



“MANAGEMENT OF ENDODONTIC EMERGENCIES DURING COVID-19 ERA”

Dental Science

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ABSTRACT

COVID-19 (corona virus disease) pandemic has put unprecedented strain on health care systems across the world due to which nonemergency surgeries, medical procedures and dental procedures have been postponed indefinitely.

To halt transmission and protect, the ministry of health department of major countries has decided the stoppage of all dental services except dental emergencies. Endodontic emergencies include one thirds of dental emergency cases. Pain and/or swelling caused by inflammation or infection of pulp and/or periradicular tissue, considered to be an endodontic emergency which needs to be diagnosed and considered to be treated during COVID-19 outbreak by an experienced dental specialist.

Considering the present facts of not having effective treatment regimen, vaccine and continual spread of COVID-19, and increased risk of aerosols exposure of COVID-19 to dental personnel, it is crucial to consider every patient to be a suspected COVID-19 and to perform an endodontic emergency procedure under strict personal protection, infection control and sterilization protocols. This review aims to highlight the aspects of covid-19 pandemic, importance of personal protection, with a specific emphasis on management of endodontic emergencies in a dental office.

KEYWORDS

COVID-19, endodontic emergency, coronavirus, PPE, pulpectomy, hand hygiene.

INTRODUCTION

Endodontic emergencies include one thirds of dental emergencies. To combat these emergencies, various strategies have been considered such as full pulpotomy, extirpation of the pulp in the larger canal, extirpation of pulp all the canals, intra-canal medication, and prescription of systemic medicines¹. Treatment of endodontic emergencies is one of the most challenging aspects of clinical dentistry which requires expert knowledge and training in diagnosis and a tailored treatment plan for every patient². An endodontic emergency is considered when a patient has pain or swelling or both caused by various stages of inflammation or infection of the dental pulp or periapical tissues before, during or after root canal treatment³ (RCT).

It is vital for the dental specialist (endodontist) to have detailed knowledge and information about the endodontic emergency treatment protocols^{4,5} and an update over infection control measures and personal protection measures during COVID-19 outbreak where the whole world is struggling to prevent the spread of COVID-19 infection by adopting the guidelines of social distancing and hand hygiene principles⁶, failure of which may result in hazardous spread of COVID-19 infection across globally.

Considering the declaration by Dr. Tedros Adhanom Ghebreyesus, WHO director-general, the corona virus disease 2019 (COVID-19) pandemic created global health care crisis⁷. Since December 2019, COVID-19 (coronavirus) infection is unstoppable and has affected 3,221,617 people globally as on 30th April 2020⁸. After considering the routes of transmission of this virus by respiratory droplets, close contacts, aerosols and in addition to shortage of personal protection equipments (PPE), nonemergency dental services have been advised to close by Centers for disease control and prevention (CDC), American dental association (ADA) considering the fact that in dental settings, the risk of cross infection may be high between dental practitioners, dental assistants, dental staff and patients^{9,10}.

In these exceptional circumstances, a dental specialist holds the responsibility of adapting emergency endodontic services, working in an extended scope of practice, caring for patients at the end of life, protecting workforce, infection prevention based on our experience, relevant guidelines and research, we made an attempt of this review to outline the protective measures for dental health care personnel, infection control measures and adaptive containment strategies to be

considered during the COVID-19 pandemic situation for effective management of endodontic emergencies.

DISCUSSION

Corona virus infection (COVID-19): Unfortunately, in late December 2019, Wuhan, Hubei province, People's Republic of china (PRC), became the centre of an outbreak of pneumonia of unknown cause, which raised immediate and intense attention. By Jan 7, 2020, the experts at the PRC Centers for Disease Control declared that the pneumonia, later known as novel coronavirus pneumonia (NCP), was caused by a novel coronavirus after analysis of respiratory samples¹¹. The World Health Organization (WHO) officially named the disease (coronavirus disease) COVID-19. The International Committee on Taxonomy of Viruses named the virus 'severe acute respiratory syndrome coronavirus 2' (SARS-CoV-2)¹². As on 30th April 2020, 3,221,617 people have been infected and more than 228,263 deaths have been recorded⁸.

