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Citation	Hong Kong Dental Journal, 2005, v. 2 n. 2, p. 102-105
Issued Date	2005
URL	http://hdl.handle.net/10722/80074
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Orofacial complications in children undergoing cancer therapy in Hong Kong

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ABSTRACT **Objectives.** To investigate the orofacial complications in children undergoing cancer therapy and to increase their awareness of oral health. **Methods.** A randomly selected convenient sample of 46 children aged below 18 years undergoing combination chemotherapy for hematological malignancies or solid tumors at Queen Mary Hospital were recruited. Clinical examination and a parental questionnaire survey were performed. Parents were taught about oral health and received a talk that focused on the common oral complications of cancer therapy and their management. **Results.** Oral mucositis presenting as erythema or ulceration, mostly on the buccal mucosa, was present in approximately one third of children. Many had dry and cracked lips with varying degrees of xerostomia. Oral hygiene was generally unsatisfactory, although the majority brushed their teeth and 60% rinsed their mouth with antiseptics. The prevalence of opportunistic infection was nonetheless very low. Only one child presented with acute pseudomembranous candidiasis and none had herpes simplex infection. Most parents or caretakers reported that their children experienced pain in the mouth during cancer therapy. Many reported that their children had difficulty in speaking, pain while swallowing, salivary changes, and a dry mouth. Other oral complications included alteration of taste, bad breath, bleeding gums, and tooth decay. **Conclusion.** Oral mucositis was a common complication during cancer therapy together with pain in the oral cavity, poor oral hygiene, and dental caries. Professional oral care should be mandatory before, during, and after cancer therapy.

Introduction

Cancer is the most common cause of disease-related death in children in Hong Kong. Advances in surgical techniques, radiotherapy, chemotherapy, and hematopoietic stem cell transplantation (HSCT) have led to major improvements in survival and cure rates for many types of childhood malignant disease. Similar to other western countries, leukemia is the most common form of childhood cancer (40%) for local children younger than 15 years followed by brain tumor (16%) ¹. A recent review showed that the overall cure rate of childhood malignancies now exceeds 70% and is projected to reach 85% by the year 2010 ².

Dentists encounter many common complications of cancer therapy, such as oral mucositis and xerostomia. Cancer therapy induces damage to the mucosal barrier of the oral cavity that is thus susceptible to inflammation and consequent erythema, ulceration, erosion, and pseudomembrane formation (otherwise known as oral mucositis).

Oral mucositis is a frequent complication of cancer chemotherapy and can occur anywhere along the digestive tract, from the mouth to the anus. Chemotherapeutic agents that affect rapidly growing tumor cells also affect rapidly growing normal tissue, such as the oral mucosa, gastric and intestinal mucosa, and conjunctival tissue ³. They slow down the maturation of rapidly dividing cells and break down and thin the protective epithelial lining, thus rendering it susceptible to irritation, inflammation, and infection. The past decade has witnessed an increased understanding of the specific biological complexities that underlie mucosal barrier injury, and in particular, oral mucositis. Our understanding of the molecular, cellular, and tissue events that lead to this common and often dose-limiting toxicity continue to evolve. To aid with understanding of oral mucosal injury, a model with five phases was proposed: initiation, up-regulation with generation of messengers, signaling

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and amplification, ulceration with inflammation, and finally healing⁴.

During the course of cancer therapy, patients are immunosuppressed due to myelosuppression. Oral opportunistic infections, such as herpes simplex and candidiasis are anticipated complications. In addition, graft-versus-host disease (GVHD), while rare, can be a serious life-threatening consequence of allogeneic HSCT. Oral signs and symptoms can present either in the early phase (less than 100 days after the transplant) or later on with a varying degree of severity. It carries significant prognostic value for the underlying GVHD. Radiotherapy, especially to the orofacial region, can induce oral mucositis and other complications, such as xerostomia (often irreversible), trismus, and osteonecrosis. These may in turn cause functional disturbances, such as difficulty in speaking, mastication and swallowing, and eventually lead to nutritional deficiency.

