are being sanitized by spraying disinfectants (with freshly prepared 1% sodium hypochlorite solution) daily, whereas high-touch surfaces (bed railings, doorknobs, light switches, etc.) are being disinfected at frequent intervals (preferably every 3–4 hourly).^[6] Strict vigilance is being instituted for regular monitoring of the body temperature and detection of respiratory symptoms of admitted patients. Patients needing traction are being put on skin traction preferably, whenever feasible, rather than skeletal traction to limit close contact with patients.

Table 1: Indications for surgery during coronavirus disease pandemic

Absolute indication	Relative indication
Open fractures	Fractures of proximal femur
Crush injuries	Displaced diaphyseal and intra-articular fractures
Compartment syndrome	Pelvic-acetabular fractures
Fractures with neurovascular compromise	And displaced upper or lower limb fractures where avoidance of operation would predictably lead to severe malformation and disability
Irreducible fracture dislocations	
Unstable spinal fractures with progressive neurologic deterioration	
Hemodynamically unstable pelvic ring injuries	
Injuries requiring amputation	
Periarticular fractures with significant soft-tissue compromise etc.	

It has been made mandatory to put on a mask for every patient, if his/her condition allows. Since surgical masks are also seeing acute shortage in peripheral centers, patients and their relatives are being advised to use homemade masks which should have multi-layer fabrics; they can be fashioned from any homemade cloth such as handkerchiefs or cotton T-shirts or any similar material.^[7]

Patient counseling and consent

Surgeons are actively considering patients' general condition, and comorbidities, since it has been demonstrated that surgical intervention in the presence of COVID-positive status is associated with higher morbidity and mortality, even when the patient is in incubation period.^[8,9] Patient counseling has become an integral part of management like never before; they are being apprised about potential risk-benefit ratio to balance benefit of surgery and its potential implication on patients, added risk to health-care personnel and risk to public safety in general.

Similarly, for a confirmed COVID-19-positive patient, surgery is being postponed until attainment of COVID-negative status and/or resolution of acute status of infection, if it is feasible.

Coronavirus disease testing strategy of preoperative patients

Since the testing kits for this disease is becoming scarce and there is lot of variations in the indications for testing, a pragmatic rationale for COVID-19 testing needs to be followed specially in smaller health centers. Reverse transcription-polymerase chain reaction test should be done for all preoperative patients if time and logistics allows the same. Since false-negative rate can be over 30% in this test as well, all safety precautions should be taken for every patient undergoing any surgical procedures.^[10] Till the time, there is abundant supply of newer, reliable, and faster test kits which can provide the results within a short time duration, such measures need to be adopted by all surgical specialties.

Perioperative strategy

At par with global standards, assigning separate OT with separate entry and exit points, and separate rooms

for donning and doffing of PPEs are not feasible at most of the smaller peripheral health centers; creating overnight laminar airflow with negative-pressure ventilation or equipping HEPA filtration system also seems far-fetched. Such measures lack practicality for a developing nation which is reeling under acute need for standard infrastructure and resources like never before. It is being stressed to take full precautions, isolation, physical distancing, and use of proper protective gears in OT for every patient being operated upon, even though the patient is COVID negative for the time being; this is especially important for hospitals serving in COVID hotspots. Very often emergency surgeries cannot wait for COVID test results, hence full complement PPEs protection is being undertaken in these circumstances.

OT staff is being kept at minimum with restricted entry and exit during the procedure. Regional anesthesia (local/nerve block/wide wake anesthesia/spinal/epidural) is being employed most often; patients are also being put on nasal catheter oxygen inhalation along with medical masks inside OT. If general anesthesia is required, intubation and extubation are preferably being performed in a separate room other than OT. Customized intubation boxes are readily being indigenously fashioned by anesthetists with easily available cheap materials such as cardboard box, foam, and thick polyethylene plastic [Figure 1]. Surgeons are increasingly taking due cognizance to follow standard recommendations to limit aerosol generation during procedure, such as limited use of power tools (drill, saw, and reamer), use of tourniquet, limited use of cautery, and liberal use of suction to suck fumes and aerosol.^[11,12] OT floor and tables are being disinfected in between two cases. There needs to be adequate time gap or changeover time between the surgical procedures in OT to avoid the accumulation of aerosols and prevent cross contamination. After completing daily scheduled cases, OT disinfection is being done with formaldehyde fumigation or ultraviolet light, whichever is available; OT table, trolleys, table tops, and overhead lights are also being sanitized with proper disinfectants.



