



REVIEW ARTICLE

Evaluating and Managing Specific Medical Conditions in Dental Practice: A Review of Pre-Treatment Protocols

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ABSTRACT

Oral health-related quality of life plays a crucial role in dental practice. Numerous systemic factors, including inadequate nutrition, tobacco use, stress, medication consumption, and diabetes, among others, have been demonstrated to affect oral health. Specific systemic treatments, such as chemo-radiotherapy for head and neck malignancies, cardiac valve replacement, bisphosphonate therapy, and allogeneic hematopoietic stem cell transplantation (HSCT), can impact oral health both during and after the primary treatment. Providing dental care for medically compromised individuals can be complex, particularly with regard to dental procedures and urgent care. An essential aspect of healthcare involves modifying dental treatments for patients whose medical conditions necessitate alterations. For these patients, dental examinations and clearances offer opportunities to deliver comprehensive preventive care that transcends professional boundaries. These consultations also provide occasions to propose treatment options before, during, and after dental visits. While numerous research studies have explored this topic, dental practitioners have not widely adopted it due to limited understanding of medical conditions. Given these clinical challenges, it is imperative to address and elucidate the dental clearance issue for common medical conditions frequently encountered in dental practice. Furthermore, there is a necessity to establish clinical protocols for assessment and management prior to medical procedures.

Keywords: Radiotherapy, MRONJ, Bisphosphonate, allHSCT

Introduction

Oral health care is a vital aspect of overall medical care, and neglecting it can lead to severe health issues that can negatively impact an individual's quality of life. Various conditions in an individual's daily life can impact the oral health-related quality of life (QoL).^{1,2} Individuals underwent certain procedures for medical conditions like chemo-radiotherapy for head and neck cancer, valve replacement for cardiac issues, bisphosphonate therapy and allogeneic haemopoietic stem cell transplantation (HSCT) can affect good oral health during and after the definitive treatment.^{3,4} The management of patients who require dental treatment modifications based on their medical condition is an important aspect of healthcare.⁵ Patients scheduled for such procedures can be referred to specialist hospital dental units, departments of dental-maxillofacial surgery, or their general dentists for comprehensive oral health assessment and treatment before undergoing the definitive medical procedure.⁶ However, managing the oral health of medically compromised patients can be challenging, particularly regarding dental therapy and emergency care. Furthermore, the absence of standardized protocols for conducting thorough and accurate screenings and providing the necessary dental treatments is a contentious issue.⁷

The guidelines recommend by the European Society of Cardiology (ESC) that the implantation of prosthetic valves or other foreign materials in the heart or blood vessels only after potential sources of dental sepsis should be identified and treated at least two weeks prior.⁸ According to the American Heart Association (AHA) guidelines, a preoperative dental evaluation is advised before medical treatment to complete any necessary dental treatment. Consequently, general dentists and specialist centers receive numerous requests from physicians for urgent dental assessments and treatments before invasive procedures.⁹ Nonetheless, these guidelines do not prescribe explicit instructions for conducting a dental screening process or delineate the criteria that constitute an oral or dental infection. This lack of clarity can make it challenging to accurately diagnose, particularly in the field of endodontics, where indications of infection may not be immediately apparent. While dentists are ultimately responsible for potential complications arising from their treatment, it is crucial for them to have access to the patient's comprehensive medical information.¹⁰

In numerous cases, dentists must often seek the advice of physicians when undertaking routine dental procedures, including cleanings, extractions, restorations, endodontic treatments, abscess drainage, or mucosal biopsies.¹¹ The level of care provided in managing a patient's dental health may vary depending on the individuals involved, yet it is expected that they will follow stringent screening and adhere to a standard of care that is of the highest quality.¹² Moreover, dental management requires modifications in the treatment procedures to account for relevant medical conditions, which minimizes the risks of complications, treatment costs, stress, and inconvenience.¹³ Dental consultations and clearance in these patients present opportunities to offer comprehensive preventive care that transcends

disciplinary boundaries and to provide recommendations for treatment options both prior to, during, and following dental visit.^{14,15}

Several studies have explored this topic in the literature; however, owing to limited knowledge about medical conditions, its acceptance among general dental practitioners is lacking. Based on the above-mentioned clinical concerns, there is a need to enlighten and address the dental clearance issue of common medical conditions that frequently occur in dental practice and to establish clinical operation standards for assessment and treatment before medical procedures.

