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Recommendations for managing endodontic emergencies during coronavirus disease 2019 outbreak: A review

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Abstract--The management of endodontic emergencies has been particularly challenging during the coronavirus disease 2019 (COVID-19) outbreak because of the possible generation of airborne particles and aerosols. The aim of this report was to contribute to the practice of endodontics by proposing a general protocol for the management of emergencies showing the rationale for remote diagnosis, clinical procedures, and the use of personal protective equipment and barriers at the dental office during the COVID-19 outbreak. A review of the literature was conducted up to May 2020 on relevant institutional sites, aiming to retrieve the best updated evidence. The reporting considered the Reporting Tool for Practice Guidelines in Health Care statement. Recommendations from Cochrane Oral Health, the American Dental Association, and the Centers for Disease Control and Prevention were included along with the American Association of Endodontists resources and scientific articles that addressed the issue. According to this article the proposed protocol could contribute to the management of endodontic emergencies at the dental office during the COVID-19 outbreak.

Keywords--endodontic emergencies, protective equipments.

Introduction

Throughout the world, COVID-19 has had a major impact on healthcare professionals and their day-to-day work. The disease has created very challenging working conditions and a number of front-line staff have become infected and died because of the corona virus . Dentists are potentially exposed to the virus due to their close proximity to patients, specifically their mouths and respiratory tracts ,thus coming into contact directly with the source of the disease. It has been reported that the coronavirus attaches to ACE 2 receptors found in the tongue, the floor of the mouth, saliva, and other oral structures,⁽¹⁾ and thus, the oral cavity can act as an initial site of entry to the body⁽²⁾. In the present pandemic, resources must be utilized safely and efficiently. Ideally, dental procedures should be defined clearly and patients should be allocated to either general dentalcare practitioners and where possible and necessary, to specialists with additional knowledge and training. Governments and regional medical and dental authorities have published guidelines and recommendations for dental treatments. Some have taken radical measures to shutdown dental clinics, whilst others have allowed emergency and urgent care treatments, with some allowing elective procedures to be continued under strict protocols ³.

The guidelines and treatment considerations that dentists must follow will remain region-specific, will rely primarily on the state of the pandemic in each individual country, and cannot be universally standardized. It was reported that during the outbreak of COVID-19 in China, the need for emergency dental treatments decreased by only 30% . Therefore, emergency dental treatments remain necessary and should be performed in dental practice to decrease the burden on the local hospitals and relieve the pain and suffering endured by those affected. The aim of this paper is to provide up-to-date information on treatment considerations for dental care in general, to discuss the available endodontic guidelines reported in the literature, and to propose new clinical recommendations on the management of endodontic emergencies.³

Current recommendations

Provision of dental care Several criteria have been proposed for the management of dental care during the COVID-19 pandemic ⁽⁴⁾ .All recommend having a tele-screening appointment, through a telephone or video call, to undertake a formal risk assessment and to reduce the chances of cross-infection. In addition to dental-related questions, it is recommended that patients should also be asked:

- whether they have a fever or flu-like symptoms, respiratory problems, change in taste or smell⁵
- whether they have been in contact with individuals who had these symptoms, or with a confirmed COVID-19-positive patient. If the patient responds 'NO' to these questions, and active dental treatment was deemed necessary, the same questions should be asked to the patients when they enter the dental clinic. This triage screening can be carried out by members of the dental team wearing the appropriate personal protection equipment(PPE) including, face mask, face shield, and protective gowns. Dental treatments should be carried out only when the patient is assumed to be free of infection or recovered from COVID-19 , that is

when there are no symptoms present for 30 days or after a negative laboratory test result. If the patients are suspected or are confirmed as having COVID-19 through triage assessment, they should be only treated in a well-equipped dedicated dental care facility or in a hospital-based setup prepared to receive COVID-19 patients. Such a dedicated facility should contain isolated well-ventilated rooms or rooms with negative air pressure, so that procedures can be carried out under strict isolation and infection control protocols.⁵

Healthcare providers should be aware of their local dedicated dental care facilities that can provide dental/endodontic services for symptomatic or suspected COVID patients. However, this is subject to the level of pain or related symptoms experienced by the patient. If COVID-19 patients have stable respiratory disease, minimally invasive procedure can be performed with the patient in the semi-supine or upright position to prevent respiratory depression⁶. A pulse oximeter should be used to monitor the oxygen saturation in the blood, and provision of oxygen supplementation should also be considered. Treatment provided should be definitive not palliative, if applicable, in these patients because of the potential of health deterioration.⁶

