



Dental Management in the Immunocompromised Children: A Review

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Oral manifestations of oropharyngeal infections in immunocompromised individuals pose a unique challenge for medical and dental specialists, as clinical signs and symptoms could be minor, making correct diagnosis and treatment difficult. Effective infection control and oral symptom management are critical, and they can be done by the careful use of topical and systemic medicines, as well as proper oral hygiene. According to current guidelines, children should receive an oral examination before starting cancer treatment. Before the commencement of cancer treatment-related oral issues, a pretreatment examination helps develop a dentist-child relationship. Intensive mouth care is critical because it reduces the chance of developing moderate/severe mucositis while also reducing the risk of septicemia and oral infections. Almost all of the therapy's oral side effects are caused by stomatotoxicity, either direct or indirect. The purpose of therapy for this patient group is to keep the oral mucosa healthy, avoid secondary infection, relieve pain, and maintain nutritional intake. In this narrative review we will be looking at evaluation, prevention and management of dental complications in immunosuppressed children.

Keywords: *Dental management; immunocompromised; oral manifestations.*

1. INTRODUCTION

All patients undergoing immunosuppressive therapy should have an oral examination prior to initiation of management to their case. Prevention and treatment of pre-existing or concomitant oral disease is essential to minimize complications in this population. The key to success in maintaining a healthy oral cavity during therapy is patient compliance. The child and the parents should be educated regarding the possible acute side effects and the long-term effects of immunosuppressive treatments in the mouth. All patients should be managed separately by direct meetings with the physicians or other dental professionals consulted before dental treatment begins [1].

Children experience dental and oral care issues at various stages of cancer therapy and after the treatment is completed. From a dental standpoint, a pediatric patient receiving oncology treatment may: (1) have untreated dental caries, periodontal disease, and/or pathologic lesions of the oral hard and soft tissues; (2) have oral manifestations of the cancer; (3) develop oral complications as a result of cancer therapies; and (4) develop long-term dental and orofacial complications after completion of cancer therapies [2].

Individuals infected with the human immunodeficiency virus (HIV) are increasingly seeking dental treatment. Despite the extremely minimal risk of professional transmission, which increases mainly in patients with a very high viral load, some professionals are nonetheless hesitant to treat these patients. Even in patients with significant immunologic impairment, the rate of problems following dental repair is relatively low. The dentist should pay close attention to the seropositive patient's overall clinical position, immunologic and HIV virologic status, as well as the presence of hemostasis abnormalities or other concurrent disorders [3].

Oral manifestations of oropharyngeal infection in immunocompromised individuals pose a unique challenge for medical and dental specialists, as clinical signs and symptoms can be minor, making correct diagnosis and treatment difficult. Effective infection control and oral symptom management are critical, and they can be done by the careful use of topical and systemic medicines, as well as proper oral hygiene. Mucosal breakdown prevention, microbial colonisation suppression, viral

reactivation control, and appropriate care of severe xerostomia are all important stages in reducing oromucosal infection morbidity and mortality in the highly immunocompromised patient [4].

For efficient mastication, speaking, good dental health and dentition are essential. Dental caries could lead to discomfort and infection if left untreated. Chronic infection around one or more teeth might harm localized structures, including growing permanent teeth. Children who are medically compromised (i.e., those who are immunocompromised as a result of disease or therapy) are more likely to develop systemic consequences from oral infections, which can be lethal. The responsibility of the general pediatrician in emphasizing the importance of good dental health for all children, particularly those who are "at risk," is highlighted [5].

2. INITIAL EVALUATION

A medical history review should include, but not be limited to, disease/condition (type, stage, prognosis), treatment protocol (conditioning regimen, surgery, chemotherapy, radiation, transplant), medications (including bisphosphonates), allergies, surgeries, secondary medical diagnoses, hematological status (complete blood count [CBC]), coagulation status, immunosuppression stats, hematological status (complete blood count [CBC]), coagulation status, immunosuppression stats, and secondary (s). Include the type of transplant, the HCT source (bone marrow, peripheral stem cells, cord blood stem cells), and the patient's age. Matching status, donor, conditioning process, expected transplant date, and GVHD prophylaxis are all factors to consider. Patients with weakened immune systems may be unable to endure a transitory bacteremia as a result of invasive dental operations [1].

According to current guidelines, children should receive an oral examination before starting cancer treatment. Before the commencement of cancer treatment-related oral issues, a pretreatment examination helps develop a dentist-child relationship. The exam entails a clinical and radiographic evaluation of the oral cavity, allowing the pediatric dentist to develop caries prevention plans and provide proactive advice based on the child's medical diagnosis and impending therapies. The dentist should inform the oncology team on the child's dental and oral health. The degree of dental caries, the

invasiveness of suggested dental therapy, and the presence of pathologic lesions, if any, should all be included in this letter. If dental caries, periodontal disease, or pathologic oral lesions are discovered before cancer treatments begin, the necessary dental care should be done within the safety net of medical clearances and without causing needless delays in cancer treatment [2,3,6,7].

The requirement for antibiotic prophylaxis for dental operations should be decided in collaboration with the child's physician. The American Heart Association's standard endocarditis prevention regimen is an acknowledged option unless your doctor advises otherwise [1].

