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Review Article

Endodontic treatment considerations in patients with special healthcare needs

Ainaa Abdulmoeen Alsharif[1]*, Osama Abdulmohsen Almuqhim[2], Sliman Mohamad Alhowimel[3], Alanoud Sameer Alfarran[4], Rakan Nejer Alotaibi[5], Zahra Ahmed Alhuwayji[6], Faisal Mohammed Al-Bakri[4], Ibtisam Abdulaziz Almotairi[7], Lama Salman Alhazmi[8], May Awad Alanazi[9], Lama Abdullah Alshumaymiri[10]

[1]Department of Endodontics, King Fahad General Hospital, Jeddah, Saudi Arabia
[2]University Medical Center, Majmaah University, Majmaah, Saudi Arabia
[3]Afif General Hospital, Afif, Saudi Arabia
[4]College of Dentistry, King Abdulaziz University, Jeddah, Saudi Arabia
[5]Ministry of Health, Riyadh, Saudi Arabia
[6]Armed Forces Hospital Southern Region, Khamis Mushait, Saudi Arabia
[7]Nujoom Al-Mahed Dental Complex, Mahd Al Dhahab, Saudi Arabia
[8]Al-Steen Dental Lab Center, Mecca, Saudi Arabia
[9]College of Dentistry, Dar Al Uloom University, Riyadh, Saudi Arabia
[10]King Fahad Military Medical Complex, Damma, Saudi Arabia

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***Correspondence:**
Dr. Ainaa Abdulmoeen Alsharif,
E-mail: Aynaa_alsharif@hotmail.com

ABSTRACT

Individuals with special needs may have conditions that are either present from birth, arise from environmental factors, or are acquired later in life. These conditions can significantly restrict their ability to engage in everyday activities, such as self-care tasks and essential life activities. Special needs encompass a wide range of conditions, including physical, developmental, mental, sensory, behavioral, and emotional impairments. These individuals may face challenges in communication and cooperation during dental treatment. Various medical conditions, such as cardiovascular diseases, hypertension, diabetes, bleeding disorders, and pregnancy, also impact endodontic care. Management strategies include careful evaluation, the use of general anesthesia, and minimizing technical compromises. Dental professionals deal with individuals in their everyday routines who suffer from a variety of medical conditions and special circumstances The review further discusses considerations for patients with bleeding disorders, diabetes, lung disorders, HIV, and those undergoing cancer treatment. Finally, it highlights the unique challenges of providing endodontic care to elderly patients and COVID-19-positive individuals, emphasizing the importance of safety protocols during the pandemic.

Keywords: Endodontic treatment, Cardiovascular diseases, Hypertension, Diabetes, COVID-19

INTRODUCTION

Dental specialists today encounter a formidable challenge in the assessment and treatment of patients whose medical conditions have become increasingly complicated.[1] The American Academy of Pediatric Dentistry, in its 2021 publication, characterizes special health care needs as encompassing a broad range of conditions, including physical, developmental, mental,

sensory, behavioural, cognitive, or emotional impairments, or any other conditions that necessitate medical management, health care intervention, or specialized service programs.[2] Individuals with special needs may have conditions that are either present from birth (congenital), arise from environmental factors, or are acquired later in life. These conditions can significantly restrict their ability to engage in everyday activities, such as self-care tasks and essential life activities. Over the past half-century, life expectancy has experienced a notable increase, resulting in a larger population of elderly individuals. This demographic often presents with partial tooth loss, complex medical histories, and dependence on multiple medications. Dental professionals deal with individuals in their everyday routines who suffer from a variety of medical conditions and special circumstances, including cardiac ailments, respiratory disorders, hypertension, diabetes, bleeding disorders, pregnancy, and radiation therapy recipients.[3] Patients suffering from cardiac disorders, such as ischemic heart disease, hypertension, valvular irregularities, and heart murmurs, are particularly susceptible to angina or myocardial infarction. Dental healthcare providers must possess the knowledge and readiness to detect and manage these conditions, either by preventing adverse incidents or minimizing their impact. For dental patients contending with obstructive pulmonary ailments like chronic bronchitis, emphysema, and bronchial asthma, appropriate adjustments can be made to dental procedures to ensure their well-being. Diabetes, characterized by disruptions in insulin secretion and varying degrees of insulin resistance, necessitates a dental care approach that prioritizes periodontal health and the delivery of comprehensive treatment while minimizing disruptions to metabolic equilibrium and recognizing associated diabetic complications. To safeguard against complications ranging from minor inconveniences to life-threatening situations stemming from bleeding disorders, it is crucial for dentists to be proficient in diagnosing and managing such conditions within a dental setting.[4] To comprehensively evaluate a patient's medical status, meticulous history-taking assumes paramount significance. This article provides a concise overview of the aforementioned medical conditions and offers guidelines for endodontists on how to manage these conditions effectively within a dental practice.

