Journal of Dental Specialities 2021;9(2):53–56

Content available at: https://www.ipinnovative.com/open-access-journals

Journal of Dental Specialities

Journal homepage: http://www.its-jds.in/

Review Article

Oral manifestation of post cancer therapy

Mutum Sangeeta Devi[1,*], Asif Ahmed[2]

[1]*Dept. of Dental Oncology, Tata Medical Centre, Kolkata, West Bengal, India*
[2]*Tata Medical Centre, Kolkata, West Bengal, India*

ARTICLE INFO

Article history:
Received 29-11-2021
Accepted 04-12-2021
Available online 20-12-2021

Keywords:
Oral Cancer
Radiation
Chemotherapy
Oral manifestation

ABSTRACT

Oral cancer has become serious health issues. It is owing to a variety of factors including poor hygiene, tobacco usage, chewing tobacco, smoking, and others. Along with surgery and chemotherapy, the most common treatments include radiation therapy and chemotherapy. Patients with cancer may experience oral toxic effects as a result of antineoplastic therapy such as radiotherapy and chemotherapy. A variety of factors influence radiation, including the oral mucosa's fast cell turnover rate, the richness and complexity of the oral microbiota, and soft tissue stress during normal mouth function. The present literature review is for awareness regarding the main oral manifestation secondary to post cancer therapy.

1. Introduction

Oral cancer is a major health issue that affects people all over the world. It is a major global health concern, with over half a million new cases diagnosed each year, and its prevalence appears to be rising in emerging nations.[1,2] It is three to seven times more common in India than it is in resource-rich countries. In India, after cervical and breast cancer, oral cancer is the third most frequent malignancy among women.[3]

Oral problems can occur with any treatment for head and neck cancer, including surgery, radiation therapy, chemotherapy etc. Oral mucosal problems may potentially be a result of more targeted therapy. Epidermal growth factor inhibitors cause erythematous mucosal reactions, tyrosine kinase inhibitors and mammalian target of rapamycin inhibitors which can also cause isolated aphthous-like lesions and emerging immunotherapies which can cause lichenoid reactions are among these medications. Furthermore, the long-term oral consequences of these treatments necessitate regular oral and dental check-ups as well as meticulous long-term oral care. Before beginning head and neck treatment, it is critical to complete a thorough oral assessment, basic oral care protocols, management of pre-existing dental conditions, and prevention and management of arising oral complications. This is best performed by multidisciplinary teams that include oncology and experienced dental clinicians who provide prompt dental treatment and preventive practises that do not interfere with cancer treatment.[4–8]

For many head and neck cancers, radiotherapy, alone or in combination with surgery or chemotherapy, has resulted in a significant rise in cure rates. High doses of radiation in broad areas, such as the oral mucosa, skin, maxilla, mandible, and salivary glands, can cause a variety of unwanted reactions that can occur during or after treatment. Ionizing radiation in normal tissues within the radiation field causes this harm.[9,10]

* *Corresponding author*.
E-mail address: mutumsangeeta21@gmail.com (M. S. Devi).

https://doi.org/10.18231/j.jds.2021.014

2. Oral manifestation of Post Radiotherapy and C hemotherapy

2.1. Mucositis

Patients having head and neck radiotherapy are more likely to develop mucositis as an acute adverse effect. By the third week of treatment, practically all of the patients have developed confluent mucositis. Reduced cell renewal in the epithelium produces mucosal atrophy and ulceration, resulting in mucosal damage. This is followed by pain, burning, and discomfort, which is exacerbated when excessively spicy meals are consumed.[11,12] The influx of inflammatory cells, followed by epithelial breakdown and ulceration, characterises mucositis. It appears 4-7 days after starting a high-dosage course and goes away 2-4 weeks after the treatment is finished. Doxorubicin, bleomycin, fluorouracil, or methotrexate are some of the drugs that are routinely used to treat mucositis.[13]

2.2. Radiation caries

When individuals are exposed to irradiation, even those who haven't had dental decay in a long time can get radiation caries. The main cause of such injuries is a decrease in the volume of saliva produced and changes in its quality. Radiation also has a direct effect on teeth, increasing their susceptibility to decalcification.[14,15] Radiation caries is primarily caused by radiation-induced damage to the salivary glands, which results in decreased saliva production; however, other causes may play a role.[16,17] Patients are also given drinks containing refined carbohydrates, which increase the likelihood of sugar adherence to dental surfaces.