SARS-CoV-2 virus belongs to the β -coronavirus family, with many potential natural hosts, intermediate hosts and final hosts that resulted in major challenges for the prevention and treatment of coronavirus infection. In comparison with other coronaviruses such as severe acute respiratory syndrome and Middle East respiratory syndrome coronaviruses (SARS-CoV and MERS-CoV, respectively), SARS-CoV-2 has high transmissibility and infectivity, and a low mortality rate¹³. Moreover, evidence suggests that SARS-CoV-2 has long-term stability on contaminated surfaces. SARS-CoV-2 is more stable on plastic and stainless steel than on copper and cardboard, and viable virus has been detected for up to 72 hours after application to these surfaces¹⁴.

Clinical features of SARS-CoV-2 infection

SARS-CoV-2 can present a wide range of symptoms ranging from mild to severe. Fever, cough, and shortness of breath are the most common symptoms¹⁵. Patients developing pneumonia showed radiographical findings such as multiple mottling and ground-glass opacity on chest X-rays^{15,16}. Patients that develop acute respiratory distress syndrome may worsen rapidly and die of multiple organ failure¹⁵. It has also been reported that about 2–10% of the patients with COVID-19 had gastrointestinal symptoms such as vomiting, diarrhea, and abdominal pain^{15,17}.

Transmission of SARS-CoV-2

Previous epidemiological studies showed that the factors involved in viral spreading are source of infection, mode of transmission including host susceptibility¹⁸.

Source of infection:

A study from Wuhan Institute of Virology showed that bats are the potential source of SARS-CoV-2¹⁹. Although no studies to date have fully elucidated the potential natural host and intermediate host of SARS-CoV-2, adequate evidence shows that this virus might be sourced from wild animals. At present, it is considered that the main source of infection of SARS-CoV-2 is patients with COVID-19 infection.

Mode of transmission:

Research suggests that COVID-19 virus is primarily transmitted between people through respiratory droplets and contact routes^{11, 20-24}. Droplet transmission occurs when a person is in close contact (within 1 m) with someone who has respiratory symptoms (e.g., coughing or sneezing) and is therefore at risk of having his/her mucosa (mouth and nose) or conjunctiva (eyes) exposed to potentially infective respiratory droplets²⁵. In addition, researchers have detected SARS-CoV-2 in samples of stool, gastrointestinal tract, saliva and urine. Based on bioinformatics, researchers found that the digestive tract may be a route of SARS-CoV-2 infection²⁶.

Transmission may also occur through fomites in the immediate environment around the infected person. Therefore, transmission of the COVID-19 virus can occur by direct contact with infected people and indirect contact with surfaces in the immediate environment or with objects used on the infected person²⁵.

In the present context of COVID-19, airborne transmission may be possible in specific circumstances and settings in which procedures or support treatments that generate aerosols are performed; i.e., endotracheal intubation, bronchoscopy, open suctioning, administration of nebulized treatment, manual ventilation before intubation, turning the patient to the prone position, disconnecting the patient from the ventilator, non-invasive positive-pressure ventilation, tracheostomy, and cardiopulmonary resuscitation, dental procedures²⁷. Airborne transmission is different from droplet transmission as it refers to the presence of microbes within droplet nuclei, which are generally considered to be particles <5µm in diameter, can remain in the air for long periods of time and be transmitted to others over distances greater than 1 m. Recently, researchers revealed that the patients in incubation period (1-14 days) does not exhibit any clinical signs and symptoms. However, patients in incubation period can spread disease most effectively through droplets and the virus persists actively in saliva of these asymptomatic patients during incubation period^{11,21,28}.

Keeping in light about the modes of transmission of virus by droplets, close contacts, aerosols transmission by saliva, WHO recommended few measures such as social distancing (atleast 1 meter), washing hands regularly with soap or alcohol based hand rub, maintenance of respiratory hygiene, avoidance of touching eyes, ears, nose⁶.