Data on orofacial complications among Hong Kong Chinese population are few. To rectify this, and as part of a community dental health project, a group of fourth-year dental students investigated the orofacial complications in children undergoing cancer therapy in one of the tertiary care institutions in Hong Kong^{5,6}. They also intended to increase the awareness of children and their carers of the importance of oral health.

Methods

The study was carried out over 2 weeks in March 2004 in a children's ward in the Department of Paediatrics and Adolescent Medicine, Queen Mary Hospital, Hong Kong. A randomly selected sample of 46 children aged below 18 years undergoing combination chemotherapy for hematological malignancies or solid tumors were recruited. A clinical oral assessment of the participating children was performed and a questionnaire survey among their parents or caretakers conducted. Informed consent was obtained from all parents or caretakers prior to the clinical examination.

The questionnaire consisted of nine simple closed questions designed to assess the dental habits of children and the parents' or caretakers' attitudes toward dental health. A dental student and one of the authors were present to clarify the questions if necessary and to ensure the questionnaire was correctly completed.

Two pairs of dental students conducted the oral examinations separately under the supervision of the authors. The examination included a general physical examination of the head and neck region, followed by a clinical examination of the dentition and oral soft

tissues using dental mirrors and a portable light source. Clinical assessment was performed using two commonly used scoring tools, the Oral Assessment Guide⁷ and the Oral Mucositis Assessment Scale⁸. Clinical examination was intended to reveal: (1) presence of dental caries; (2) presence of dental plaque; (3) presence of infection, such as herpes and candidiasis; (4) thrombocytopenia in the form of oral petechiae and spontaneous gingival bleeding; and (5) mucositis. Clinical findings were always discussed and individual oral health instructions were given to the children and their caretakers. An oral health education talk was held for the children, parents, caretakers, and the nurses. It focused on the common oral complications of cancer therapy, their management, dietary modification, and the prevention and management of tooth decay.

Results

A total of 46 children participated in this study: 30 (65%) boys and 16 (35%) girls with a mean age of 9.4 years (standard deviation, 4.8 years). Of these, 11 (24%) were currently undergoing treatment and 35 (76%) were in remission. The children had leukemia (57%), a tumor of the nervous tissue (26%), or a solid tumor such as rhabdomyosarcoma and liver cancer (17%).

Approximately one third (15/46, 33%) of the children had oral mucositis presenting as erythema (6/15, 40%), ulceration (5/15, 33%), or both (4/15, 27%). The most frequently affected site was the buccal mucosa (85%). Other affected sites included the tongue, floor of the mouth, and the palate or lips. Five (11%) children had oral petechiae but their platelet counts were unavailable at the time of examination. Ten (22%) had dry and cracked lips and a varying degree of xerostomia. One child had exacerbated chronic GVHD and her entire oral cavity and lips were affected by severe mucositis associated with trismus and lichenoid changes. The prevalence of opportunistic infection was very low: only one child had oral pseudomembranous candidiasis and none had oral herpes simplex at the time of study.

The oral hygiene of these children was generally unsatisfactory with localized plaque (12/46, 26%) and generalized plaque (13/46, 28%). Nonetheless most (30/46, 65%) brushed their teeth at least once a day. Two reported being unable to brush their teeth. Most (69%) of the participants did not use dental floss and only 40% used mouthwash. Most importantly, 14 (30%) children had one or more untreated carious teeth, and a few had a dental abscess.

Twenty-five (54%) parents or caretakers reported that their children experienced pain in the oral cavity during

cancer therapy. Twenty-one (46%) reported difficulty in speaking and swallowing. Dry mouth (31%), alteration of taste (27%), bad breath (22%), and bleeding gums (16%) were also reported. Only 13 (28%) parents or caretakers took their children for regular dental check-ups at least once a year, while 42% never visited a dentist on a regular basis. Twenty-six (57%) children ate a snack at least once a day and 10 (22%) never consumed snacks between meals.