2.3. Trismus and fibrosis

Trismus may appear immediately after the start of radiation. Trismus is most common in patients who have tumours of the palate, nasopharynx, or maxillary sinus. If left untreated, trismus makes eating difficult and other oral therapeutic treatments practically impossible. The primary treatment consists of primarily exercising the affected muscles. Patients are given bite openers or tongue-exercising equipment such as tongue blades. Improvement is usually transient, appearing and disappearing within a few hours. To avoid the severity of trismus, it is necessary to exercise at regular intervals. Chronic trismus progresses to muscle fibrosis, and at this point, muscle stretching is not recommended as a treatment option. Exercise should be incorporated into the treatment plan as soon as possible.[18]

2.4. Osteoradionecrosis

Osteoradionecrosis, an inflammatory disorder caused by ionising radiation to the bones, is one of the most serious side effects of radiotherapy. The osteocytes and microvascular system are irreversibly damaged by this radiation, resulting in a steady decline in micro vascularization. The tissue becomes hypoxic, hypo vascular, and hypocellular. All of these characteristics prevent bone repair, which can lead to necrosis with or without infection. Atrophy, osteoradionecrosis, and pathological fractures come from harm to the remodelling system, which causes atrophy, osteoradionecrosis, and pathological fractures. Tooth extraction and dental illness in irradiated areas have long been known to be significant risk factors for osteoradionecrosis. Because of its low vascularization and high bone density, the mandible is far more prone to osteoradionecrosis than the maxilla. This side effect usually appears after a year of treatment. Undefined cortical damage with or without sequestration is one of the radiologic characteristics.[19–21]

2.5. Infections

Neutrophils make up 55-70 percent of all white blood cells in circulation. They have the ability to recognise and destroy intruders. Chemotherapy diminishes their numbers, resulting in neutropenia, which promotes the spread of infections. Infections of the oral cavity are widespread, and are often caused by bacteria, fungi, and viruses.[22,23]

2.6. Bacterial

During neutropenia, it's normal to see a previously asymptomatic tooth that's now causing infection symptoms. In chemotherapy patients, periodontal disease is a common observation. Sialadenitis, particularly of the parotid gland, is uncommon but can cause significant discomfort and swelling. The most common cause of parotid sialadenitis is Staphylococcus aureus. Bacteremia is usually caused by Streptococcus viridans. Toxic effects of Streptococcus mitis include rash, hypotension, palmar desquamation, and acute respiratory syndrome.[22]

2.7. Fungal

Because of the persistence of neutropenia caused by chemotherapy, fungal infections are more likely to occur. Candida albicans is commonly found in these infections. Angular cheilitis, as well as pseudomembranous, erythematous, and hyperplastic candidiasis, can produce dysgeusia and xerostomia, as well as a burning feeling and general oral pain.[24]

2.8. Viral

Viruses replicate within a host cell, multiply, and spread to other cells, infecting them. T-lymphocytes mediate cell-mediated immunity, which is the initial line of defence against viral infection. As a result, immunocompromised patients, such as chemotherapy patients, are defenceless

against viral incursions.[25]

2.9. Lichenoid reactions (LR)

A lichenoid response is a pathologic condition that affects the cutaneous or mucosal areas, or both, and is characterised by whitish reticular papules and erythematous erosions and plaques in a reticular pattern, as well as radiating striae. LR can either vanish instantly after the agent's action is accomplished, or it can remain active at the same time.[26,27]

2.10. Dental growth and development alteration

Chemotherapy has a systemic effect, unlike radiotherapy, which only affects the cells within the irradiated zone. As a result, even when far removed from the tumour site, growing odontogenic cells are vulnerable to chemotherapy. In children receiving chemotherapy, researchers discovered delays in dental development, hypoplasia, and microdontia.[28]

2.11. Xerostomia

Salivary gland function is generally harmed by chemotherapy. This disruption is just transient and can be reversed. However, it creates discomfort, interferes with speaking, and makes chewing difficult. There are higher amounts of amylase and peroxidase. Chemotherapy causes a drop in IgA and IgG levels at the same time. As a result, the oral mucosa becomes vulnerable to damage and oral mucositis.[22]

2.12. Bleeding

Bone marrow cells are harmed by cytotoxic drugs. Thrombocytopenia can result from this negative consequence. Excessive bleeding may be caused by this bone marrow suppression. Petechiae, hematomas, and ecchymoses are the most common symptoms. During chemotherapy, ecchymoses can suggest a low platelet count. A platelet count of less than 50,000/mm3 is a risk factor for tooth extraction and other invasive procedures. Excessive bleeding is more likely with a platelet count below 20,000/mm3, especially during the early stages of gingivitis. Haemorrhage can occur anywhere in the mouth, including the soft palate, the floor of the mouth, the lower lip, and the vestibular mucosa.[21]