3. DENTAL AND ORAL CARE BEFORE THE INITIATION OF IMMUNOSUPPRESSIVE THERAPY

Before beginning treatment, a dental/oral examination has three goals:

- to communicate with the medical team about the patient's oral health status, treatment plan, and timing without needlessly delaying or inducing complications.
- to identify and stabilize or eliminate existing and potential sources of infection and local irritants in the oral cavity without needlessly delaying or inducing complications.
- to inform the patient and parents about the necessity of proper oral hygiene in order to avoid oral problems/discomfort before, during, and after treatment, as well as the therapy's potential acute and long-term effects on the oral cavity and craniofacial complex. [1]

4. PREVENTIVE STRATEGIES: DENTAL AND ORAL CARE DURING IMMUNOSUPPRESSION PERIODS

Oral hygiene: Intensive mouth care is critical because it reduces the chance of developing moderate/severe mucositis while also reducing the risk of septicemia and oral infections. Thrombocytopenia should not be the main determinant of oral hygiene, as patients with a wide range of platelet counts can brush without bleeding. Patients should wash their teeth two to three times each day using a soft nylon brush and replace it on a regular basis (every two to

three months). Although fluoridated toothpaste can be used, it may be discontinued and replaced with mild-flavored nonfluoridated toothpaste if the patient cannot tolerate it during periods of mucositis due to mouth burning or stinging sensations. Foam brushes or ultra soft brushes soaked in chlorhexidine may be used if moderate to severe mucositis develops and the patient cannot tolerate a typical soft nylon toothbrush or an end-tufted brush.

Foam or very soft brushes, on the other hand, should be avoided because they do not allow for effective cleaning. As soon as the mucositis improves, you should resume using a conventional brush. Brushes should be allowed to air dry in between uses. If the patient is capable of using electric or ultrasonic brushes without causing damage or irritation, they are suitable. It is reasonable to continue flossing throughout therapy if patients are adept at flossing without disturbing the tissues. To avoid tissue trauma, toothpicks and water irrigation devices should not be used when the patient is pancytopenia [1].

Fluoride: helps to prevent tooth decay. At home, fluoridated toothpaste and mouthrinses with a low fluoride content (900-1,100 ppm) can be used. Fluoride varnish, fluoride gel, and fluoride foam are professional fluoride applications that offer substantially greater fluoride concentrations (12,300-22,600 ppm) and are applied in the dental clinic. The frequency of fluoride application by a professional should be determined by the patient's caries risk assessment. Patients who can dependably expectorate toothpaste should be provided prescription high-strength fluoride toothpastes containing 5,000 ppm of fluoride [2].

Flossing: For children who have the suitable dexterity, flossing is suggested. If the youngster can swish and spit the mouth-rinse, it could be advised as a supplement to brushing and flossing. Children with clinical decay and/or enamel demineralization may benefit from fluoridated mouth-rinses. A chlorhexidine mouth-rinse should be recommended to children who have plaque-induced gingivitis or periodontal disease. Children may take an alcohol-free version of chlorhexidine mouth rinse better, especially during episodes of mucositis [2].

Dental Care: Elective dental care should be avoided while on immunosuppression. If a dental emergency occurs, the treatment plan should be

addressed with the patient's physician, who will give medical therapy suggestions (e.g., antibiotics, platelet transfusions, analgesia). During treatment, in times of stable hematological status, and always after reviewing the medical history, the patient should be evaluated every six months (or at shorter intervals if there is a risk of xerostomia, caries, trismus, and/or chronic oral GVHD) [1].

HIV pediatrics: 8.8-18.4% of children with HIV had salivary gland enlargement in one or both parotid glands, with or without xerostomia. Additionally, several antiretroviral drugs limit salivary output, increasing the risk of dry mouth. Oral candidiasis, particularly the pseudomembranous, erythematous, and angular cheilitis variants, is the most commonly reported lesion in HIV-infected children. HIV-infected children are also more susceptible to opportunistic viral infections in the oral mucosa, such as herpes simplex, herpes zoster, Epstein-Barr, and human papillomavirus. Infection-related precancerous lesions such as oral hairy leukoplakia, oral warts, and oral cancer are more common as viral infection rates rise. Gingival and periodontal diseases associated with HIV in children include linear gingival erythema, necrotizing stomatitis, and necrotizing ulcerative gingivitis or periodontitis in 2.2-5 percent of pediatric patients. Long-term use of highly active antiretroviral medication has also been linked to calcium homeostasis dysregulation, bone loss, diabetes mellitus, and dyslipidemia, all of which can lead to periodontal disease. Caries prevalence is higher in HIV-infected children than in non-infected children, but equivalent to that of other chronically unwell children. Caries prevalence may be increased as a result of classic risk factors such as decreased salivary antibodies, absolute lymphocyte count, and salivary flow rate, as well as a diet high in sucrose or carbs to prevent or treat caloric shortages [8-10].

