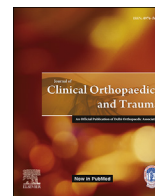


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# Minimising aerosol generation during orthopaedic surgical procedures- Current practice to protect theatre staff during Covid-19 pandemic



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Covid-19 pandemic is the largest health care crisis of this century. A large number of health care workers have succumbed to this virus. Orthopaedic trauma surgery has changed during the pandemic, by generally treating more patients conservatively. Emergency Orthopaedic surgeries and fracture neck of femur patients still need to be treated operatively for a better outcome. Our paper aims to give an insight into our current practice to minimise aerosol generation during these procedures, thereby reducing the risk of infection to the surgical and anaesthetic team.

## 1. Background

In late December 2019, a previously unidentified coronavirus, currently named as the 2019 novel coronavirus emerged from Wuhan, China, and resulted in a formidable outbreak in many cities in China<sup>1</sup> which then spread globally. A large number of healthcare workers caring for Covid-19 patients were infected and some have died. The current advice is to take pragmatic decision making, suggests non-operative management of many injuries and reduced face to face follow up.<sup>2</sup> The spread of SARS-CoV-2 is predominantly via droplets (aerosol), but also via direct contact with contaminated surfaces (fomites). Any personal prophylaxis needs to consider both these modes. Furthermore, one needs to consider the viral load to which the health worker is exposed which in turn influences the severity of disease, if acquired.<sup>3</sup> In orthopedic surgical procedures, surgical power tools, such as electrocautery, bone saws, reamers

and drills, are commonly used that has shown to produce aerosol<sup>4</sup>. It has been postulated that virus transmission can happen through blood aerosol infecting the health care professionals.<sup>5</sup> We describe the current practice that we have adopted to reduce the aerosol production while treating patients surgically.

## 2. Current practice

Precautions are taken as any patient taken for surgery may be infected with Covid-19 (symptomatic/asymptomatic). Even though they are all tested, we are aware of the large number of false negatives. The patient should be transported directly to the operating theatre and should wear a surgical mask if it can be tolerated.

### 2.1. Theatre settings

Operating rooms fitted with laminar flow with a negative-pressure environment, frequent air exchange, and a separate access should be used. Airborne spread is a concern during aerosol-generating procedures, so it is important to understand the airflow within an operating room and have the proper equipment and protocols in place to limit the spread of infection in this setting. Storerooms to put in and remove protective equipment should be available, or even constructed, adjacent to the operating room.

### 2.2. Enhanced personal protective equipment (PPE)

All theatre staff should wear enhanced PPE that consists of FFP3 mask (Filtering face piece and the number denotes level of

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protection), full face shield, head cover, Double pair of gloves, full sleeve waterproof gown and shoes. All staff should be trained to do donning and doffing in the designated areas provided.

### 2.3. Anaesthesia

General Anaesthesia (GA) involving intubation has shown to increase the production of aerosol leading to an increased risk of infection to the healthcare workers<sup>5</sup>. The aim is to do most of the procedures under regional block, but this is not possible for all procedures. If GA is administered, then it's carried out in theatre itself with minimal number of staff rather than in the anaesthetic room and for the next 20 min, after intubation, staff members are not allowed to go in or come out of theatre. The same applies when the patient is extubated.<sup>6</sup> Recovery of the patient is done in theatre, and once stable, shifted directly to ward.

### 2.4. Orthopaedic surgical procedures

- During exposure, use of diathermy should be minimised. If used, make sure to use suction along with it (safeair smoke pencil-Lina).
- While doing bone cuts use an osteotome and nibblers rather than an oscillating saw.
- For patients requiring skeletal traction or pinning, a hand drill can be used, similarly a hand saw or giglie saw can be used for amputation or osteotomy procedure that helps in minimising aerosol production
- While preparing the proximal femur during hemiarthroplasty/ total hip replacement use charley spoon and pencil reamer. Avoid using broach but if it has to be used, use with caution and consider placing a wet swab over visible cancellous bone to catch blood droplets. Femoral canal should be sucked and dried properly with moist gauze before implantation to prevent splash of particles or blood.
- For irrigation use saline in a syringe. Avoid using pulse lavage.
- Open surgery must be avoided If there is an option of doing the procedure percutaneously, like cannulated screw fixation of hip.

By doing percutaneously the skin and soft tissues act as a guard thus reducing the aerosol in theatre.

If there is an option of different implants for treating a fracture, such as an Intertrochanteric fracture, choose the one that can be done with a smaller wound. We use short proximal femoral nail (Short gamma-Stryker) and avoid using Dynamic hip screw (DHS). Use hand reaming as much as possible and avoid power reaming and drilling.

Short nail can be done with small percutaneous incisions compared to DHS that requires an open wound. The other option would be to use Enders nail, which can be done with minimal incision.

With the current Covid-19 pandemic situation, it is strikingly evident that the time taken for surgery and turnover time is exponentially longer than normal, but it is time well spent considering the safety of the staff.

The versatility of orthopaedic surgeons lends them to have an important role. We have come up with novel ways to protect ourselves and our team members in these unprecedented times. The aim of this paper is to share our experiences with other orthopaedic colleagues and help them and their teams to stay safe.

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