2.13. Neurotoxicity

Neurotoxicity has been linked to drugs like vinblastine and vincristine. The mandible may experience extreme deep discomfort as a result of the neurotoxicity. The pain goes away a week after the chemotherapy is finished. To help physicians identify the pain from pain produced by pulp problems, detailed exams including as X-rays and intraoral probing are required. Dental sensitivity is usually noticed weeks or months following chemotherapy. Topical fluorides or specially formulated desensitising toothpaste may be effective in reducing symptoms.[23]

2.14. Oral hyperpigmentation

Imatinib treatment can cause cutaneous and mucosal depigmentation or hyperpigmentation, which has been shown to be dose-dependent and reversible once treatment is stopped. Imatinib has an effect on c-kit, a tyrosine kinase receptor that regulates melanogenesis. C-kit has been found in oral cavity and dental pulp mesenchymal cells.[22]

2.15. Dysgeusia

Patients may have an unpleasant metallic taste during chemotherapy as a result of chemotherapeutic drug diffusion into the oral cavity. Dysgeusia appears a few weeks after starting cytotoxic treatment and is usually reversible in a few weeks. The chemotherapy drugs cyclophosphamide, methotrexate, and 5-fluorouracil, as well as the protocol agents for days after the infusion, cyclophosphamide, epirubicin, and 5-fluorouracil, as well as their derivatives, can be found in saliva. Damage to specific cranial nerves (VII, IX, X), the oral mucosa, or the taste buds are all part of the pathophysiology of dysgeusia.[29]

3. Conclusion

To minimise patient suffering and morbidity, better awareness of the adverse consequences of radiotherapy and chemotherapy is necessary. Introducing appropriate oral home care and more regular visits to the dentists before cancer treatment will enable for continued care during and after cancer therapy. Dentists should understand the biology of cancer and the range of issues associated with the disease and treatments in order to provide safe dental care. Within the multidisciplinary team, the dentist's responsibility is to ensure dental treatment coordination and prioritisation that is relevant to the patient's medical needs and within their clinical expertise.

4. Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

5. Source of Funding

None.

References

1. Fan CY. Epigenetic alterations in head and neck cancer: Prevalence, clinical significance, and implications. *Curr Oncol Rep*. 2004;6(2):152–61. doi:10.1007/s11912-004-0027-0.