1. Dental Management of Head and Neck Cancer Patients undergoing Radiotherapy

Head and neck cancers are a group of cancers that affect various parts of the head and neck, including the mouth and throat. The most common symptom of head and neck cancers is a persistent sore throat. When diagnosed early, head and neck cancers are often treatable, and many cases are preventable.¹⁶ Head and neck cancer is primarily treated through surgery, radiotherapy, and chemotherapy. Radiotherapy constitutes a crucial component of the treatment regimen and may result in various adverse effects, including dental complications, which are contingent upon patient- and treatment-related factors. Xerostomia, mucositis, candidiasis, post-radiotherapy dental decay, and osteoradionecrosis are common oral complications that can affect a substantial number of patients undergoing radiotherapy. Up to 90% of patients may experience xerostomia, whereas mucositis, candidiasis, post-radiotherapy dental decay, and osteoradionecrosis may affect more than 60%, 40%, and 50% of patients, respectively.¹⁸ Considering the prevalence of these complications, it is critical to assess and manage oral health before radiotherapy. Implementing specific preventive, restorative, and rehabilitative management strategies can help minimize the risk of developing complications both during and after radiation therapy for such patients.¹⁹

1A. DENTAL ASSESSMENT BEFORE RADIOTHERAPY.

Patients with head and neck cancer should always be managed using a multidisciplinary team (MDT) approach to assess, diagnose, and treat their condition. This approach includes dental specialists and health practitioners who provide preventive dental care education.²⁰ Obtaining a comprehensive medical and dental history is crucial for identifying important factors related to cancer diagnosis, such as tumor type, staging, location, and its proximity to adjacent structures.²¹ In addition, treatment-related factors, including radiation dose, field size and location, and chemotherapy or surgery, must be taken into account. It is essential for patients to be informed that doses exceeding 60 Gy, especially in areas close to the major salivary glands, can increase the risk of complications. Evaluating a patient's motivation and capacity to maintain oral hygiene regimens is essential but challenging during the brief pre-radiotherapy phase.²² The patient's current oral hygiene practices and past interactions with dental healthcare professionals may offer valuable insights. It is also important to address risk factors such as smoking and alcohol cessation. Lastly, a comprehensive clinical and

radiographic examination should be conducted, and a treatment plan that considers all these factors should be developed.²³

1B. DENTAL TREATMENT BEFORE RADIOTHERAPY.

i) Restorative and Endodontic Treatment

Before initiating radiotherapy, it may be necessary to perform simple restorations. In cases where definitive restorations cannot be completed within a given timeframe, provisional glass ionomer cements (GICs) are often the most suitable option. Additionally, scaling, prophylaxis, and the application of fluoride should all be performed. Amalgam restorations are typically discouraged as they can result in back-scatter and lead to local mucositis. In order to prevent trauma to irradiated soft tissues, it is recommended to smooth or repair any sharp cusps or restorations.²⁴ Dentures should be regularly assessed to ensure proper fit and to prevent any potential issues such as ulceration. It is important to advise patients to refrain from using dentures until their radiotherapy treatment is completed. Taking impressions is crucial for creating study models and medicament trays or soft mouth guards at a later time.²⁵

ii) Extraction consideration

Decisions about pre-radiotherapy extractions aim to minimize the risk of osteoradionecrosis (ORN). Although the primary concern is the patient's well-being, the potential influence on their quality of life should not be overlooked.²⁶ The decision-making process is significantly influenced by the patient's ability and willingness to perform thorough oral hygiene, as well as their past history of dental service usage.²⁷ The extraction protocol is applicable to teeth with irreparable caries or caries extending to the gingival margin, teeth with extensive and compromised restorations, and those exhibiting severe erosion or abrasion, in conjunction with substantial periodontal attachment loss (pocketing exceeding 5 mm).²⁸ Typically, the extraction of anterior mandibular teeth is not performed unless the primary tumor is located within the oral cavity. Regarding impacted third molars, the available evidence concerning their extraction or retention prior to radiotherapy remains inconclusive.²⁹ When managing at-risk teeth, it is important to exercise clinical judgment, and extracting healthy teeth just because they are located in the radiation field seems unnecessary.³⁰ A two to three-week waiting period before radiotherapy for mucosal healing is deemed appropriate and should not be postponed for complete dento-alveolar bone remodelling, which typically takes several months and occurs concurrently with radiotherapy. After radiotherapy, patients are monitored through three-monthly follow-up appointments, daily use of fluoride and bicarbonate rinses, and any necessary dental restorations.^{31, 32}

