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Nurturing Smiles: Mucositis and Xerostomia in Childhood Cancer

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Abstract

Chemotherapy, a cornerstone treatment for childhood cancers, is associated with significant oral health complications due to its effects on rapidly dividing cells, including those in the oral mucosa. This article explores the impact of chemotherapy on oral health in children, focusing on conditions such as oral mucositis, xerostomia (dry mouth), and dental caries, which are common side effects of treatment. Chemotherapy-induced immunosuppression further increases the risk of oral infections, including fungal and bacterial infections. The article highlights the prevalence of these complications in pediatric oncology patients, emphasizing the importance of proactive oral care strategies to mitigate these effects. For xerostomia, salivary substitutes, chewing gum, and hydration are recommended to alleviate discomfort and prevent oral infections. The role of preventive oral hygiene, including gentle brushing with fluoride toothpaste and the use of soft-bristled toothbrushes, is stressed. Nutritional support also plays a crucial role in maintaining oral health, particularly for children with mucositis or xerostomia who may face difficulty eating. The article concludes by advocating for regular dental assessments, early intervention, and comprehensive care, including educational support for children and caregivers, to improve the quality of life for paediatric cancer patients undergoing chemotherapy. Early referral to specialized dental care is essential for optimal management of chemotherapy-induced oral health complications in this vulnerable population.

Keywords: Childhood Cancer, Chemotherapy, Oral Mucositis, Xerostomia, Cancer Pain, Quality of Life

Introduction

Chemotherapy, a pivotal treatment for childhood cancers, presents challenges beyond its intended effects on cancer cells. While crucial for combatting cancer, chemotherapy can have adverse impacts on various body systems, particularly the oral cavity. For children undergoing chemotherapy, maintaining optimal oral health is paramount not only for their well-being but also for mitigating treatment-related complications since dental care is required in various phases of cancer treatment due to a high risk of developing dental caries, periodontal diseases, or pathological conditions. This article delves into the repercussions of chemotherapy on oral health in children and delineates essential strategies for oral care during treatment.[1] Childhood cancer is one of the main reasons for mortality among children and adolescents and there is a lapse in the preventive and early diagnostic strategies considering their rarity and heterogenicity with [2,3] Globally observed and local population data in 2011 has shown that 52,366 children and 76,805 adolescents have developed cancer every year with Uttar Pradesh, Bihar, Maharashtra, West Bengal, and Madhya Pradesh with the highest incidence. Leukaemia, Central Nervous System Tumours, and lymphomas contributed more to the total number of carcinomas diagnosed.[4] In the major urban areas of Bangalore, Chennai, Delhi, and Mumbai, the annual incidence rate of CNS tumors in children is 10-20 per million, which is about half of that seen in the developed world. Interestingly, over the past 30-40 years, the incidence of CNS tumors in children has risen in developed countries, likely due to greater access to CT and MRI scanners.[5] Herein in this review, we discuss two major changes that affect the lifestyle of those children undergoing chemotherapy and suggest recommended strategies for their management.

Common Impact of Chemotherapy on Oral Health

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The main reason for various changes is due to Chemotherapy drugs, targeting rapidly dividing cells, affect not only cancer cells but also healthy tissues with high cell turnover rates, like those in the oral mucosa. Consequently, children undergoing chemotherapy face heightened risks of oral complications, including mucositis, xerostomia (dry mouth), infection, bleeding gums, and dental caries. Chemotherapy-induced immunosuppression further heightens the risk of oral infections, including fungal (e.g., oral thrush) and bacterial infections. Additionally, children may experience bleeding gums due to thrombocytopenia, characterized by low platelet counts.[2,6]

Oral Mucositis

Oral mucositis is a debilitating condition defined as oral mucosa inflammation triggered by antineoplastic therapies,[7] that is characterized by inflammation and ulceration of oral mucous membranes, is a prevalent side effect in children undergoing chemotherapy. These painful oral lesions impede eating, swallowing, and speaking, leading to nutritional deficiencies and compromised quality of life. Mucositis is more common in children with hematologic malignancies with 80% of children undergoing chemotherapy showing clinical features. The increased percentage has been attributed to the more potential for cell growth compared to adults.[8]

Classification of Mucositis [9]

Grade	Criteria
0	Normal, No Mucositis
I	Mild Tissue Changes (Focal) White anemic changes Erythematous Patches Mucosal Thinning No Sensitivity and Normal Eating
II	Mild tissue changes (focal): Erythematous/thinning mucosa Small ulcerations <2 mm Slight sensitivity Normal eating
III	Moderate tissue changes (focal-diffuse): Erythematous/denuded/ulcerated mucosa ≤ ½ mucosal area involved Blood clots, no active bleeding Moderate sensitivity Eating/drinking with difficulty
IV	Marked tissue changes (diffuse): Erythematous/denuded/ulcerated mucosa ≥ ½ mucosal area involved Active oozing/bleeding Marked pain No eating

Management of Children undergoing antineoplastic treatment often presents severe side effects due to the dosage and duration of treatments, with oral mucositis emerging as one of the most prevalent and painful inflammatory conditions with a growing number of evidence on therapeutic interventions such as cryotherapy, low-level laser therapy, and natural compounds for this condition. Bragues *et al* (2024)[8] evaluated the therapies currently available for mucositis in their systematic review. The therapies included low-level laser therapy, palifermin, glutamine, chlorhexidine, and oral cryotherapy, as well as natural therapies with honey, olive oil, aloe vera, and colostrum. The most effective were Chlorhexidine and Glutamine, with honey decreasing the severity, duration, and pain associated with the conditionand this evidence points to the use of natural Honey that can be a safe choice of treatment in children. Other than the use of honey mucosal coating agents (e.g., hydroxypropylmethylcellulose) and film-forming agents also have been suggested and certain therapies are not recommended for use in children including sucralfate, antimicrobial lozenges, chlorhexidine, pentoxifylline and granulocyte-macrophage colony-stimulating factor mouthwash. [9]