On consideration of the information and guidelines from WHO, the Centers for Disease Control and Prevention (CDC) recommended that the dental Facilities should postpone elective procedures, surgeries, and non-urgent dental visits, and prioritize urgent and emergency visits and procedures for the coming time. This aligns with recommendations from the American Dental Association external icon (ADA) and the American Dental Hygienists' Association external icon (ADHA) to postpone non-emergency and elective dental procedures, as well the Centers for Medicare and Medicaid Services (CMS)'s that all non-essential dental procedures be postponed^{9,10}.

In the present scenario, due to the absence of effective treatment modality and vaccine against COVID -19, management is mainly dependent on self protection measures, effective containment and symptomatic treatment²⁹.

Our aim is to present a review on role and responsibility of a dental specialist (endodontist) to strictly monitor and follow all preventive strategies to avoid COVID-19 infection, to precisely diagnose and treat an endodontic emergency and play a pivotal role in the successful containment of COVID-19 infection.

Considerations for effective management of endodontic emergencies during COVID-19 outbreak involves multiple steps such as,

1. Diagnosis of endodontic emergencies
2. Pre procedural patient education
3. Education to dental assistants and clinical and nonclinical staff
4. Preparation of clinic area and dental operatory room
5. PPE of dental specialist and dental assistant
6. Decision making in treatment plan and procedure
7. Post procedural patient education
8. Post procedural infection control measures

1. Diagnosis of endodontic emergencies: Teledentistry is a viable option during COVID-19 outbreak, where social distancing plays a major role to prevent the spread of COVID-19. Teledentistry is a combination of telecommunications and dentistry, which involves the exchange of clinical information and images over remote distances for dental consultation and treatment planning³⁰. A COVID-19 screening questionnaire is carried out.

- Patient details including age and sex and mailing details which may be necessary for further contact
- Chief complaint presenting symptoms, clinical, dental, medical and drug history
- Any photographs of the face (in cases of swelling) that can be shared virtually
- Any COVID-19 symptoms of the patient and accompanying family
- Any history of travel of the patient and accompanying family
- Any recent history of contact with hotspot zones of COVID-19 of the patient and accompanying family
- Any relevant questions pertaining to suspicious exposure to COVID-19

Preferably a senior experienced dental specialist can arrive at a tentative diagnosis of a non-COVID-19 (fig.1) and prescribe oral antibiotics and analgesics (fig.2) or schedule the patient requiring an endodontic emergency after having a real time teleconsultation.

Diagnosis	Symptoms	Management
1.Acute irreversible pulpitis	<ul style="list-style-type: none"> • Tooth pain - spontaneous and longer lasting (up to several hours) and may keep the patient awake at night • Pain may be difficult to localize to a single tooth, may last for several hours, may be dull and throbbing, may be worsened by heat, but may also be alleviated by cold 	<p>Advice and self help</p> <ul style="list-style-type: none"> • Recommend optimal analgesia. • Advise patient to try rinsing with cold water as this can alleviate pain • Advise patient to call back if symptoms get worse. <p>Emergency endodontic treatment</p> <ul style="list-style-type: none"> • If pain is severe and uncontrollable, preventing sleeping or eating, advised endodontic emergency management
2.Acute apical abscess	<ul style="list-style-type: none"> • Pain (usually localized to a single tooth) • Swelling of the gingiva, face or neck • Fever • Restlessness, lethargy, loss of appetite 	<p>Advice and self help</p> <ul style="list-style-type: none"> • Recommend optimal analgesia. • Prescribe antibiotics if you are concerned about swelling or if there are signs of systemic infection (fever, malaise) • Ask patient to call back in 48-72 hours if their symptoms have not resolved <p>Emergency dental care</p> <ul style="list-style-type: none"> • If patient has spreading infection without airway compromise, or if patient has continuing or recurrent symptoms, advised endodontic emergency management for drainage through root canal or drainage through soft tissues Emergency hospital care • If patient has spreading infection with or likely to have airway compromise and/or severe trismus refer for emergency care.

