

Oral and Maxillofacial Minor Surgery Practice Post-COVID 2019 Pandemic - An Insight

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Abstract

COVID-19, a worldwide pandemic, has given an awakening and introspective moment for all surgeons involved with aerosol-generating procedures. We ought to modify our practices to learn to live with it if we wish to prevail over it. This article outlines similar small changes that can be done in our minor maxillofacial surgery practice to safeguard both patients and healthcare workers.

Keywords: COVID-19, exodontia, impaction, implants, minor surgery

INTRODUCTION

The COVID-19 pandemic demands reassessment of all oral and maxillofacial treatment paradigms. As recent evidence suggested that saliva has a better diagnostic capacity than nasopharyngeal swab for SARS-Corona detection, it has heightened our fears and concerns even more. It is a new disease with its postulating theories changing dynamically over hours and days.

Any oral surgery involves manipulation of saliva and blood and produces enough aerosol and splatter to put surgeons, assistant staff and even patient at high risk for COVID-19 infection. Aerosols, splatters, viruses have existed for centuries and oral and maxillofacial surgeons had been dealing with this threat quite complacently. However, this highly infective SARS-Corona virus, which has spread to over 250 countries around the globe, ought to make us change the way we practice. Even the most routinely done minor surgeries like third molars and dental implants, which are bread and butter of our practice, needs restructuring.

It is practically impossible for all to delay opening their practices/offices until we have full control over COVID-19 because that day is yet to come. It is prudent that we prepare ourselves for restructuring our clinical practice, which will safeguard us as such pandemics are known to repeat every decade or two. This article focuses on the way some modifications can be introduced to our minor/OPD based Oral

and Maxillofacial practice, which can enhance infection control against all biodiversities.

WHY AND WHAT ARE WE WORRIED OF?

Bio-aerosols are aerosols consisting of particles of any kind of organism. The oral cavity is a reservoir for uncountable species that can either be commensal or pathogenic. Aerosols are generated even by talking, breathing, sneezing, or coughing. Two terms aerosols and splatter, need to be understood here. Aerosols are responsible for the transmission of airborne micro-organisms by air and may consist of small particles named droplet nuclei (1–5 μm) or droplets (>5 μm). Droplet nuclei can stay airborne for hours and get transported over long distances and usually contaminate surfaces by falling down.^[1] It can easily settle on the body of the operating person, scatter in the operating field, and body of the patient as well as assistant. These particles being smaller in size, are deeply penetrating and they reach the nonciliated alveoli and

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terminal bronchioles of the respiratory system, thus increasing their infectivity.

Particulate matter in the 5–20 µm range is usually insoluble, may be removed by mucociliary action but still can penetrate deep into the tracheobronchial tree. It has been proven that droplets can contaminate surfaces in a range of 1 m (3ft).^[1] Therefore, droplet transmission requires close physical proximity between an infected individual and a susceptible individual. Particles of 20–50 µm, however, may be incorporated into aerosols, but such particles are generally filtered by the nose during breathing. Splatter is defined as airborne particles larger than 50 µm in diameter. Splatter particles behave in a ballistic manner and are not incorporated into suspended aerosols. This means that these particles or droplets are ejected forcibly from the operating site and arch in a trajectory similar to that of a bullet until they contact a surface or fall to the floor.^[2] These particles are too large to become suspended in the air.

Normally COVID-19 is known to spread by droplets which can be transmitted during coughing, sneezing within 1 m or by fomites. Salivary droplets represent the main source of human to human transmission of the SARS CoV-2 infection when the social distance is <2 M.^[3] In the context of COVID-19, airborne transmission via droplet nuclei may be possible commonly with dentistry as most of our procedures generate aerosols even greater than bronchoscopy or intubation and we are in close proximity to these sources.

Droplets and droplet nuclei are produced immensely with the use of air rotors and ultrasonic equipment. Minor oral surgery practice, especially with high-speed motors and piezosurgery is responsible for splatter.

Not only scaling procedures can create blood containing aerosols but also minor oral surgical procedures that involve mucosal invasion have a predominance of blood in the mist. This further exposes us to virulent microorganisms. With this high risk, we must aim to practice in ways that minimize this threat.

STRATEGIES TO MINIMIZE SPREAD OF INFECTION

We can broadly divide our strategies to contain the risk into four levels:

1. Identify, quantify and minimize risk
2. Protection from aerosols and splatter
3. Reduce aerosols and splatter
4. Manage aerosols.