Xerostomia

Saliva plays multiple roles such as protection of dentition and oral structures, deglutition,

perception of taste, and a host of other complicated factors that include antimicrobial action. The most common effect of xerostomia includes the destruction of teeth due to caries formation and worsening of nutritional status since the oral cavity cannot function in an optimal state due to lack of saliva. Xerostomia can be considered when the whole salivary flow rate is reduced by 45-50% of the normal secretion.[10,11]

The protective role of saliva can be attributed to its functions of lubricating tissues, neutralizing acids, and remineralizing tooth enamel derived from minerals from the blood and topical sources. Insufficient saliva flow renders children more susceptible to oral infections, tooth decay, and difficulty in chewing and swallowing food.[12] Salivary gland dysfunction the cause of Xerostomia has been related to head and neck cancers and also a post treatment complication among survivors. The main risk factor being head and neck radiotherapy that alters the function of the salivary glands and because of this risk-reducing interventions such as bethanechol and acupuncture have been advocated along with topical interventions such as mucosal lubricants, saliva substitutes, chewing gums, and Transcutaneous Electrostimulation may be offered. [13,14]

Common Dental management includes the incorporation of preventive strategies that include oral hygiene by guiding the patient with tooth-brushing techniques including incorporation of oral hygiene aids that are planned on a patient-to-patient basis.[10] Management of Xerostomia can be based on AAPD guidelines (2022) and advocate preventive strategies including the use of fluoridated kinds of toothpaste, the use of toothbrushes with soft nylon bristles including cleaning of the tongue. Children who have sufficient maturity and neurological control can use ultrasonic toothbrushes along with flossing to avoid any oral injuries. A healthy diet to maintain nutritional status, avoiding cariogenic foods, and avoiding spicy, highly acidic, and hard foods must be avoided. Nutritional consideration is highly important during chemotherapy and radiotherapy to lessen the complications of Mucositis and Xerostomia, both of which can lead to its effect making it necessary for all dental procedures to be completed before the start of cancer therapy.

Discussion

In general priority has been given for child health the issue of prevalence and early diagnosis and management of childhood cancer has not yet been prioritized. What has been promoted is the prevention of infant mortality, through immunization, breast-feeding practices, and prevention of infections such as malaria.[15] Moreover, the psychological impact of oral complications cannot be underestimated. Children may endure heightened anxiety, fear, and reluctance to engage in oral care routines due to pain and discomfort, potentially exacerbating oral health issues. Despite chemotherapy's challenges, proactive oral care measures can significantly alleviate adverse effects and promote oral health in children undergoing treatment. Here are crucial strategies:

1. ***Regular Dental Assessments:*** Before commencing chemotherapy, children should undergo comprehensive dental examinations to identify and address existing oral health issues. Throughout treatment, regular dental check-ups are vital for monitoring oral health status, detecting complications early, and implementing timely interventions.

2. ***Gentle Oral Hygiene Practices:*** Children undergoing chemotherapy should adhere to gentle oral hygiene practices to minimize trauma to oral tissues. Using a soft-bristled toothbrush and fluoride toothpaste, they should brush their teeth gently twice daily, paying extra attention to cleaning the gumline and tongue. Flossing should be performed carefully to prevent gum irritation and bleeding.

3. ***Moisturizing Oral Mucosa:*** To alleviate xerostomia, children can use sugar-free lozenges or chew sugar-free gum to stimulate saliva production. Hydrating oral rinses or artificial saliva substitutes can also moisturize oral mucosa and provide relief from dry mouth symptoms.

4. ***Nutritional Support:*** Maintaining adequate nutrition is crucial for children undergoing chemotherapy, especially when mucositis affects their ability to eat solid foods. Offering soft, nutrient-rich foods and beverages at cooler

temperatures can soothe oral tissues and ensure sufficient calorie and nutrient intake. In severe cases, nutritional supplements or feeding tubes may be necessary to prevent malnutrition.

5. ***Oral Pain Management:*** Topical analgesics or oral rinses containing anesthetic agents can alleviate oral pain associated with mucositis and other chemotherapy-induced oral complications. Non-pharmacological approaches, such as cold compresses or oral cryotherapy, may also provide temporary relief from discomfort.

6. ***Prevention of Oral Infections:*** Good oral hygiene practices, along with regular dental visits, are essential for preventing oral infections in children undergoing chemotherapy. Antifungal or antimicrobial agents may be prescribed to manage or prevent oral thrush and other opportunistic infections, particularly in immunocompromised patients.

7. ***Education and Support:*** Educating children and caregivers about the importance of oral care during chemotherapy and providing practical tips and resources can empower them to maintain oral health. Psychosocial support and counseling can alleviate anxiety and fear associated with oral complications, fostering a positive attitude towards oral care.

Conclusion

In conclusion, oral care is integral to the comprehensive management of children undergoing chemotherapy for cancer treatment. By implementing proactive oral hygiene practices and addressing treatment-related oral complications promptly, healthcare providers can minimize discomfort, enhance quality of life, and promote optimal oral health outcomes in paediatric oncology patients. Diagnosis of symptoms of Cancer and its clinical features in the oral cavity is one of the challenging clinical situations especially with Pediatric Dentists and referral to a specialty dental care especially when dealing with children must be a protocol. When in doubt always refer to a Pediatric Physician and at higher care centers when necessary. Prioritize dental treatment and avoid wastage of time, discussing a proper clinical decision and the same needs to be explained to the parents as well the oncologist. Always follow guidelines and other protocols when treating patients under immunosuppression including chemotherapy.

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