2. Otoh EC, Johnson NW, Danfillo IS, Adeleke OA, Olasoji HA. Primary head and neck cancers in North Eastern Nigeria. *West Afr J Med*. 2004;23(4):305–13. doi:10.4314/wajm.v23i4.28146.
3. Sankaranarayanan R, Masuyer E, Swaminathan R, Ferlay J, Whelan S. Head and neck cancer: A global perspective on epidemiology and prognosis. *Anticancer Res*. 1998;18(6B):4779–86.
4. Perterson DE, Jensen SB. Oral complications of nonsurgical cancer therapies: diagnosis and treatment. In: Glick M, editor. Burket's Oral Medicine. 12th Edn. Shelton: PMPH-USA, Ltd.; 2014. p. 201–18.
5. Ackson LK, Johnson DB, Sosman JA, Murphy BA, Epstein JB. Oral health in oncology: impact of immunotherapy. *Support Care Cancer*. 2015;23(1):1–3. doi:10.1007/s00520-014-2434-6.
6. Ganzer H, Epstein JB, Touger-Decker R. Nutrition management of the cancer patient. In: R TD, C M, JB E, editors. Nutrition and Oral Medicine. New York: Human Press, Springer; 2014. p. 235–53.
7. Thariat J, Vignot S, Lapierre A. Integrating genomics in head and neck cancer treatment: Promises and pitfalls. *Crit Rev Oncol Hematol*. 2015;95(3):397–406. doi:10.1016/j.critrevonc.2015.03.005.
8. Jackson LK, Johnson DB, Sosman JA, Murphy BA, Epstein JB. Oral health in oncology: impact of immunotherapy. *Support Care Cancer*. 2015;23(1):1–3.
9. Otmani N. Oral and maxillofacial side effects of radiation therapy on children. *J Can Dent Assoc*. 2007;73(3):257–61.
10. Rosales AC, Esteves SC, Jorge J, Almeida OP, Lopes MA. Dental needs in Brazilian patients subjected to head and neck radiotherapy. *Braz Dent J*. 2009;20(1):74–7.
11. Hancock PJ, Epstein JB, Sadler GR. Oral and dental management related to radiation therapy for head and neck cancer. *J Can Dent Assoc*. 2003;69(9):585–90.
12. Dörr W, Hamilton CS, Boyd T, Reed B, Denham JW. Radiationinduced changes in cellularity and proliferation in human oral mucosa. *Int J Radiat Oncol Biol Phys*. 2002;52(4):911–7.
13. Napeñas JJ, Brennan MT, Bahrani-Mougeot FK, Fox PC, Lockhart PB. Relationship between mucositis and changes in oral microflora during cancer chemotherapy. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 2007;103(1):48–59. doi:10.1016/j.tripleo.2005.12.016.
14. Silverman S. Oral cancer. Complications of therapy. *Oral Surg Oral Med Oral Pathol Oral Radiol Endond*. 1999;88(2):122–6.
15. Epstein JB, Chin EA, Jacobson JJ, Rishiraj B, Le N. The relationships among fluoride, cariogenic oral flora, and salivary flow during radiation therapy. *Oral Surg Oral Med Oral Pathol*. 1998;86(3):286–92. doi:10.1016/s1079-2104(98)90173-1.
16. Deng J, Jackson L, Epstein JB, Migliorati CA, Murphy BA. Dental demineralization and caries in patients with head and neck cancer. *Oral Oncol*. 2015;51(9):824–31.
17. Mccaul LK. Oral and dental management for head and neck cancer patients treated by chemotherapy and radiotherapy. *Dent Update*. 2012;39(2):135–40. doi:10.12968/denu.2012.39.2.135.
18. Kumar D, Rastogii N, Kapur S, Singh A. Oral Complications and Its Management During Radiotherapy. *Indian J Dent Sci*. 2011;2(2):109–11. doi:10.5005/jp-journals-10001-1062.
19. Johnson JT, Ferretti GA, Nethery WJ, Valdez IH, Fox PC, Ng D, et al. Oral pilocarpine for post-irradiation xerostomia in patients with head and neck cancer. *N Engl J Med*. 1993;329(6):290–5.
20. White SC, Pharoah MJ. Oral radiology: principles and Interpretation. St. Louis, Mo.: Mosby/Elsevier; 2004.
21. Mitchell MJ, Logan PM. Radiation-induced changes in bone. *Radiographic*. 1998;18(5):1125–36.
22. Van Dalen EC, Mank A, Leclercq E, Mulder RL, Davies M, Kersten MJ, et al. Low bacterial diet versus control diet to prevent infection in cancer patients treated with chemotherapy causing episodes of neutropenia. *Cochrane Database Syst Rev*. 2016;24(4):CD006247. doi:10.1002/14651858.CD006247.
23. Poulopoulos A, Papadopoulos P, Andreadis D. _Oral side effects and dental interventions-a review of the literature. *Stomatological Dis Sci*. 2017;1:35–49. doi:10.20517/2573-0002.2017.03.
24. Lerman MA, Laudenbach J, Marty FM, Baden LR, Treister NS. Management of oral infections in cancer patients. *Dent Clin North Am*. 2008;52(1):129–53. doi:10.1016/j.cden.2007.10.006.
25. Raber-Durlacher JE, Epstein JB, Raber J, Van Dissel JT, Van Winkelhoff AJ, Guiot HF, et al. Periodontal infection in patients treated with high-dose chemotherapy. *Support Care Cancer*. 2002;10(6):466–73. doi:10.1007/s00520-002-0346-3.
26. Lark RL, Mcneil SA, Vanderhyde K, Noorani Z, Uberti J, Chenoweth C, et al. Risk factors for anaerobic bloodstream infections in bone marrow transplant recipients. *Clin Infect Dis*. 2001;33(3):338–43. doi:10.1086/322595.
27. Spielberger R, Stiff P, Bensinger W, Gentile T, Weisdorf D, Kewalramani T, et al. Palifermin for oral mucositis after intensive therapy for hematologic cancers. *N Engl J Med*. 2004;351(25):2590–8. doi:10.1056/NEJMoa040125.
28. Hong CH, Napeñas JJ, Hodgson BD, Stokman MA, Mathers-Stauffer V, Elting LS, et al. A systematic review of dental disease in patients undergoing cancer therapy. *Support Care Cancer*. 2010;18(8):1007–21. doi:10.1007/s00520-010-0873-2.
29. Jensen SB, Mouridsen HT, Bergmann OJ, Reibel J, Brünner N, Nauntofte B. Oral mucosal lesions, microbial changes, and taste disturbances induced by adjuvant chemotherapy in breast cancer patients. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 2008;106(2):217–26. doi:10.1016/j.tripleo.2008.04.003.

Author biography

Mutum Sangeeta Devi, Dental Oncologist

Asif Ahmed, Prosthodontics

Cite this article: Devi MS, Ahmed A. Oral manifestation of post cancer therapy. *J Dent Spec* 2021;9(2):53-56.