IDENTIFY QUANTIFY AND MINIMIZE RISK

Screening

With the given evidence that the incubation period lasts from 14–21 days, it is not always possible to identify asymptomatic carriers early or without testing.^[4] However, prevention is surely better than cure. One must stratify the patients visiting the practice into high- or low-risk categories. Along with

detailed personal, travel and epidemiological history, the patient must be asked about respiratory symptoms such as cough or shortness of breath or fever, if any. Fever and fatigue could also be caused by acute dental infection; therefore, the etiology should be confirmed. COVID-19 screening consent elaborating the same should be preferably digitally signed by each patient. Any patient with respiratory symptoms may be deferred for COVID screening.

Waiting area

Avoid multiple appointments and ensure you have minimum people sitting in your waiting area. Advocate mask and alcohol-based hand rub at the entrance for all. Cough etiquette instructions chart should be depicted in the waiting area. The spatial separation in the waiting area between two patients should be at least 1 meter.^[5] Vital signs, including temperature, should be noted. Attendants should be permitted only with children or medically compromised patients.

Prefer natural ventilation in rooms. Remove all clutter like paper, magazines from the premises and cover all your inanimate surfaces with a transparent cover that can be changed or wiped clean with 1% hypochlorite or other recommended solutions. Create transparent and impervious barriers between patients and your staff wherever possible. Reduce storage areas in the operatory and keep it as less packed as feasible.

If possible, entry and exit areas of the patients should be different. Avoid direct contact as handshaking. If the patient requires a pen for consent paperwork, they should bring their own or it needs to be disinfected before use by anyone else. The transfer of the paperwork should be limited. Old prescriptions, radiographs, or any physical documentation should be visualized at a distance or preferably seen in digitized form.

Operative area

Preprocedural antimicrobial mouth rinses preferably with 1.5% hydrogen peroxide (1:1 dilution of 3% H₂O₂) or 0.5% povidone-iodine or 0.2% chlorhexidine for 60 seconds can significantly reduce the level of oral microorganisms in the aerosols generated during routine dental procedures. Oral rinses to be done by the patient in secluded wash basin so that the aerosols generated with patient spitting are not threat to the health-care workers. If it has to be done on a dental chair then let there be at least 10 min time gap before health-care worker enters the same room.

Full deep cleaning of the operatory should be done every 4–5 hours. Ensure that after first cleaning there is a sufficient gap after which anyone enters the room because as noted, bioaerosols remain suspended for 30 min to 2 h posttreatment. Flushing waterlines are advocated at the beginning of the workday and between each patient. The Centers for Disease Control and Prevention (CDC) recommends water and air should be discharged for a minimum of 20–30 s after each patient.^[1] This should be completed for all devices that connect to a waterline and enter patients' mouths, such as handpieces, ultrasonic scalers, and air/water syringes.

All instruments should be preferably pouched and autoclaved individually. Equipment such as thermometers and BP cuffs should be cleansed and disinfected with 70% ethanol after each use.

Train your staff and ascertain protocols devised are followed pragmatically. Bathrooms should be sanitized after every use (faucets, door handles, switches, etc.)

PROTECTION FROM AEROSOLS AND SPLATTER

During dental practices, most of the aerosols and splatter radiates toward the face of the operator due to chair positioning of the patient. Personal Protective Equipment can act as a barrier against most hazards generated from the operative site.

Personal protective equipment

It has been confirmed in literature that COVID-19 may also be transmitted through contact with mucous membranes in the eyes, as the infectious droplets can easily infect the conjunctiva.^[6] Standard precautions, as outlined by the CDC, involve the use of PPE. Primary PPE includes donning properly fitting gloves and surgical masks, protective eyewear with solid side shields or face shield, head cap, and protective full body covered impervious clothing/disposable gowns. N95 or higher-level respirator during aerosol-generating procedures is must. This equipment should be worn both by the surgeon, assistant staff, and person who is responsible for disinfection/cleaning. Masks and gloves should be changed between all patients; moreover, all PPE should be changed if torn, wet or visibly soiled.

Wear gloves, a gown, eye protection (i.e., goggles or a disposable/reusable face shield that covers the front and sides of the face, and a protective eyewear or face shield should be worn throughout treatment and disinfected in between two patients. Reusable eye protection must be cleaned and disinfected according to manufacturer's reprocessing instructions.

If a respirator is not available, use a combination of a surgical mask and a full-face shield. Face masks ideally should be able to filter 0.1 μm particles with 0.3 μm as minimum desirable.^[7] To reduce disease transmission, all PPE must be removed before exiting the treatment area. Besides PPE regular interval handwashing with proper technique for all health-care workers is a must. Ensure your skin on hands has no undressed cuts, lacerations or wounds.

Hand hygiene

The WHO has stated that hand hygiene should be performed preferably with soap and water if not then alcohol-based hand rub. Hand hygiene should be performed before touching a patient, before any procedure, after exposure to body fluids, after touching the patient and after touching patient's surroundings and even before and after disinfection. Regular hand washing with the correct technique for 40 s should be a norm for all personnel in the premises.