Treatment protocols

If clinical treatment is deemed necessary, specific clinical protocols should be put in place. The patient should be asked to attend the dental facility alone without company, unless the patient is a minor, or has a physical or mental disability that requires a supporting carer (Ebben et al. 2020). Patients should be seated at least approx. 2 m away from the unaffected care unit in a well-ventilated room and asked to wear masks until being seated on the dental chair⁷. Before beginning the oral examination, the Center for Disease Control has initially indicated that patients should be instructed to gargle with 0.23% povidone-iodine or 0.5%–1% hydrogen peroxide for at least 15 s prior to initiating dental exam/treatment due to their nonspecific viricidal activity against coronavirus. Most recently, the recommendation has been removed from the CDC guidelines as there was no evidence of any efficacy in decreasing the viral load with this protocol.⁷

Endodontic intervention

Following the COVID-19 outbreak in Wuhan, China, (2020) characterized the type of dental emergencies and reported that patients with symptomatic irreversible pulpitis were the most common form of emergency. They indicated that pulpotomy was very effective in controlling the patients' symptoms; however, they did not provide any statistical data on the level of effectiveness of such treatment, or the management of patients with acute apical abscess or other endodontic conditions requiring root canal debridement.⁸

Ather et al. (2020) categorized the type of endodontic interventions during the pandemic into primary and secondary treatment protocols. For cases with symptomatic irreversible pulpitis or symptomatic apical periodontitis, pain medication through a combination of ibuprofen and acetaminophen or dexamethasone was advised by the authors. If that medication proves ineffective, full pulpotomy was advised as the secondary protocol. Antibiotics were

recommended for primary management only in cases of an acute apical abscess (AAA) in addition to incision for drainage for fluctuant intra-oral swellings. Vital pulp therapy, such as pulp capping and pulpotomy was indicated as a secondary management protocols in symptomatic tooth fracture cases. ⁸

These guidelines did not clearly address case selection and management when symptoms persist. Additionally, no criteria were provided for teeth where treatment had been initiated previously, and no caution related to the use of ibuprofen was mentioned. ⁽⁴⁾ addressed some of the limitations in the Atheret al. (2020) protocol with a focus on providing clinical interventions, instead of pharmacological treatment, and reducing the number of treatment visits needed. They suggested pulpotomy for symptomatic irreversible pulpitis, cracked teeth with vital pulps, and symptomatic complicated crown fractures. In cases of symptomatic apical periodontitis, acute apical abscess, primary or secondary endodontic lesion, and pupal necrosis, mechanical debridement and canal dressing was proposed. In retreatment cases where canal filling material cannot be retrieved, occlusal reduction and pharmacological management were recommended. ⁸

The British Endodontic Society ,Bhanderi & Tomson 2020 ,proposed a palliative approach for the treatment of endodontic disease using verbal advice and detailed analgesic and antibiotic regimens for both adult and paediatric patients. They also recommended that only cases with AAA and severe swelling that may compromise the airway would be referred to an emergency department for clinical intervention. Interestingly, no clinical intervention was indicated as a first or second protocol of treatment, unlike the abovementioned studies. This guideline was found to be the most conservative. ⁸

The International Federation of Endodontic Associations (IFEA) and the Indian Endodontic Society(IES) also suggested through a joint statement that partial or complete pulpotomy would be the recommended protocol to manage cases with irreversible pulpitis⁸. They also proposed a pharmacological approach to manage severe dental pain. However, no other diagnostic modality was addressed in these guidelines. Other recommendations have also been proposed by the Scottish Dental Clinical Effectiveness Program regarding management of acute dental pain during the pandemic(SDCEP 2020). Similarly, they lacked specificity regarding the appropriate treatment modalities for the various endodontic clinical scenarios. ⁸

Recommendations for endodontic treatment

Extensive endodontic recommendations are presented here in based on previously published data, with several modifications and adjustments for the following reasons:

1. To stabilize the patient's dental condition long enough to avoid any rebound effects or tooth loss.
2. To protect dental and auxiliary staff from repeated visits by the same patients to manage endodontic pain until the pandemic is over. ⁹

