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A review of strategies to prevent periodontitis in patients with head and neck neoplasms undergoing chemotherapy

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Abstract--In many countries, head and neck cancer incidence continues to rise. Treatment of head and neck cancer patients using chemotherapy has several oral side effects during and after treatment. These include mucositis, dry mouth, oral candidiasis, changes in the sense of taste and thinning of the mucosa, which can increase the risk of periodontal disease. Periodontitis can be easily ignored, as the symptoms of gingivitis may be deep in the periodontium. General dentists should evaluate the periodontal status of patients with head and neck cancer before, during and after chemotherapy. In addition, dentists need to design a comprehensive treatment plan to prevent periodontitis in these patients. This study aimed to review different strategies to prevent periodontitis before, during, and after treating patients with head and neck neoplasms and undergoing chemotherapy.

Keywords---Chemotherapy, Head and Neck Cancer, Periodontitis, Periodontal Disease.

Introduction

In the last ten years, many studies have been conducted on cellular changes during cancer (Gatto, 2021), diagnosis and treatment of malignancies. Alcohol, cigarettes and chewing tobacco play the most important role in increasing the incidence of head and neck neoplasms (Adelstein & Rodriguez, 2010). In the past, the disease was first seen in older men, but other studies have shown an increased incidence in young people under 40 (Shibuski, Schmidt, & Jordan, 2005).

A thorough examination of the head and neck, early detection of cancer, and survival rates of patients undergoing pre-chemotherapy health care changes (Warnakulasuriya, 2020). At present, the importance of oral examinations before

chemotherapy in the treatment of most patients, especially patients with head and neck cancers, is not hidden from anyone (Piret & Coucke, 2021). In case of surgery in the oral cavity, control of oral diseases and postoperative complications should be considered by the dentist. These complications may also be quite painful and affect the patient's quality of life, response to treatment, or survival (Sultan et al., 2017).

These complications may start when the cancer is being treated or maybe the result from malignancy. For example, the side effects of chemotherapy can be due to suppression of the bone marrow or immune system or the direct cytotoxic effects of chemical elements on oral tissues occur as mucositis, infection, or bleeding (Morton & Roberts, 1990).

Preventive Measures by the Dentist before Starting Treatment

The dentist is required to perform a thorough examination of the cancer patient, a clinical examination, and a radiograph, and to gather information about the medical and dental history, oral health status, diagnosis and staging of the lesion, and the patient's treatment plan. It is also essential to assess the patient's level of awareness of oral health and their motivation and ability to perform care (Jensen, Vissink, Limesand, & Reyland, 2019).

The condition of the teeth and supporting tissues are charted for further evaluation, and if a lesion is seen, it needs to be removed before starting cancer treatment. Dry mouth is a complication of chemotherapy, so it may sometimes be necessary to evaluate salivary gland function before starting treatment (Kulyapina, 2014). Prevention may be needed to reduce the amount of bacterial flora before scaling and smoothing the root surface, and to emphasize the daily removal of bacterial plaque from the tooth surface. Sometimes during oral chemotherapy, oral hygiene practices such as flossing, flossing, and fluoride-containing toothpaste change but are corrected as soon as possible (Brignardello-Petersen, 2020).

The condition of dental implants is assessed by the dentist, and if the tissue hygiene before implantation is not well maintained, the implant should be removed (Chrcanovic, Albrektsson, & Wennerberg, 2016). In general, dental implants are more likely to fail when implants are placed during chemotherapy, especially when combined with radiation therapy (Albrektsson, Berglundh, & Lindhe, 2003). Also, sharp and uneven edges of teeth, direct and indirect restorations of teeth and any defects that can cause soft tissue irritation should be corrected. It is best to replace prostheses that do not fit well with the underlying tissues and are not repairable, and any possible source of oral infection should be identified and removed. Suspected periodontal teeth with extensive caries should be removed, and teeth involved in pulp tissue should receive appropriate endodontic treatment (Beech, Robinson, Porceddu, & Batstone, 2014). For better wound healing, it should be done one to three weeks before the start of chemotherapy and in fully atheromatic tooth extraction conditions (Moore, McLister, O'Neill, Donnelly, & McKenna, 2020).

Side effects of chemotherapy in the oral cavity

During chemotherapy, various drugs are used topically or systemically to destroy and suppress or prevent the spread of malignant cells. These drugs are used to increase the patient's life expectancy and prevent the rapid return of malignancy, and also affect normal cells active in mitosis. Typically, chemotherapy has adverse effects on hematopoietic cells of the skin and gastrointestinal tract, including the oral cavity (Cheung-Ong, Giaever, & Nislow, 2013). The soft tissues of the mouth are often exposed to various chemical, physical, thermal and microbial damage, so the oral cavity can be the focus of various side effects of chemotherapy (Jham et al., 2007).