REDUCE AEROSOLS AND SPLATTER

During procedures, the universal droplet precautions should be maintained, keeping the operatory room door closed and restricting the number of personnel entries in the room.

All aerosol-generating procedures should be minimized or substituted whenever possible. High-speed drills and ultrasonic-based devices, including piezoelectric devices are known to produce the most aerosols and splatter. The piezoelectric instrument produces a modulated ultrasonic frequency of 24–29 kHz, and a microvibration amplitude between 60 and 200 mm/sec. Microstreaming and cavitation phenomena are the peculiar features of piezosurgery. The microstreaming is generated by a continuous whirling movement of a fluid generated by a little vibrating insert that favors a mechanical action of debris removal. This produces high volumes of aerosols. Piezosurgery has provided a lot of boon to our practice. Its biggest advantage is protection to soft tissue, including important vessels during bone removal. However wherever specific indications for its use are not there, it should be avoided. If used extra measures for aerosols to be absorbed should be taken.^[8]

EXODONTIA AND THIRD MOLAR SURGERY

For performing simple extractions, the patient should preferably be kept in a supine position to increase the distance from his oral cavity and avoid working within the direct exhalation pathway of the patient.

The third molar is the most frequent minor oral surgery. For the third molars, we need to go back to our historical method of using chisels and osteotomes. Those who are less versed with this technique and are worried about bad splits or fractures may use low-speed drills to make initial grooves on bone or teeth, which can be further deepened using chisel osteotomes. Revisit to the lingual split technique will be a boon to this hour. These hand instruments are best way to minimize aerosols.

Motors at low speed produce less of aerosols but generate greater heat and can be damaging to bone, especially if pressure or torque control measures have not been instituted. Instead of conventional micromotors that do not have adequate speed and torque control, physiodispensors may be preferred for all bone cutting as it permits to work in low speed with alteration of torque as required as per the available density of bone without undue heating effect to osteocytes. The physiodispensor allows a surgeon to control the power of the mechanical drill with a speed range between 300 and 40,000 rpm with varying intensity of torque up to 70 N/cm². It also provides for an integrated coolant system whose speed of irrigation can also be controlled. The resistance experienced during bone cutting and the amount of heat produced is significantly lesser while using physiodispenser.^[9] Avoiding prolonged, repeated use of the same burs will also prevent thermal damage, thus permitting low speed and minimizing aerosols. The risk of transmission

cannot be eliminated completely but can be minimized with these measures surely.

Another bone ablating modality that can be used with caution is Er:YAG laser. It may be an extra investment for those who have not ventured into hard tissue lasers in their practice but Er:YAG lasers are known to have an edge over conventional rotary drills in the removal of third molars. As shown in studies, it was possible to make a sharp, clean-cut through bone or tooth.^[10] According to this study, unlike other lasers the Er:YAG laser produced no smoke during the ablation process.

The mechanism behind tissue ablation in LASER is firstly through photothermal evaporation where the light energy is absorbed by water in the hard tissue itself and in other organic substances and secondly by the mechanical effect through the microburst principle, also known as the microexplosion concept where the water vapor pressure build-up created by the extremely violent evaporation of water exceeds the threshold of the tissue. This ablation produces laser plume, which is less evident with Er:YAG laser and because of its aseptic effects, is less damaging. It can also be managed with a high volume evacuator.

Only disadvantage with lasers is the prolonged time of the procedure and its cost. The Er:YAG laser offers other significant advantages over other conventional osteotomy techniques like a noncontact intervention, no mechanical vibration, free and elaborate cut geometries and aseptic effects, which can be asset for anxious patients in your regular practice.

Air-water syringe used for irrigation and cleaning or drying is also known source of aerosols. It is less commonly used in oral surgery practice, but it should be completely replaced with cleaning and drying by gauze.

Whenever irrigating with saline protect with overlying gauze that can absorb the splatter.

Resorbable sutures to be used to avoid repeat appointments.

Use immunomodulators like Vitamin C, antioxidants in regular prescription.

IMPLANTS

Implants in the last two decades have got popularized extensively and is part of routine practice already. In post-COVID pandemic it will be a preferred treatment option over more aerosol generating procedures like RCT/crown cutting, especially for teeth with poor prognosis. Instead of using conventional high speeds with physiodispenser in regular drilling of implant sites, speed as low as 50 rpm with or without irrigation could be preferred. This reduces the particulate generate. Studies have already proved the viability of bone cells in low-speed drilling, even without irrigation.