3. To protect the patient from potential exposure to the virus during repeated visits. To reduce the burden on hospital emergency clinics. Endodontic treatment is a specialized modality that is profoundly affected by COVID-19. It represents the majority of emergencies in dental practice. It often requires multiple and longer treatment visits, and inevitably generates aerosols. This results in an increased and repeated exposure to the corona virus for the dentists, their staff and patients. In a study conducted in China, out of all patients attending for emergency dental care during a 10 days period, 50% were endodontic emergencies, with 53% being symptomatic irreversible pulpitis .⁹

Endodontic therapy is the most predictable approach through which the signs and symptoms of endodontic disease can be controlled, and a tooth can be saved.⁹ Despite the undesirable circumstances, Endodontists have a special responsibility to save teeth and relieve the patients' symptoms. The timeline related to their assumption of 'normal' dental activities is uncertain in different regions. Even if or when dental care facilities are fully operational, special care is potentially needed to minimize cross-infection until a predictable treatment or vaccine for COVID-19 becomes available. For these reasons, if clinical intervention is deemed necessary, it seems sensible to suggest that clinicians should consider definitive treatments to minimize the chance of patient presenting for further intervention and thus reduce possible cross-contamination risks.

Endodontic treatments can be classified into three categories:

- 1) emergency procedures requiring immediate attention
- 2) urgent care procedures requiring prompt attention, but not as immediate as a true endodontic emergency⁹
- 3) elective procedures that can be scheduled at the patients'/providers' convenience. For suspected/confirmed COVID patients, only endodontic emergencies should be considered and provided using either palliative or clinic intervention in a dedicated dental facility. For unsuspected/recovered patients, clinicians may consider addressing both emergencies and urgent care scenarios in a typical dental facility to avoid further deterioration of the patients' dental condition. Clinicians might consider deferring elective endodontic treatments for unsuspected or recovered COVID-19 patients or address them on a case-by-case basis.⁹

Endodontic treatment

If endodontic intervention is needed to address the patients symptoms, clinicians should consider a more definitive treatment, when applicable. Aerosol production is only a concern at the beginning of most endodontic treatments, for example during caries/restoration removal and access preparation, and at the end of treatment during occlusal adjustments. All the other procedures related to canal instrumentation, irrigation, or even canal filling and restoration placement do not produce aerosols. Treatments such as vital pulp therapy (pulp capping or pulpotomy) which are effective in reducing pain can be accomplished in a short time and have a high success rate. Care, however, should be taken for proper

case selection to minimize the possibilities of immediate clinical failure, exacerbation of symptoms and the need for another treatment appointment.⁹

If root canal debridement is deemed necessary to control symptoms/disease, the clinician should consider a single-visit root canal treatment. In an overview of systematic reviews, Moreira et al.2017 reported no difference in the outcome of root canal treatment between single-and multiple-visit treatments, with a trend of lower postoperative complications and higher efficiency in treatments completed in a single session. Single-visit treatment is a safe, effective and well-tolerated procedure even in cases with acute apical abscess, if complete drainage is achieved from the canal, or via incision and drainage, and the canals are dry at the time of filling⁹.

Certain procedures, such as nonsurgical retreatment, may require a longer treatment time. Performing a lengthy procedure can place the patient and the treating clinician at a lower risk of cross contamination compared to the potential need for two appointments. Complete debridement and placement of anti-bacterial intracanal medicament such as calcium hydroxide would be the alternative approach if the treatment cannot be completed in a single visit, due to time or treatment-related reasons. Therefore, it is recommended that an experienced dental practitioner or Endodontist should carry out these procedures. Only in case of an acute apical abscess with severe swelling that may compromise the airway, should the patient be referred to an emergency clinic for clinical management as suggested by the British Endodontic Society¹⁰.