METHODOLOGY

This study is based on a comprehensive literature search conducted on October 12, 2023, in the Medline and Cochrane databases, utilizing the medical topic headings (MeSH) and a combination of all available related terms, according to the database. To prevent missing any possible research, a manual search for publications was conducted through Google Scholar, using the reference lists of the previously listed papers as a starting point. We looked for valuable information in papers that discussed endodontic treatment considerations for patients with special healthcare needs. There were no restrictions on date, language, participant age, or type of publication.

DISCUSSION

The process of selecting endodontic cases and planning treatments for individuals with special needs, like any other patients, involves evaluating their affected teeth.[5] However, this evaluation can be particularly challenging due to potential issues related to patient cooperation and communication skills.[6] Patients with special needs sometimes exhibit defensive behaviors and heightened anxiety in dental settings, producing multiple challenges for dental practitioners when providing treatment to this diverse population.[5,7] These challenges encompass limited diagnostic resources, such as dental and radiographic examinations, the need for single appointment procedures under general anesthesia, increased costs and risks, complex follow-up treatments, and a lack of awareness regarding oral health in these individuals.[2] These difficulties can hinder endodontic treatment, especially in cases involving periapical pathosis or higher levels of complexity. Regardless of the treatment's complexity, it is crucial to ensure that all interventions are evidence-based. With advancements in technology and healthcare, the life expectancy of individuals with special needs has increased, emphasizing the importance of maintaining functional dentition.[6] This shift has moved the treatment approach from extracting teeth as the first option to providing tooth retention options, including endodontic therapy. Multiple extractions and tooth loss can exacerbate nutritional problems, especially in individuals with mental or cognitive impairments who may struggle with removable prostheses and lack resources for fixed prostheses or implants. Therefore, delivering high-quality dental care is essential to minimize the need for extractions. To address the challenges of providing dental treatment to patients with special needs, dental practitioners sometimes choose to perform treatments under general anesthesia, which is considered a safe alternative to non-pharmacological behavioral guidance techniques or no treatment at all.[6,8] General anesthesia provides a conducive environment for both qualitative and quantitative dental work, allowing for more extensive treatment in a single session and reducing the impact of patient cooperation issues. However, it is important to acknowledge that endodontic therapy under general anesthesia can be complex, considering that patients with special needs often have a higher incidence of concomitant systemic diseases, increasing the risk of infectious complications. General anesthesia can also lead to intra- and post-operative complications, including nausea, vomiting, dysrhythmia, airway obstruction, blood pressure changes, and laryngospasms, all of which can be life-threatening in compromised patients.[8] Furthermore, the unique challenges of endodontic treatment under general anesthesia, such as limited mouth opening due to intubation, the need for a brief treatment session, and the necessity to complete as much treatment as possible during that time, can make the process more demanding.

In some cases, technical compromises may be necessary to shorten the treatment duration, affecting steps like rubber dam placement, access, pulpal diagnosis, instrument sequence, working length determination, irrigation quantity, obturation technique, and coronal restoration placement.[6] However, any modifications to these steps must ensure minimal compromise to the high technical quality of care provided, as the goal is to minimize the risk of endodontic failure. Frequent repetitions of general anesthesia should be avoided, and the aim is to reduce the incidence of dental practitioners opting for extractions over saving teeth.