5. MANAGEMENT OF COMMON ORAL COMPLICATIONS IN IMMUNOCOMPROMISED CHILDREN

In order to avoid any interactions with clinician-prescribed medications, antiretroviral or other drug therapies must also be documented. Except in cases of neutropenia or severe immunosuppression, tooth extraction is the most common dental procedure that does not require antibiotic treatment. Other dental procedures do

not necessitate additional care, and the complication rate among infected individuals is comparable to that of the general population. With this background, it is necessary to educate clinicians-in-training about the importance of regular dental health checkups as part of the HIV-infected patient's health care routine, as well as familiarise them with their management, while not ignoring the unquestionable necessity of implementing the general and specific prevention measures that must be implemented in all cases [11].

Approximately 40% of the growing number of individuals getting chemotherapy may experience major mouth difficulties during each treatment. Chemotherapy is highly dangerous to the oral mucosa because of its rapid growth and cell turnover rate. Almost all of the therapy's oral side effects are caused by stomatotoxicity, either direct or indirect. The purpose of therapy for this patient group is to keep the oral mucosa healthy, avoid secondary infection, relieve pain, and maintain nutritional intake. [12].

Oral Mucositis: Oral mucositis occurs in 40% of children who get standard-dose chemotherapy and in 80% of patients who receive radiation therapy for head and neck malignancies. 75 percent of patients undergoing bone marrow transplantation develop oral mucositis. Based on the patient's symptoms and clinical appearance, oral mucositis is classified as mild, moderate, or severe. Mucositis caused by cancer treatment can be assessed and tracked using a variety of rating scales. One such grading instrument is the World Health Organization Oral Toxicity Scale. Mucositis in grades 3 and 4 is considered serious on this scale. Oral mucositis impairs a patient's ability to function and tolerate cancer treatment. Patients report it as the most debilitating side effect of cancer treatment. Oral Mucositi [2,3,12-20].

Palliative care is the cornerstone of oral mucositis treatment. Maintaining proper oral hygiene is essential for both preventing and treating oral mucositis. Brush bristles may need to be softened in warm water for a few minutes to make brushing more comfortable. Foam brushes can be used by patients with severe mucositis who cannot tolerate a toothbrush. For the treatment of oral mucositis in cancer patients, oral cryotherapy, recombinant human keratinocyte growth factor-1, low-level laser therapy, sodium bicarbonate rinses, and benzydamine mouthwash have all been shown to be effective. Pain from oral mucositis can be

relieved with analgesic medicines. Topical anaesthetics temporarily relieve discomfort but do not alleviate mucositis. Topical anaesthetics can also have cardiovascular and central nervous system effects due to systemic absorption through the oral mucosa, thus they should be used with caution in young children if at all [2,3,21,22].

Oral mucosal infections: During neutropenic periods, the indications of inflammation and infection may be considerably reduced. As a result, infection symptoms may differ dramatically from those seen in the general population. The oral cavity is closely monitored, allowing for early diagnosis and treatment of fungal, viral, and bacterial infections. Nystatin prophylaxis is ineffective in preventing and/or treating fungal infections. All suspected lesions should have oral cultures and/or biopsies conducted, and preventative drugs should be started until more specific therapy can be provided. [1] When oral candidiasis is discovered in children undergoing cancer treatment, the first line of treatment is nystatin, which may or may not be effective. Antifungal medications such as amphotericin B may be required. When nystatin is used, clinicians must keep in mind that the sugar content of the oral suspension is high and can increase caries susceptibility [2].

Oral Bleeding Management: Oral bleeding is caused by thrombocytopenia, coagulation factor disturbances, and/or compromised vascular integrity. Local (e.g., pressure packs, antifibrinolytic rinses or topical medications, gelatin sponges) and systemic therapies should be used to manage the condition (e.g., platelet transfusions, aminocaproic acid) [1].

Neuropathic Pain: Plant alkaloid chemotherapy drugs such as vincristine and vinblastine can cause neuropathic pain in children, which generally affects the mandibular teeth. In the absence of an odontogenic source of pain, these children complain of deep discomfort in the jaw and teeth. In children, neuropathic pain is usually temporary and fades or disappears after treatment is finished. Palliative treatment may be administered with over-the-counter pain drugs in the absence of a clear cure for chemotherapy-induced neuropathic pain [2].

Xerostomia: It is treated with sugar-free chewing gum or sweets, sucking tablets, specific dentifrices for oral dryness, saliva replacements, regular water consumption, alcohol-free oral

rinses, and/or oral moisturisers. It may be beneficial to keep a humidifier by your bedside at night. Children are not allowed to use saliva stimulating medicines. In these patients, fluoride rinses and gels are highly suggested for caries prevention [1].

6. CONCLUSION

Immune-compromised patients and children are one of the most sensitive cases to manage in general, with that being said dental management is without doubt imposes great challenge in such patients. With most of the immunocompromised children have great risk of developing oral and dental complications. Palliative and preventive methods are a must in such cases. Prober hygiene and dental care and other preventive methods considered the cornerstone for preventing complications. There's a lot of agents also that can be used to treat different complicated cases such as using amphotericin B and nystatin to manage fungal infections. Also, careful monitoring and management is the key to manages these patients.

CONSENT AND ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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