<p>3.Acute periodontal abscess/Perio-endo lesions</p>	<ul style="list-style-type: none"> • Pain and tenderness of gingival tissue • Increased tooth mobility • Fever and swollen/enlarged regional lymph nodes • Presence of swelling on gingiva • Suppuration from the gingiva. 	<p>Advice and self help</p> <ul style="list-style-type: none"> • Recommend optimal analgesia. • Prescribe antibiotics if you are concerned about swelling or if there are signs of systemic infection (fever, malaise) • Ask patient to call back in 48- 72 hours if their symptoms have not been resolved and provide emergency dental care. • If patient has spreading infection without airway compromise, or if patient has continuing or recurrent symptoms, advise an endodontic emergency management for drainage through the canal or soft tissue. • If patient has spreading infection with or likely to have airway compromise and / or severe trismus, refer for emergency care.
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Fig.1: Triage of Endodontic emergencies³¹

Adults	Children																												
<p>Mild to moderate dental pain, an appropriate 5-day regimen is either:</p> <ul style="list-style-type: none"> • Paracetamol, 2 x 500 mg tablets up to four times daily (i.e. every 4–6 hours) <p>or</p> <ul style="list-style-type: none"> • Ibuprofen, 2 x 200 mg tablets up to four times daily (i.e. every 4–6 hours), preferably after food. <p>For severe dental pain, an appropriate 5-day regimen is either:</p> <p>increase the dose of ibuprofen to 3 x 200 mg tablets up to four times daily, preferably after food</p> <p>or</p> <ul style="list-style-type: none"> • Ibuprofen and paracetamol together, preferably after food, without exceeding the daily dose or frequency for either drug, as above <p>or</p> <ul style="list-style-type: none"> • Diclofenac (1 x 50 mg tablet three times daily) and paracetamol together, preferably after food, without exceeding the recommended daily dose or frequency for either drug. 	<ul style="list-style-type: none"> • Paracetamol (500 mg tablets, or 120 mg/5 ml or 250 mg/5 ml oral suspension*), dose depending on age (see below); up to four times daily (max 4 doses in 24 hours): <table border="0"> <tr><td>• 6-12 months</td><td>120 mg</td></tr> <tr><td>• 8-9 years</td><td>360-375 mg</td></tr> <tr><td>• 2-3 years</td><td>180 mg</td></tr> <tr><td>• 10-11 years</td><td>480-500 mg</td></tr> <tr><td>• 4-5 years</td><td>240 mg</td></tr> <tr><td>• 12-15 years</td><td>480-750 mg</td></tr> <tr><td>• 6-7 years</td><td>240-250 mg</td></tr> <tr><td>• 16-17 years</td><td>500 mg-1 g</td></tr> </table> <p>or</p> <ul style="list-style-type: none"> • Ibuprofen (200 mg tablets or 100 mg/5 ml oral suspension*), dose depending on age (see below), preferably after food, up to three times daily unless indicated otherwise below: <table border="0"> <tr><td>• 6-11 months</td><td>50 mg (4 x daily)</td></tr> <tr><td>• 7-9 years</td><td>200 mg</td></tr> <tr><td>• 1-3 years</td><td>100 mg</td></tr> <tr><td>• 10-11 years</td><td>300 mg</td></tr> <tr><td>• 4-6 years</td><td>150 mg</td></tr> <tr><td>• 12-17 years</td><td>300-400 mg (4 x daily)</td></tr> </table> <p>*Sugar-free preparation is available</p>	• 6-12 months	120 mg	• 8-9 years	360-375 mg	• 2-3 years	180 mg	• 10-11 years	480-500 mg	• 4-5 years	240 mg	• 12-15 years	480-750 mg	• 6-7 years	240-250 mg	• 16-17 years	500 mg-1 g	• 6-11 months	50 mg (4 x daily)	• 7-9 years	200 mg	• 1-3 years	100 mg	• 10-11 years	300 mg	• 4-6 years	150 mg	• 12-17 years	300-400 mg (4 x daily)
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Fig.2: Recommended first line analgesic dose^{32,33,34,35}

N.B. Maximum drug doses in 24-hour period: 4 g paracetamol; 2.4 g ibuprofen; 150 mg diclofenac. Do not prescribe diclofenac or high doses of ibuprofen (i.e. more than 1.6 g daily dose) for patients with moderate or severe asthma, those with hypersensitivity to aspirin or any other NSAID or those with renal impairment.