Drills should be frequently replaced because fresh drills with good cutting efficiency can drill even in dense bones with minimal thermal trauma to adjoining bone. On the contrary,

dull or reused drills will generate more heat and pressure if low speed is used. And as you increase the speed to compensate, the unyielding bone aerosols/splatter are bound to increase.

Use active self-drilling types of implants over passive implants.

Sinus lifts are also a common adjunctive procedure in the replacement of upper teeth. They have been simplified considerably with the use of piezoelectric units with minimal risk of sinus perforation. However, considering today's scenario, we need to resort to the Sinus lift technique using osteotomes for indirect lifts at least wherever possible.

Direct sinus lifts itself, and bone grafts can be avoided by resorting to pterygoid/zygomatic implants or all on four techniques.

Ossedensification principle wherever possible, especially in the maxilla in deficient ridges, should be used. Unlike the traditional technique, osteotomyosseodensification technique does not excavate bone but simultaneously compacts and autografts the particulate bone in an outward direction to create the osteotomy, thereby preserving vital bone tissue.^[11] This technique condenses the available bone to improve the implant-bone interface. Also being used at low speed with slow irrigation, they are known to reduce the generation of aerosols. This combination facilitates increased bone plasticity and bone expansion with less expulsion of debris. It maintains alveolar ridge integrity thereby allowing implant placement in autogenous bone, also achieving adequate primary stability. This way extra procedures like bone grafts and sinus lifts can be avoided. Hence, in all types of bone with reduced density, this technique should be used.

SOFT TISSUE PROCEDURES

Prefer scalpel over electrocautery. Surgical smoke has been shown to harbor intact viral and bacterial particles. It is strongly recommended to minimize or avoid electrocautery during the COVID pandemic. For a similar reason, use hemostats, other hand instruments, and local agents for hemostasis should be preferred.

Use hemostats and other hand instruments and local agents for hemostasis.

Consider contacting patients 4 to 7 days after their appointment to confirm that they are not presenting any symptom of COVID-19.

MANAGE AEROSOLS

Dental aerosols and splatter that are produced can be reduced with the use of high-velocity air evacuation. The high-volume evacuator's (HVE) large diameter (>8 mm) allows for the removal of high volumes of air in a short time, which reduces the amount of bioaerosols by up to 90%.^[12] In routine practice, saliva ejectors are being used, but they do not have adequate suction power. Suction should also preferably have suction capacity of at least 300 ml/min.

In surgical cases, many times, separate glass suction units are used. Such portable suctions with minimum. Seventy-five HP should be used with suction tips of wider diameter like the Yanker suction tube.

Extraoral dental evacuation systems can be used besides the regular HVE or suction. These are cup-shaped and can be placed just outside the oral cavity in the direction of splatter and aerosol. This can minimize the spread of generated aerosol as they will be absorbed considerably near the origin source. Extraoral evacuators can be used along with for suction of aerosols immediately at the exit of the oral cavity.

VENTILATION MANAGEMENT

Aerosol control in confined, poorly ventilated spaces where the air exchange with filtration cannot be successfully applied presents a challenge. Most of the time, our clinics are not enough large to permit adequate air exchange. Another concern is to decrease the indoor concentration of bioaerosols. Creating a negative pressure system with exhaust fans is a simple solution. While some indoor air purification techniques aim solely at reducing aerosol concentrations, others are designed to inactivate viable bioaerosols.^[12] Ensuring adequate ventilation is known to limit spread of airborne infections.

Air cleaning systems – such as high-efficiency particulate air (HEPA) filters, gas filter cartridges, and electrostatic filters – assist in purifying the air in and outside of dental operatories. The HEPA systems direct air through a series of prefilters, which help to continuously catch airborne microorganisms and retain particles as small as 0.3 µm.^[13]

Ultraviolet germicidal irradiation units, commonly employed in hospital operatories and waiting areas, are successful adjunctive means for eliminating aerosols. The high spectral emission lamps from these units produce photons that expose microorganisms to a short light wavelength (254 nm) that is lethal to a variety of microorganisms. Ultrasonic spray machines with germicidal and virucidal solutions can be used to sanitize equipment, chair accessories and surface tops.^[13]

CONCLUSION

In the last few months, we have realized that there will be no “One” safe day to start your life to pre-COVID routine. As we health-care workers are prudent to the transmission of common pathogens like HIV, HbsAg, HCV, mycobacterium, HSV it is high time we upgrade ourselves for ever for even more higher infectious and smaller biodiverse agents. In the beginning, it may be time and funds consuming, but this highly needed change in the infection control practices at our workfronts will save us from the inevitable dangers of nature in a better way. Hence,

instead of COVID scaring us away lets prepare to fight it back.

Informed consent

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