2. Dental Management of Cardiac Patients undergoing Cardiothoracic Surgery and Interventional Cardiovascular Procedures.

Cardiovascular disease (CVD) is one of the leading causes of death worldwide. Individuals who have cardiovascular disease (CVD) often have additional chronic comorbid conditions that increase their risk of mortality.³³ The absence of standardized protocols for conducting comprehensive and accurate dental assessments (screenings) and providing necessary dental treatments,

as well as managing cardiac patients, presents a significant challenge in this critical phase of therapy for patients awaiting cardiac interventions, given the involvement of various professionals.³⁴

The effectiveness of dental care delivery is contingent upon multiple factors, including the patient's health status, the duration allocated for treatment, and the treatment prognosis for each individual tooth.³⁵ Nevertheless, dental practitioners often lack information regarding the timing of cardiac interventions, while cardiologists are typically unaware of the nature, significance, or complexity of the dental procedures/treatments required for their patients. Ultimately, it cannot be determined by either the cardiac specialist or the dental team whether the potential benefits of addressing an oral or dental infection in a patient with a severe cardiovascular condition outweigh the potential risks connected with the procedure.³⁶

2A. DENTAL ASSESSMENT BEFORE DEFINITE CARDIAC INTERVENTION

The AHA and the ESC recommend dental screening for patients who require elective cardiac surgery, according to guidelines. However, there is no established or universal protocol for the dental and oral screening process, nor is there consensus on the specific dental treatments that should be performed immediately or postponed until after the cardiovascular intervention.^{37,38} Recommendations for eradicating potential sources of dental sepsis before the placement of intracardiac or intravascular foreign materials, such as prosthetic valves, should be followed at least two weeks prior, unless the procedures are urgent.³⁹ The feasibility of administering suitable dental treatment is contingent upon the patient's status, the available time, and the prognosis for the required treatment for each individual tooth. Effective management of patients with infective endocarditis involves comprehensive questioning to identify all possible risk categories in their health history.⁴⁰ In instances of uncertainty, it is essential to seek guidance from the patient's physician. Moreover, it is crucial to employ good oral hygiene practices that enhance gingival health while minimizing the risk of bacteraemia.

2B. DENTAL TREATMENT BEFORE CARDIAC INTERVENTION

The complexity of the oral cavity makes it one of the most intricate bacterial ecosystems in the body, and oral bacteria have repeatedly been linked to bloodstream infections in patients, particularly those with periodontal and/or periapical infections. In individuals with severe gum inflammation, initial oral hygiene measures should involve gentle procedures.⁴² Oral irrigators are typically not recommended as they can spread bacteria. Susceptible patients should maintain optimal oral hygiene once the inflammation is under control. It is essential to eliminate severe periodontal disease and any areas of infection or suppuration in the mouth.⁴³ Before all procedures, including periodontal probing, pre-treatment Chlorhexidine mouth rinses are advised to significantly minimize the bacterial presence on mucosal surfaces. Avoiding dental extraction in healthy mouths is recommended when feasible.⁴⁴ Endodontic therapy is the preferred treatment option, and single extraction is preferred over multiple extractions. Antibiotic prophylaxis

is required for all dental treatment procedures. In order to ensure optimal oral health, it is recommended that patients with infective endocarditis schedule their appointments at least 10 to 14 days apart.⁴⁵ However, if this interval cannot be maintained, an alternative antibiotic regimen should be administered for appointments that are within 7 days of each other. It is essential to emphasize the importance of regular recall appointments that emphasize oral hygiene reinforcement and the maintenance of oral health. These appointments are particularly crucial for patients with infective endocarditis.^{46,47}

3. Dental Management of Patients Undergoing Bisphosphonate Therapy.

Bisphosphonates are a type of medication that is used to treat a variety of metabolic disorders, including osteoporosis, Paget's disease, breast cancer, prostate cancer, and multiple myeloma, which inhibit bone resorption due to their action on osteoclasts.⁴⁸ Although bisphosphonates have demonstrated effectiveness in the treatment of several metabolic bone diseases, they can impede bone healing and remodeling, leading to an elevated risk of medication-related osteonecrosis of the jaw (MRONJ) following dental surgical procedures like extraction or implant placement.⁴⁹ The likelihood of developing MRONJ rises with the duration of drug administration. Patients receiving intravenous bisphosphonates are at a more significant risk of MRONJ than those receiving oral bisphosphonates.⁵⁰

3A. DENTAL ASSESSMENT BEFORE BISPHOSPHONATE THERAPY.