Optimal analgesia is defined as the maximum recommended dose of painkillers that takes into account the patient's age and is within the normal safe limits

N.B. Combining paracetamol and ibuprofen is not recommended for children without consulting a pharmacist or medical practitioner

<ul style="list-style-type: none"> • Dexamethasone 0.07-0.09 mg/kg • Immediate pain relief : 0.5% Bupivacaine (long acting local anesthetic)

Fig.2 (continued): Recommended second line analgesic dose^{36,37}

Adults	Children																								
<ul style="list-style-type: none"> • Amoxicillin, 1 x 500 mg capsule 3 times daily <p>or</p> <ul style="list-style-type: none"> • Phenoxymethylpenicillin, 2 x 250 mg tablets 4 times daily <p>or</p> <ul style="list-style-type: none"> • Metronidazole, 1 x 400 mg tablet 3 times daily. <p>N.B. For severe infections (e.g. extra-oral swelling, eye closing or trismus), the dose of amoxicillin and phenoxymethylpenicillin can be doubled</p>	<ul style="list-style-type: none"> • Amoxicillin (250 mg capsules, or Oral Suspension* 125 mg/5 ml or 250 mg/5 ml) dose depending on age (see below); three times daily, <table border="0"> <tr><td>• 6-11 months</td><td>125 mg</td></tr> <tr><td>• 5-11 years</td><td>500 mg</td></tr> <tr><td>• 1-4 years</td><td>250 mg</td></tr> <tr><td>• 12-17 years</td><td>500 mg</td></tr> </table> <p>For severe infection in children aged 6 months to 11 years, increase the dose of amoxicillin up to 30 mg/kg (max 1 g) three times daily. For severe infection in children aged 12-17 years, double the dose of amoxicillin.</p> <p>or</p> <ul style="list-style-type: none"> • Phenoxymethylpenicillin (250 mg tablets, or Oral Solution*, 125 mg/5 ml or 250 mg/5 ml) dose depending on age (see below); four times daily, <table border="0"> <tr><td>• 6-11 months</td><td>62.5 mg</td></tr> <tr><td>• 6-11 years</td><td>250 mg</td></tr> <tr><td>• 1-5 years</td><td>125 mg</td></tr> <tr><td>• 12-17 years</td><td>500 mg</td></tr> </table> <p>For severe infection in children up to 11 years, increase the dose of phenoxymethylpenicillin up to 12.5 mg/kg four times daily. For severe infection in children aged 12-17 years, increase the dose up to 1 g four times daily.</p> <p>Or</p> <ul style="list-style-type: none"> • Metronidazole (200 mg tablets, or Oral Suspension, 200 mg/5 ml) dose depending on age (see below) three times daily unless indicated below <table border="0"> <tr><td>• 1-2 years</td><td>50 mg</td></tr> <tr><td>• 7-9 years</td><td>100 mg</td></tr> <tr><td>• 3-6 years</td><td>100 mg (2 x daily)</td></tr> <tr><td>• 10-17 years</td><td>200 mg</td></tr> </table> <p>*Sugar-free preparation is available</p>	• 6-11 months	125 mg	• 5-11 years	500 mg	• 1-4 years	250 mg	• 12-17 years	500 mg	• 6-11 months	62.5 mg	• 6-11 years	250 mg	• 1-5 years	125 mg	• 12-17 years	500 mg	• 1-2 years	50 mg	• 7-9 years	100 mg	• 3-6 years	100 mg (2 x daily)	• 10-17 years	200 mg
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Fig.2 (continued): Recommended first line antibiotic dose (5 day course regimen)³²:

<ul style="list-style-type: none"> • Clindamycin • Loading dose: 600 mg • Maintenance dose: 300 mg q6 h • Clarithromycin • Loading dose: 500 mg • Maintenance dose: 250 mg q12 h • Azithromycin • Loading dose: 500 mg • Maintenance dose: 250 mg q24 h

Fig.2 (continued): Various other antibiotics used in endodontic emergencies³⁸:

1. Preprocedural patient information and education: once the tentative diagnosis has been made, patient education plays a vital role which can be accomplished through real time teleconsultation which includes education about

- The COVID-19 pandemic outbreak situation
- The COVID-19 guidelines about its spread and protection
- Possible endodontic procedure to be done
- Impact of possible complications of endodontic emergency procedures
- Arrival with one attendant (the attendant details should be discussed in advance about not having any suspicious exposure to COVID-19)

- Emphasize the importance of social distancing, hand hygiene and keep a note about the hand rub and automatic hand sanitizer³⁹ dispensers before entering dental office
- Double layered facemask to be worn by patient and the attendant
- Consent details for the endodontic emergency procedure and COVID-19 and all possible complications to be sent by mail
- Finally the stigma of the pandemic and anxiety alleviation

2. Education to clinical staff and dental assistant: Make sure all the staff confirmed about the health status and respiratory symptoms.

- All staff should be educated about the situation of COVID-19 pandemic and its consequences, its spread and impact on health.
- Emphasize the importance of social distancing, hand hygiene principles and hand rub before entering clinic to be followed by themselves and monitoring that patients and attendors could be followed.
- COVID-19 infection control measures and guidelines
- Use of medical surgical face mask by all clinical staff and double layered face mask by all nonclinical staff
- Body temperature of the patient along with the attendant to be checked by non contact infrared thermometer prior their entrance³⁹.

3. Preparation of the clinic area and dental operatory room:

- Nonclinical staff to be given specific instructions to follow all guidelines regarding the low concentration sodium hypochlorite disinfection of all surfaces prior to procedure, automatic hand sanitizer dispensers, plasma air sterilization of whole dental office^{39,40}, fumigating or fogging of the operatory room, arranging HEPA filters^{40,41} in the vicinity of operatory room, seating arrangement in the reception area keeping in mind about 1 meter distance (social distancing), hand disinfectants to be arranged at every possible area where there might be chances that the patient or staff could touch a surface.
- Clinical staff to acquire the consent form signed by the patient
- Dental assistant to be informed in advance the type of treatment procedure, and required autoclaved armamentarium and high volume suction, double barrier to intraoral x-ray sensor, covering all light handles ,drawers, bracket trays, headrests, X-ray viewers with disposables⁴²

4. Protective measures for the dentist and the dental assistant: As per ESC guidelines, level III Protection (fig.6) is needed for dentist and dental assistant to accomplish the endodontic procedures as these procedures may lead to aerosols production which might carry the risk of COVID-19 spread and all the dental health personnel should be well trained with donning and doffing of PPE protocol (fig.7)

level III protection	<ul style="list-style-type: none"> • disposable surgical cap • medical protection mask FFP-3 (filtering face- piece) • work uniform • gown • disposable surgical gloves • full-face respiratory protective devices or powered air-purifying respirator,if available 	aerosol generation procedures during which the suspected/probable (unaware of asymptomatic COVID-19 carriers) or confirmed COVID-19 patient may spray or splash, respiratory secretions, body fluids or blood
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Fig.3: The dental specialist and the dental assistant should follow strictly the protection guidelines^{43,44}

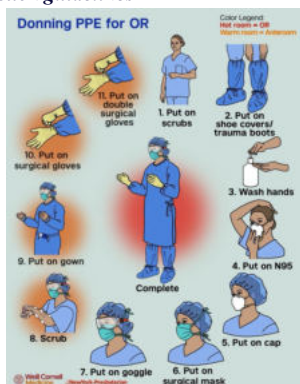


Fig.4: All clinical staff should be well-versed in proper techniques for donning and doffing of PPE including eye protection⁴⁵.

1. Decision making in treatment plan and procedure involves a confirmative diagnosis of the endodontic emergency which includes a detailed X-ray (IOPA) examination. After the preprocedural antimicrobial mouth rinse, an IOPA examination, treatment procedure decision, patient preparation, rubber dam isolation the treatment can be accomplished.