Common side effects of chemotherapy include dry mouth, difficulty swallowing and taste buds, and a high risk of mucositis. Mucositis in patients may be severe and begin one week after chemotherapy and continue for days or weeks (C. F. Chen, Wang, Cheng, & Chang, 2004). Gingivitis is common in these patients, and in cases where bone marrow suppression is severe, bleeding from the gums due to thrombocytopenia is seen (Feitosa & et al., 2020). Patients taking drugs such as phosphatide, methotrexate, doxycycline, actinomycin, fluracil, and melphalan are more likely to develop mucositis and bone marrow suppression (Pai et al., 2019).

Measures required during chemotherapy

As mentioned above, the health of periodontal tissues should be maintained during chemotherapy. Chemotherapy is usually given periodically for three to five days. The intervals between courses are 21-28 days, during which time the bone marrow suppression makes the patient more prone to bleeding and infection. Many researchers recommend that normal hygiene be stopped when platelet counts fall below 40,000, although trauma bleeding is more likely to occur when platelet counts fall below 20,000 per cubic millimetre (C. F.). Chen et al., 2004)

When bleeding from the gums, measures such as pressure, periodontal dressing, topical thrombin, gelatin sponge or cellulose oxide can be effective, and if bleeding continues, platelet products can be used (Villa & Akintoye, 2018). Periodontal treatment should be delayed when the number of white blood cells reaches less than 2000 per cubic millimetre. Also, if periodontal treatment is needed during chemotherapy, it is best to do this one day before starting chemotherapy (McCaul, 2012). Emergency periodontal treatment in these conditions usually requires antibiotic prophylaxis, which is best done through an intravenous catheter to prevent bacteremia. The choice of appropriate antibiotics should also be made in consultation with the oncologist (Hartner, 2018).

If chemotherapy is continued, invasive treatments should be avoided. Many treatment protocols for these patients recommend limited hygiene measures such as brushing teeth with gauze, earwax, sponges, and brushes impregnated with chlorhexidine or sodium bicarbonate (Ptasiewicz, Maksymiuk, & Chałas, 2022). Patients with mucositis should rinse their mouths with salt or 5% sodium bicarbonate solution to dilute mucous secretions, maintain slipperiness of the oral mucosa, and increase the pH of oral fluids. Rinsing with chlorhexidine digluconate or half a per cent betadine may help prevent wound tissue infection,

and in the absence of dry mouth, soothing mouthwashes containing substances such as kaolin and diphenhydramine are recommended for the treatment of daugėlaitė. Užkuraitytė, Jagelavičienė, & Filipauskas, 2019).

Viral infections are common in patients who have had bone marrow suppression as a result of chemotherapy. Up to 30% of the population is immune to the herpes simplex virus by serum antibodies. Thus, when the immune system is suppressed, the virus reactivates and leads to severe infections, often accompanied by long painful sores. Diagnosis of herpes lesions is made using virus culture, and direct immunofluorescence and the lesions are treated with antiviral drugs such as acyclovir orally or intravenously (Y. K. Chen et al., 2011).

During chemotherapy, bacterial infections can cause localized mucosal lesions, salivary gland infections, periodontal abscesses, pericoronitis, or acute necrotic ulcerative lesions (ANUG). Because systemic infections are very dangerous in these patients, oral infections of any kind require immediate control and treatment (Coelho et al., 2021). In the normal oral flora of patients undergoing chemotherapy, *Streptococcus diphtheria* is reduced. While gram-negative bacilli are reduced, including *Escherichia coli*, *Klebsiella*, and *Pseudomonas*, as well as oral candidates (Coelho et al., 2021), thus eliminating occupational health bacterial plaque and good oral health. And the use of antimicrobial mouthwashes such as chlorhexidine is very important.

Chemotherapy may have toxic effects on the autonomic and peripheral nerve fibres and sometimes on the branches of the lingual-pharyngeal and trigeminal nerves. The neurological disorders caused by this treatment may cause a sore mouth that resembles periodontal or toothache. Neurological complications usually subside after the end of chemotherapy. In short, proper health care is essential for these patients, and if the side effects of chemotherapy cannot be prevented, the dentist, in coordination with the oncologist, should select the appropriate program for the patient's periodontal treatment to control bleeding from the infection. Or to ensure other harmful effects (Jacobs et al., 2019).

Conclusion

Increasing skills in diagnosing and treating cancers have expanded the role of the dentist in the relevant treatment group. The dentist's intervention begins before the start of chemotherapy and continues to a limited extent during treatment. After treatment, the dentist should continue to work with the oncologist and seek help from other colleagues involved in oral care to achieve the desired treatment results.

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