If the child complained of toothache, most parents or caretakers (82%) preferred to bring their children to a dentist. Only a few (3/46, 7%) opted for nonprescription painkillers and some (3/46, 7%) advised their children simply to ignore the pain.

Discussion

The prevalence of oral complications, especially oral mucositis in children undergoing cancer therapy was similar to that reported by studies from the West^{9,10}. The incidence and prevalence of oral tissue injury varies depending on the diagnosis and treatment regimens⁴. The time course of oral mucositis is well researched, and is generally around 3 weeks. It begins 3 to 5 days following commencement of cancer therapy, and peaks at 7 to 14 days¹¹. This project was a single time-point cross-sectional study of a randomly selected sample of children with cancer. The changes in oral cavity experienced by the children during their active treatment in the hospital might differ to those observed during ambulatory or follow-up care. In the latter, oral lesions may have healed before the clinical examination. A limitation of this study was that neither the day of onset nor resolution could be specified. In addition, it was not possible to accurately record the response of the oral mucosal membrane to intervention.

All children reported oral disturbances caused by cancer therapy, such as pain, dry mouth, bad breath (halitosis), tooth decay, bleeding gums, altered taste, and problems with speech and swallowing. Pain, the most frequent complaint, led to dysphagia with a consequent decreased oral intake that resulted in poor nutrition and dehydration. Pain could also cause therapy to be interrupted, prolong hospital stay and thus increase the cost of treatment. Pain may also have interfered with plaque control. Mouthwashes that contain local anesthetic and antiseptic (e.g. Diffiam; 3M Pharmaceuticals, Thornleigh, Australia) and systemic analgesics (e.g. Panadol; GlaxoSmithKline, Middlesex, United Kingdom) were frequently used to alleviate pain. Frequent rinsing with sodium chloride solution or normal saline was recommended to keep the mucosa moist and to soothe inflamed or ulcerated mucosa.

Many of the children who presented with oral

mucositis also had generalized or localized plaque and debris. In such children, oral debridement should be performed with caution because there is often concomitant neutropenia and thrombocytopenia, thus traumatic tooth brushing can cause gingival bleeding and, more importantly, result in transient bacteremia. Ultra-soft toothbrushes, such as Butler Ultra-soft Toothbrush (John O Butler Co., Chicago, United States) and Biotene Supersoft Brush (Laclede, Inc., California, United States), should be used for mechanical cleaning of teeth. Sponge-tipped applicators and gauze soaked in sodium chloride solution are recommended for oral debridement. Antiseptic and alcohol-free mouthwashes should be used to reduce the oral bacterial load.

All dental treatment should be completed before cancer therapy and a high standard of oral hygiene maintained throughout treatment and hospital stay. Many local children received no dental treatment before or during cancer therapy. Furthermore, parental awareness of the importance of proper dental care in relation to cancer therapy was generally poor. It is thus imperative to encourage parents' and caretakers' awareness of oral health and for oral health to be monitored before commencing therapy. In addition, ongoing prevention of caries and a high standard of oral care should be provided during and after cancer therapy and during remission by a dentist experienced in the care of cancer patients.

The 1990 National Institutes of Health Consensus Panel stated that to minimize oral complications, all cancer patients should have an oral examination and pre-existing oral disease should be treated before cancer therapy is initiated¹². Oral complications from cancer therapy not only hamper the patient's quality of life but may cause further potentially life-threatening complications such as septicemia. The dentist must work together with the medical team to help prevent and manage any oral problems.

Acknowledgments

The authors wish to thank the dental students, HEY Chan, MC Chan, YM Ching, WK Ho, OY Lai, CC Lee, KF Sit, J Tung, and KE Wong for their contributions in this study. This community health project was awarded the Oral-B prize for the best student community health project in 2004.

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