The common emergency endodontic procedures includes pulpotomy, pulpectomy, pulpectomy with incision and drainage

- **Pulpotomy:** This is advisable in cases of acute pain of pulpal origin. The goal of the pulpotomy is to remove the coronal pulp tissue in the chamber without penetrating pulpal tissue in the root canal systems. This procedure has been advocated in emergency situations for many years⁴⁶⁻⁴⁸. Since it is not possible for the clinician to precisely determine the apical extent of pulpal pathosis, a pulpectomy offers the advantage of complete removal of the pulp. Therefore, a pulpectomy always considered to be a viable option when sufficient time is there to treat an endodontic emergency and it is the preferred procedure during COVID-19 pandemic.
- **Pulpectomy:** This is advisable in patients who present with symptoms of irreversible pulpitis, or pulp necrosis with or without swelling. The decision of single visit or multiple visit endodontic treatment solely depends upon the specialist's diagnosis and treatment protocol so that the emergency endodontic situation can be treatable without causing discomfort to the patient during and post endodontic procedure. As mentioned above, although the success of pulp extirpation is high, partial pulpectomy can be unsuccessful in certain clinical cases and should be avoided due to reasons such as 1) sensory nerve sprouting from "random" peripheral axotomy; 2) residual inflamed tissue as a source of pain; and 3) residual necrotic tissue that precludes adequate chemo-mechanical debridement. Therefore, reasonable protocol includes complete instrumentation with placement of an intracanal medicament, calcium hydroxide (CAOH) is now the preferred choice⁴⁹⁻⁵².
- **Incision and drainage:** This is advisable in endodontic cases, where drainage is best achieved through a combination of canal instrumentation and when there is a fluctuant swelling. The goal of emergency treatment for patients with swelling is to achieve drainage through soft tissues or root canal. The object of drainage is to evacuate pus from the tissue spaces. Profound anesthesia may be problematic at the surgical site but peripheral infiltration is advisable to reduce the discomfort of the patient. The incision should then dissect gently to the bone overlying the root of the involved tooth. The wound should be kept clean with hot saltwater rinses⁵³.
- **Occlusal reduction:** Evidence suggests that 'If a tooth responsible for an acute abscess is extremely painful on biting, occlusal contact should be reduced so that the tooth is reasonably comfortable in normal occlusion'. Occlusal reduction is a highly predictable procedure for the prevention of postoperative pain and relief of pain due to endodontic emergencies. Occlusal adjustment reduces mechanical stimulation of sensitized nociceptors⁵³⁻⁵⁵. Therefore pulpotomy, pulpectomy, occlusal reduction and incision and drainage, when indicated, provide the clinician with

highly predictable pain reduction strategies in endodontic emergencies.

2. Post procedure patient education: The patients are advised for discharge and preferably the instructions could be given out through telecommunication regarding

- post operative discomfort/pain/swelling
- diet recommendations
- oral hygiene measures
- use of analgesics
- use of antibiotics, if required in cases of systemic involvement
- use of antimicrobial mouthwash
- revisit schedules decision, depending upon the alleviation of symptoms, through teledentistry
- repeating all rules to avoid the spread of COVID-19, hand hygiene guidelines
- virtual review checkups

3. Post procedure infection control measures

- Educate the dental assistant about biowaste management principles, management of water pipelines of the handpieces used, CDS (cleaning, disinfection and sterilization) of all armamentarium used, disinfecting all surfaces of the dental operatory room.
- Educate the clinic staff and nonclinical staff about repeating disinfection protocol of all surfaces and equipment used.

CONCLUSION

The COVID-19 pandemic outbreak may challenge the current infection control regimen in dental practices, due to which the dental health care professionals has to adapt to the strategies which limits nonemergency endodontic procedures, tailored individualized measures for effective diagnosis of a real endodontic emergency and treatment measures under strict infection control protocols, personal protection measures and measures that can reduce the aerosol transmission. At all times, attention to prevention and control of infectious diseases are of paramount importance.

In consideration of the current scenario, the prime mission of a dental health care professional should be towards self protection, staff health, and patient health and maintenance of high standards of care and infection control and update of COVID-19 infection and constant strive to learn, adapt the new guidelines and elevate the level of care.

As we learn more about this virus, its transmission modes and its impact on general and dental health, additional recommendations will be forthcoming.

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