ENDODONTIC CONSIDERATIONS IN CARDIOVASCULAR DISORDERS PATIENTS

Modern times have seen a rise in cardiovascular diseases, emphasizing the need for dentists to be aware of precautions when treating such patients. Valuable guidance is available in the AHA/ACC Guideline for valvular heart disease, ensuring safer dental care for heart patients.[9]

Hypertension

Hypertension, characterized by elevated blood pressure, depends on cardiac output and vascular resistance. Hypertensive patients, defined by treatment or high blood pressure readings, face acute complications like heart attacks and strokes, along with chronic risks.[10] In dental care, guidelines suggest medical consultation for patients with severe hypertension (SBP>180/DBP>110), while vasoconstrictors like epinephrine are generally safe for moderate hypertension.[11] However, advanced cases require caution, and emergency dental treatment necessitates medical consultation. For SBP of 160-179/DBP of 100-109, limited epinephrine use is recommended. Avoiding retraction cords with epinephrine and certain injections is advised in these patients. Precise care is crucial for hypertensive individuals during dental procedures.[11,12]

Ischemic heart disease

Ischemic heart disease, a result of advanced coronary atherosclerosis, is a prevalent condition, particularly among the elderly, often manifesting as angina or heart failure. Angina, a common symptom, can be triggered by physical exertion, stress, and even dental procedures. In endodontic management for patients with ischemic heart disease, several key considerations are essential. These include scheduling morning appointments, keeping appointments brief, providing anxiolytic drugs or nitrous oxide/oxygen sedation for anxiety control, minimizing the use of vasoconstrictors, ensuring effective pain management during and after dental procedures, and, in some cases, considering cardiac monitoring. These measures help ensure the safety and well-being of patients during dental care.[13]

Valvular disease

Patients with valvular disease undergoing dental treatment pose specific concerns related to infective endocarditis and anticoagulant therapy-related bleeding risks. In endodontic management, assessing the type of heart condition and the potential for bacteremia from the dental procedure is crucial. Recent guidelines recommend antibiotic prophylaxis solely for high-risk valvular disease patients during specific dental procedures involving gingival or periapical tissue manipulation. Routine nonsurgical root canal procedures, including local anesthesia, rubber dam placement, and canal instrumentation confined within the canal system, generally carry a minimal infective endocarditis risk. Bacteremia risk in such cases is low, with bacteria rapidly cleared from the bloodstream, rendering antibiotic prophylaxis unnecessary in most instances. These guidelines ensure a balanced approach to dental care for valvular disease patients.[1]

ENDODONTIC CONSIDERATIONS IN BLEEDING DISORDER PATIENTS

In patients with bleeding disorders, the administration of inferior alveolar nerve-block anesthesia presents a significant risk of hematoma formation, potentially compromising the airway. Preoperative prophylactic coverage should be discussed with the hematologist before any local anesthesia on the floor of the mouth or lingual infiltration. Articaine, a local anesthetic with unique properties, can be employed for buccal infiltration into the mandibular first molars, offering effective results and improved patient acceptance. A mental nerve block injection in the mandibular arch is a safer alternative. Other techniques, like sedation with diazepam or nitrous oxide oxygen analgesia, can reduce the need for anesthesia.[14] Dental pain management in these patients should avoid aspirin and non-steroidal anti-inflammatory drugs (NSAIDs), which can exacerbate bleeding tendencies. Paracetamol is a suitable analgesic option.[15] Non-surgical endodontic treatment is generally low-risk and can be performed without modifying anticoagulant therapy. Rubber dam usage, precise working length calculation, and careful instrument selection minimize trauma. Surgical endodontic procedures may necessitate hematologist consultation for adjustments in anticoagulant therapy or replacement therapy in cases of clotting factor or platelet deficiencies. Overall, careful consideration and communication with hematologists ensure safe endodontic care for patients with bleeding disorders.[16,17]

ENDODONTIC CONSIDERATIONS IN A DIABETIC PATIENT

Diabetes mellitus is a complex metabolic disorder characterized by disrupted glucose, fat, and protein metabolism due to impaired insulin secretion or resistance. Diagnosis is based on fasting blood glucose

levels, with values over 125 mg/dl indicating diabetes and levels between 110-125 mg/dl indicating impaired glucose tolerance. Hemoglobin A1c (less than 6 HbA1c) serves as a valuable marker for long-term glucose control, aiding in the management of diabetes and reducing complications.[1] Oral health in diabetes is a significant concern, as poorly controlled diabetes is associated with gingivitis, periodontitis, and delayed wound healing.[18,19] When treating diabetic patients, careful appointment scheduling and consideration of nutritional consistency are vital, especially in those taking insulin or oral antidiabetic medications. Surgical procedures may necessitate antibiotic prophylaxis in poorly controlled diabetics due to altered neutrophil function. These measures help ensure optimal oral and overall health in diabetic individuals.[20,21]