Although endodontic surgery is most often an elective procedure, it might be the only treatment approach to address a patients' symptoms. In such cases, clinicians might be at a greater risk of exposure to aerosols due to the absence of a rubber dam. If applicable and available, clinicians may consider requesting the patient to take a COVID-19 test prior to engaging in surgical intervention. They can also consider using surgical handpieces and ultrasonic units without the built-in coolant, and use instead external irrigation through a plastic syringe.^{9,10}

Preferred restorative approach

Since elective dental procedures might be postponed in certain locations, patients may not be able to see their general dentists in a timely manner to place a permanent intracoronal or a full-coverage restoration. Attempts should be made, in coordination with the referring dentist, to restore the tooth with a direct permanent restoration such as composite or amalgam, to minimize tooth/restoration fracture, crack propagation, or coronal leakage¹¹. If temporary intra-coronal restorations are to be placed, calcium sulphate-based material should be avoided due to their low compressive strength, solubility, and expansion¹². Occlusal reduction should also be considered to minimize postoperative pain and the risk of tooth/restoration fracture.

Management of traumatic injuries

If a suspected or confirmed COVID patient arrives with a tooth avulsion/luxation injury, it is preferable not to do any intervention in a typical dental care facility

and the patient should be referred to a specially equipped dental facility for management according to the International Association of Dental Traumatology (IADT) guidelines. For avulsion, the tooth should be kept in a readily available storage media such as milk.¹⁰

Pharmacological management

Controlling the symptoms of patients through medication should be considered as the primary treatment approach for suspected or confirmed COVID patients. A case report suggested that the use of ibuprofen caused further deterioration of systematic symptoms in four COVID-19-positive patients . This resulted in statements from several health organizations, including the WHO, warning against the use of ibuprofen for suspected or confirmed COVID-19 patients . In their last update, the WHO has retracted their warning regarding the use of ibuprofen due to insufficient evidence. Accordingly, clinicians may consider the use of ibuprofen alone or in combination with acetaminophen, or dexamethasone to control dental pain for COVID-19-positive patients, depending on the severity of pain. Clinicians may follow their normal postoperative pain medication protocols and the guidelines for antibiotics prescription .¹⁰

Discussion

The COVID-19 pandemic led to the need to postpone elective care for endodontic patients to help slow or prevent the spread of the coronavirus. Thus, in the health system, in the first phase of coping with the disease, only care for endodontic emergencies was advised by health authorities. Over time, each government will determine the best moment for the reopening of dental services, with the proper biosafety criteria already incorporated into the clinical routine. It is essential that endodontists are well prepared for both phases. Overall, to date, no universal protocol or guideline is available to provide dental care to confirmed or suspected cases of COVID-19. Distinct governments have developed guidelines with their health authorities¹³. Certainly, endodontists should regularly consult their state dental boards or other regulatory agencies for specific requirements for their jurisdictions because information is changing rapidly.¹²

Proposals for dental care protocols by the scientific community are extremely necessary so that professionals are more secure in providing dental care in the current adverse scenario. This proposed protocol aims to minimize the risks of spreading the virus, guiding professionals on their protection and that of the patient with specific care for before, during, and after clinical care. Dental management guidance documents from different countries provide information on how to group patients according to a risk assessment of the potential status of COVID-19 (eg, positive for COVID-19, suspected COVID-19, or asymptomatic)¹³

Alharbi et al indicated that in cases of endodontic emergency in suspected or confirmed COVID-19 patients, they should be treated in isolation rooms for airborne infections or negative pressure rooms, preferably in a hospital environment. However, the Directorate-General of Health of Portugal recommends considering the patients' symptoms, attending at the private office, scheduling the

appointment at the end of the day, and using adequate personal protective equipment for high-risk procedures.

In view of this, it is imperative to keep in mind that scientific studies indicate that the COVID-19 incubation period can extend for 14 days, with an average time of 4–5 days from exposure to symptoms. It has been shown that asymptomatic patients or patients during the incubation period may have potential for transmission. Positive results of the reverse transcription polymerase chain reaction test have also been reported in recovered patients⁽¹⁴⁾. Together, these recommendations and studies provide important insights into the management of endodontic emergencies of patients in private offices during the COVID19 pandemic. The proposed protocol could contribute to the management of endodontic emergencies at the dental office during the COVID-19 outbreak.¹³

Conclusion

The guidelines from previous publications, as well as the recommendations proposed in this paper, are only suggestions offered to practitioners to help them in their daily operation and planning until the pandemic is over or under control. The ultimate decision on patient management and treatment should be made by the clinician to provide what is in the patients best interest. Clinicians may consider these guidelines as long as they do not contradict those published by local authorities and/or governmental instructions within each state or country.

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