Figure 1: Customized intubation box prepared from readily available materials

With the measures of lockdown in various forms being implemented, the volunteer blood donation system has collapsed which can have severe effects in health care. Need for blood transfusion is being critically judged to conserve precarious reserves. Practice of placing closed suction drain is being done away with whenever practically feasible. Postoperative dressing is preferably being done with transparent material to ease in evaluation from distance, and dressing changes are being kept at minimum. Similarly, it is also stressed for preferable use of POP slab or removable brace rather than cast. Patients are being discharged once his/her condition is conducive as early as possible to minimize nosocomial infection risk; every patient is being given contact details for future telephonic consultation.

Follow-up visits are similarly being kept at minimum to avoid hospital visit and overcrowding except when absolutely necessary; OPD room and dressing room facility at non-COVID block have been identified and are following similar procedures as in the emergency department or first contact region. With the recent surge in telehealth, this appears to be an attractive alternative to monitor patients' progress without direct contact. As and when feasible, telephonic verbal conversations, before scheduling OPD visits are increasingly being used to render follow-up and rehabilitation instruction to limit hospital visits.

Cooperative networking and transfer

Number of premier institutions and tertiary care centers have been entrusted with mentoring peripheral and far-flung centers in India.

An efficient network of cooperation, communication, and transfer facility have been put in place; surgeons in higher centers are rendering consultation and aiding in decision-making as and when required by the peripheral centers by telehealth and/or video conferencing. Timely communication with required authority at the receiving hospital and expedient transfer is being undertaken with dedicated ambulance facilities taking all precautions of isolation and personal protection; however, it is also being stressed upon to trade judiciously not to overwhelm tertiary care hospitals also.

Current Situation and Future Directions

The stringent lockdown measures initially adopted by India have helped us in boosting our health-care resources, logistics, and framing guidelines which have improved our efficacy in dealing with this formidable opponent.^[13] Nevertheless, it is too early to be complacent and without any conclusive report or any study dealing with this subject, it will not be appropriate to justify the work strategy of peripheral orthopedic centers. We, therefore, would like to propose few steps that are based on our experience in building efficient work environment for delivering orthopedic trauma care in peripheral health centers:

1. With the gradual lifting of lockdown, evidently, there will be an increase in trauma patients. To prepare for the future, specific nonCOVID hospitals in tier-2 and tier-3 cities can be entrusted with dealing of trauma victims exclusively; it will also benefit from mobilization of resources, including orthopedic specialist, and related support staffs from COVID facility to these non-COVID hospitals
2. Ramping up of testing facilities by procuring sufficient testing kits. Recent recommendation of TrueNat system for rapid screening and diagnosis of COVID-19 would likely boost testing capacity of preoperative patients at far-flung areas.^[14] India is currently on the way of completing the production of rapid and economical indigenous COVID testing kits (FELUDA Kit) which is hoped to reduce the time taken for results;^[15] in coming days, it is believed to solve the crisis of testing kits in far-flung areas
3. Emphasis should be placed for equipping health facilities in tier-2 and tier-3 cities with necessary infrastructure, which can reasonably and easily be procured and/or built- providing HEPA filtration system for OTs is one such necessity, among others. Adequate supply of PPEs cannot be overstated
4. Formation of team comprising senior surgeon, junior assistant, anesthetics, OT staff, and implementation of weekly rotas
5. Ensuring an adequate reserve of orthopedic implants in hospitals for common emergency

surgeries (e.g. K-wires, external fixator, and intramedullary nails)

6. Keeping complete records of operated patients and their visiting relatives, more so when COVID testing could not be conducted due to scarcity of kits. To this end, promotion of Aarogya Setu App whenever feasible, developed by Government of India, could come handy- it is proving useful for contact tracing, informing user about possible risk of infection, and also providing valuable timely health advisories.^[16]

COVID-19 disease has brought in open the vulnerability of the health systems of the world in dealing with an unknown and a new species of virus against whom the human race has no resistance. The peripheral urban health care centers especially in developing countries need to be geared up in providing the optimal level of health care to all the persons affected. The above guidelines and protocols adopted in our centers will hopefully provide a firsthand experience to many such centres who are facing this disease or might have to deal with this conundrum in the near future.

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Conflicts of interest

There are no conflicts of interest.

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