ENDODONTIC CONSIDERATIONS IN A PATIENT WITH LUNG DISORDERS

Asthma is a respiratory condition characterized by reversible narrowing of the peripheral bronchi, heightened sensitivity to various triggers, and often allergic components.[22,23] It is important to differentiate between allergic and non-allergic asthma. In endodontic care, dentists must consider the potential for dental materials and products to exacerbate asthma, such as dentifrices, sealants, enamel dust, and methyl methacrylate. Certain patients with severe asthma, particularly those on high-dose systemic corticosteroids, may require prophylactic antibiotics and corticosteroid replacement therapy to prevent complications and adrenal suppression. Proper positioning of dental instruments and the avoidance of bacterial aerosols are crucial to preventing airway responses in sensitive individuals. Rubber dams should be used cautiously, and the dental team should be prepared to manage acute asthmatic attacks during treatment. Following endodontic procedures, acetaminophen is the preferred analgesic for asthmatic patients, although long-term use should be monitored due to the potential exacerbation of asthma. Careful consideration of asthma management is essential in dental care to ensure patient safety.[1]

ENDODONTIC CONSIDERATIONS IN AN HIV POSITIVE PATIENT

HIV-positive patients seeking dental care present unique considerations for endodontic treatment. HIV, a blood-borne retrovirus, is managed with highly active antiretroviral therapy (HAART), which has significantly improved patients' quality of life and longevity.[24,25] However, potential drug interactions and changes in pharmacokinetics can complicate treatment. Dentists must be aware of drug interactions between antiretroviral medications and those commonly administered in dental practice.[1] Understanding the metabolism pathways of these drugs and their potential interactions, is essential for patient safety. While antibiotic prophylaxis may be necessary for a small subgroup of advanced HIV patients, routine antibiotic coverage for dental procedures lacks substantial supporting evidence. Dental clinicians should also be aware of the medications their HIV-positive patients are taking, be prepared to prescribe alternatives to avoid interactions and educate themselves and their staff about occupational risks and post-exposure prophylaxis guidelines. As more HIV-positive individuals seek routine dental care, staying informed and cautious in treatment planning is paramount for their well-being.

ENDODONTIC CONSIDERATIONS IN A PREGNANT PATIENT

Pregnancy brings about various physiological changes and considerations for dental practitioners when providing endodontic care to pregnant patients. Understanding these changes is vital for the safety and well-being of both the mother and the unborn child. In terms of drug usage, many dental medications are generally safe during pregnancy, but caution is essential. Local anesthetics like lidocaine and prilocaine are considered safe for local anesthesia, while others like bupivacaine, mepivacaine, and articaine should be used with care. Vasoconstrictors in low concentrations, such as epinephrine, are acceptable. Antibiotics like penicillin, erythromycins, azithromycin, and cephalosporins are generally safe, while tetracycline should be avoided.[26] Nonsteroidal anti-inflammatory drugs (NSAIDs) like aspirin, diflunisal, ibuprofen, ketoprofen, and naproxen are discouraged, with acetaminophen being the preferred choice. Narcotic pain medications are relatively safe for short-term use. For anxiety, non-pharmaceutical methods are preferred, but, if necessary, benzodiazepines should be administered with caution. Nitrous oxide use is controversial. Most dental procedures are not contraindicated during uncomplicated pregnancies. Dental prophylaxis is encouraged, and invasive care for dental caries is essential. Local anesthetics and diagnostic procedures are considered safe, with proper precautions for radiographs. These precautions include high-speed film, limited exposures, and lead-apron protection for the patient.[1] Addressing patient fears and anxieties through counseling is crucial for ensuring their well-being during pregnancy.