Dental health assessments are strongly recommended prior to bisphosphonate treatment by oral surgeons, dental specialists, or well-trained general dental practitioners. The assessing clinician should aim to eliminate or reduce risk factors for MRONJ.⁵¹ To promote oral health, the removal of infected or non-restorable teeth should be considered, and follow-up examinations should be scheduled to monitor healing progress. Furthermore, dental restorations, scaling, polishing, and denture adjustments should be evaluated for future planning before bisphosphonate therapy commences.⁵²

3B. DENTAL TREATMENT BEFORE BISPHOSPHONATE THERAPY.

According to the best practices, it is recommended that bisphosphonate therapy be initiated only after dental health has been fully optimized. This decision involves close collaboration between the primary care physician, dentist, and specialists. The focus during this stage should be on preserving restorable teeth and completing any necessary surgeries at least four to six weeks prior to beginning bisphosphonate treatment. This provides ample time for osseous healing.⁵²

Root canal therapy has demonstrated successful outcomes in alleviating discomfort and preventing dental extractions that could potentially lead to MRONJ if immediate radiation therapy is initiated. In cases where tooth removal is unavoidable, preserving the tooth root is advised to reduce the extent of bone and oral tissue trauma.⁵³

Nonsurgical endodontic procedures are generally considered safe, although care should be taken when adjusting rubber dams and clamps. These treatments not only serve to preserve teeth, obviating the need for extraction and significantly reducing the risk of apical periodontitis, but also decrease the likelihood of developing MRONJ during therapy. In the course of shaping and cleaning during root canal treatment, the inner pulp and dentin of the tooth become vulnerable to oral bacteria, which can result in harm to the soft tissue during the process of cleaning the root or applying a rubber dam. This increased susceptibility to infection further heightens the likelihood of developing MRONJ.^{54, 55}

Implant in Bisphosphonate therapy.

Patients who are administered intraoral bisphosphonate therapy for fewer than five years and follow proper operative care pose a low risk for MRONJ after dental implantation. In contrast, intravenous bisphosphonate therapy increases the likelihood of complications, which makes dental implant placement a high-risk option. To ensure implant safety, it is crucial to take preoperative measures such as assessing drug withdrawal, administering antibiotics, and implementing follow-up protocols.⁵⁵ Combining treatments such as PRP, PRF, and PRGF can improve wound closure and support the healing process for dental implants. The method and duration of bisphosphonate administration play a significant role in determining the success of dental implants and the risk of MRONJ. Dental practitioners must assess patients' conditions thoroughly and follow stringent post-implantation protocols, particularly for those receiving bisphosphonate therapy, in order to minimize the likelihood of MRONJ and optimize the success of dental implant treatments.^{56,57}

Prosthetic management for patients who have not undergone implant procedures poses minimal risk compared to more invasive oral surgical procedures such as extractions and implants.⁵⁸ Patients who have developed MRONJ can still receive prosthetic rehabilitation for both aesthetic and functional purposes.⁵⁹ However, if any discomfort occurs, it is crucial to report it promptly to adjust or replace dentures to minimize soft tissue trauma. To ensure optimal results, close monitoring of the denture-bearing tissues and prosthesis is recommended every 2-to-3-month intervals.^{60,61}

4. Dental Management of patients undergoing Allogeneic Hematopoietic Cell Transplantation

Allogeneic hematopoietic cell transplantation (alloHSCT) is a potentially curative and life-extending treatment for malignant and non-malignant hematopoietic disorders. However, it necessitates conditioning chemoradiotherapy, which results in profound immunosuppression, thereby increasing the risk of life-threatening infections for patients undergoing this therapy.⁶² The significance of oral health issues is highlighted by the extent of dental care needs observed in patients undergoing hematopoietic stem cell transplantation (HSCT) at the time of the procedure. Typically, individuals scheduled for alloHSCT have a dental assessment conducted before the transplant, as untreated oral infections can pose threats

during and following the procedure.⁶³ This process consists of evaluating and managing a patient's dental health by addressing any appropriate dental needs based on their medical status. This entails identifying acute oral infections, dental issues that may impact treatment, and conditions that could become acute infections during planned medical care.⁶⁴