ENDODONTIC CONSIDERATIONS IN A PATIENT UNDERGOING CANCER CHEMOTHERAPY AND RADIATION THERAPY

Endodontic considerations for patients undergoing cancer chemotherapy and radiation therapy require careful planning and attention to their unique medical needs. Before cancer treatment, it is crucial to eliminate all potential sources of infection and inflammation. Teeth with a poor long-term prognosis or non-restorable conditions should be extracted at least two weeks before radiation therapy begins. Symptomatic non-vital teeth can undergo endodontic treatment at least one week before starting chemotherapy. In some cases, antibiotic prophylaxis may be recommended (Figure 1).[27]

During chemotherapy, dentists should be aware of the patient's white blood cell count (WBC) and platelet status. Endodontic procedures can be considered when the neutrophil count is greater than 2,000 cells per cubic mm and platelet levels are higher than 50,000 per cubic mm. Post-radiation osteonecrosis (PRON) is a potential complication characterized by bone exposure in areas exposed to high radiation. To reduce the risk of PRON, treatment strategies may include choosing endodontic therapy over-extraction, performing atraumatic surgical procedures, using local anesthetics without or with low concentrations of epinephrine, and administering prophylactic antibiotics during the healing period.

Regimen	Drugs
Standard regimen	Adults: 2.0 g Amoxicillin Children: 50 mg/kg Amoxicillin
Patients allergic to penicillin or already taking penicillin class of medication	Adults: 2.0 Cephelexin or other 1st or 2nd generation cephalosporin Or 600 mg Clindamycin Or 500 mg Azithromycin or Clarithromycin Children: 50 mg/kg Cephelexin or other 1st or 2nd generation cephalosporin (Or) 20 mg/kg Clindamycin Or 50 mg/kg Azithromycin or Clarithromycin
Alternative IM/IV regime for patients allergic to penicillin and unable to take oral medications	Adults: 1.0g IM or IV Cefazolin or Ceftriazone Or 600 mg IM or IV Clindamycin Children: 50 mg/kg IM or IV Cefazolin or Ceftriazone Or 20 mg/kg IM or IV Clindamycin within 30 min. before the procedure.

Figure 1: Antibiotic prophylaxis in a patient undergoing cancer chemotherapy and radiation therapy.[27]

ROOT CANAL TREATMENT FOR ELDERLY PATIENTS

Root canal treatment in elderly patients presents unique challenges due to factors such as calcification, limited pulp chamber space, and various medical conditions that may contraindicate the procedure. However, preserving teeth in elderly patients offers numerous benefits, including maintaining oral function, supporting dentures, and preserving bone structure.[28] To successfully manage root canal treatment in elderly patients, several key considerations should be kept in mind: obtaining informed consent, evaluating medical history and medications, addressing emotional needs, prescribing prophylactic antibiotics when necessary, considering challenges with pulp vitality tests and anesthesia, choosing appropriate anesthetics, protecting patients' eyes, carefully assessing preoperative radiographs, addressing access cavity challenges innovatively, using magnification and transillumination, ensuring patient comfort, employing rubber dam isolation, opting for single-visit treatment when suitable, recognizing working length determination challenges, and utilizing NiTi instrumentation. These considerations are crucial for providing effective and safe root canal treatment for elderly patients, ultimately helping to preserve their oral health and quality of life.

ENDODONTIC EMERGENCY TREATMENT DURING RESPIRATORY PANDEMICS

In light of the COVID-19 pandemic, dental healthcare providers (DHCPs) faced significant challenges when dealing with dental emergencies in COVID-19 positive patients.[29] Current guidelines from the ADA, CDC, and NIH advise limiting dental work to emergencies only during respiratory pandemics due to the high-risk classification of DHCPs. Managing dental pain in known COVID-19 patients becomes a necessity, and while antibiotics may not be effective, there is no consensus on treatment protocols. Concerns regarding viral load transmission during endodontic procedures raise questions about the safety of such treatments. Portable dental operatories with mobile negative pressure rooms are considered. Enhanced requirements, including full face protection and powered air purifying respirators, are recommended. Pretreatment radiographs should be limited, and preoperative mouth rinses may reduce the viral load. Definitive treatment should be postponed until the patient recovers, following CDC guidelines. These provisions aim to ensure operational excellence in the "new normal" of dental care in the midst of pandemics.

CONCLUSION

It is important of understanding and addressing the unique needs and challenges faced by patients with special healthcare needs in the context of endodontic treatment. The review emphasizes the significance of evidence-based care, careful consideration of medical conditions, and adherence to safety protocols, especially in the current COVID-19 pandemic. This review serves as a valuable resource for dental practitioners seeking to provide optimal care to these patient populations.

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