4A. DENTAL ASSESSMENT BEFORE UNDERGOING ALLOGENEIC HEMATOPOIETIC CELL TRANSPLANTATION

The appropriate dental evaluation entails not only providing proper education and preparation for patients undergoing transplantation but also addressing their oral health from a healing perspective. Dental healthcare providers cannot guarantee the resolution of dental issues due to the inability to forecast future infection development or a patient's oral and systemic disease progression.⁶⁵ To achieve optimal results, the primary objective should be to eliminate potential sources of immediate and future infections or complications. Although there isn't a definitive agreement on how to plan dental treatments, standard recommendations include addressing oral infection foci.⁶⁶ This is because immunosuppressive therapies may increase the risk of bacteremia from active infectious sites and decrease the patient's ability to handle these changes. Several dental treatment approaches have been suggested. For individuals receiving dental assessments, it is critical to inform them about potential oral complications and provide them with the necessary resources to maintain good oral health throughout their treatment.⁶⁷ Motivational interviewing can help patients comprehend the significance of their oral health and take charge of it. Effective preventive care before transplantation involves providing oral hygiene instructions, professional dental cleaning, fluoride treatment, and chlorhexidine gluconate 0.12% rinse to minimize oral hygiene issues and reduce the microbial load, which can ultimately decrease the risk of infection.^{68,69}

4B. DENTAL TREATMENT BEFORE UNDERGOING ALLOGENEIC HEMATOPOIETIC CELL TRANSPLANTATION

The objective of dental treatment before transplantation is to manage dental caries and periodontal disease to the best of our ability. It's also crucial to take steps to prevent soft tissue trauma. Delayed healing can pose challenges during dental procedures, particularly for patients undergoing chemotherapy or radiotherapy.⁷⁰ Dental procedures, such as tooth extraction, may still be performed, but the timing of the transplantation and the patient's haematological status must be carefully considered.⁷¹ Optimally, any invasive dental procedure should be completed a minimum of two weeks prior to the initiation of the conditioning regimen to allow adequate time for soft tissue healing. Collaboration with the patient's oncology team is imperative before proceeding with any invasive dental intervention.⁷² The patient's hematological status will determine the necessary precautions that must be implemented. Patients should have an absolute neutrophil count of less than 500/mL before invasive dental procedures can be performed. In instances where the neutrophil count is between 500 and 1000/mL, prophylaxis may be considered based on other patient factors, if invasive dental treatment cannot be postponed, antibiotic prophylaxis should be administered before the procedure. In cases where the platelet count is

as low as 50,000/mL, local haemostatic measures may be enough. Platelet transfusions should be considered both before and after an invasive procedure in patients with a platelet count of $\leq 30,000$ /mL.^{73,74}

It is important to note that the patient's haematological status and timing of the transplantation must be carefully considered before proceeding with any dental procedures. Invasive dental treatment should ideally be completed at least two weeks before the start of the conditioning regimen to allow sufficient time for soft tissue healing.^{75,76} However, if the procedure cannot be postponed, antibiotic prophylaxis should be administered before the procedure. The patient's haematological status will determine the appropriate precautions that must be taken. Patients should have an absolute neutrophil count of less than 500/mL before invasive dental treatment can be carried out. If the neutrophil count is between 500 and 1000/mL, prophylaxis may be considered based on other patient factors. In cases where the platelet count is as low as 50,000/mL, local haemostatic measures may be sufficient. However, platelet transfusions should be considered both before and after an invasive procedure in patients with a platelet count of $\leq 30,000$ /mL. Collaboration with the patient's oncology team is essential before proceeding with any dental treatment that is invasive.^{77,78,79}

In summary, it is crucial to take the patient's haematological status and timing of the transplantation into account when performing dental procedures. Invasive dental treatment should be completed at least two weeks before the start of the conditioning regimen to allow for sufficient soft tissue healing. If the procedure cannot be postponed, antibiotic prophylaxis should be administered before the procedure. The patient's haematological status will determine the appropriate precautions that must be taken, and collaboration with the patient's oncology team is essential before proceeding with any dental treatment that is invasive.

Conclusion

The preceding comprehensive analysis highlights the necessity of maintaining a wide-ranging knowledge of diverse medical conditions and their associated dental treatment approaches. When preparing for dental procedures on patients with health complications, it is crucial to have a thorough understanding of the patient's particular condition and its potential impact on their physiological responses to dental interventions and subsequent healing process. Moreover, the capacity to skill-fully manage possible complications is vital and will be further discussed in the upcoming exploration of specific medical conditions.

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