Dental treatment after radiotherapy: An integrative review of the literature

Tratamento odontológico pós-radioterapia: Uma revisão integrativa da literatura

Tratamiento odontológico posradioterapia: una revisión integradora de la literatura

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RESUMO

Objetivo: Descrever as características das lesões mais recorrentes pós-radioterapia, assim como, as implicações na saúde geral do paciente, tratamento e prognóstico. **Metodologia:** Este estudo trata-se de uma revisão integrativa da literatura. **Resultados:** Os estudos ressaltaram a importância de um tratamento odontológico preventivo prévio, antes do início do tratamento radioterápico, pois a incidência de complicações durante e após o tratamento são consideráveis, sendo essas alterações ocorrendo em sua maioria entre 10 a 17 dias após o início das sessões de radioterapia. A alteração da microbiota bucal favorece a inciência de mucosite, xerostomia, cáries de radiação, fibrose tecidual, trismo e doença periodontal predispondo o surgimento da osterorradionecrose. **Conclusão:** A equipe odontológica deve atuar em conjunto com oncologistas e outros profissionais de saúde visando uma abordagem multidisciplinar e individualizada para cada paciente, visando mitigar e tratar complicações bucais específicas melhorando a saúde bucal e o bem-estar desses pacientes nesse contexto desafiador.

Descritores: Câncer; Radioterapia; Osteorradionecrose; Saúde bucal.

ABSTRACT

Objective: To describe the characteristics of the most recurrent lesions post-radiation therapy, as well as their implications on overall patient health, treatment, and prognosis. **Methodology**: This study is an integrative literature review. **Results:** Studies have highlighted the importance of preventive dental treatment prior to the initiation of radiation therapy, as the incidence of complications during and after treatment is considerable, with these changes mostly occurring between 10 to 17 days after the start of radiation therapy sessions. Alteration of oral microbiota favors the incidence of mucositis, xerostomia, radiation caries, tissue fibrosis, trismus, and periodontal disease predisposing osteoradionecrosis. **Conclusion:** The dental team should collaborate with oncologists and other healthcare professionals in a multidisciplinary and individualized approach for each patient, aiming to mitigate and treat specific oral complications, thereby improving oral health and the well-being of these patients in this challenging context.

Descriptors: Câncer; Radiotherapy; Osteoradionecrosis; Oral Health.

RESUMEN

Objetivo: Describir las características de las lesiones más recurrentes post-radioterapia, así como las implicaciones en la salud general del paciente, tratamiento y pronóstico. **Metodología:** Este estudio es una revisión integrativa de la literatura. **Resultados:** Los estudios han destacado la importancia de un tratamiento odontológico preventivo previo al inicio de la radioterapia, dado que la incidencia de complicaciones durante y después del tratamiento es considerable, con la mayoría de estas alteraciones ocurriendo entre 10 y 17 días después del inicio de las sesiones de radioterapia. El cambio en la microbiota bucal favorece la incidencia de mucositis, xerostomía, caries por radiación, fibrosis tisular, trismo y enfermedad periodontal, predisponiendo a la osteorradionecrosis. **Conclusión:** El equipo odontológico debe colaborar estrechamente con oncólogos y otros profesionales de la salud para adoptar un enfoque multidisciplinario e individualizado para cada paciente, con el fin de mitigar y tratar complicaciones bucales específicas, mejorando así la salud bucal y el bienestar de estos pacientes en este contexto desafiante.

Descriptores: Cáncer; Radioterapia; Osteorradionecrosis; Salud Oral.

REVIEW

Introduction

Head and neck cancer encompasses several types of cancer that develop in this region, including the tongue, mouth, oropharynx, paranasal sinuses, salivary glands, thyroid, among others. Currently, excessive consumption of tobacco, alcohol and exposure to sexually transmitted infections such as the human papillomavirus (HPV) are the biggest drivers of this problem, especially cancer in the tongue and oropharynx region. Its signs and symptoms vary depending on the location and stage, as well as its treatment and prognosis.[1]

Radiation therapy is a common form of medical treatment used in the fight against head and neck cancer and other cancers or medical conditions. It consists of the use of ionizing radiation to destroy cancer cells, slow their growth or relieve associated symptoms, it is one of the main treatment modalities for various types of cancer, this treatment can be administered in different ways, including external beams of radiation directed to the affected area (external radiation therapy) or insertion of radioactive materials directly into the body (brachytherapy), It can be used alone or in combination with surgery, chemotherapy or immunotherapy, depending on the type of cancer and stage of that cancer.[2-3]

Post-radiotherapy dental treatment plays a key role in the recovery and maintenance of oral health of patients who have undergone radiotherapy, especially in the head and neck region, radiotherapy, while effective in fighting cancer, can result in a number of adverse oral complications due to the direct and indirect effects of radiation on the soft and hard tissues of the oral cavity, including mucositis, xerostomia, radiation-induced caries, tissue fibrosis, periodontal disease, and limitation of mandibular function.[4]

After radiation therapy, it is important to schedule a thorough dental evaluation with a dentist who is familiar with the side effects of radiation therapy to the mouth. This assessment will help identify any existing dental problems and establish a personalized treatment plan. Dry mouth is a common effect of radiation therapy, so it is essential to keep the oral cavity well lubricated. This may involve using special mouthwashes, lubricating gels, or artificial saliva to relieve dryness and prevent problems such as cavities. Oral mucositis is a common complication of radiation therapy characterized by inflammation and ulceration of the oral mucosa. Treatment may include mouthwashes with soothing solutions, medications to relieve pain and promote healing, and measures to maintain oral hygiene.[5]

Osteoradionecrosis is a serious complication in which the exposed bone in the jaw does not heal properly due to radiation therapy. Treatment may involve the use of antibiotics, special mouthwashes, and, in severe cases, surgery to remove necrotic tissue. If there are teeth damaged or lost due to radiation therapy, restorative treatments such as fillings, crowns, or dentures may be necessary to restore the function and aesthetics of the mouth. After the initial treatment, it is important to schedule regular visits to the dentist to monitor long-term oral health and address any issues that may arise. This is especially important because of the increased risk of dental complications after radiation therapy.[6]

The post-radiotherapy dental approach requires close collaboration between the dentist and the medical team responsible for the patient's cancer treatment. It is essential for healthcare professionals to be aware of the patient's

medical history and coordinate their efforts to ensure the best possible outcome in terms of oral health and quality of life.[7] Thus, this study seeks to describe the characteristics of the most recurrent lesions after radiotherapy, as well as the implications for the patient's general health, treatment and prognosis, emphasizing the importance of integrated and holistic care in the treatment of patients with head and neck cancer, involving dentists, oncologists, radiologists and other health professionals, seeking to disseminate knowledge, improve the quality of life of patients and increase awareness about the Importance of oral health in the context of cancer treatment.

Methodology

This is an integrative literature review, which seeks to synthesize and describe the most relevant aspects of post-radiotherapy dental treatment in patients with head and neck cancer, highlighting its management, characteristics, limitations and associated complications. To carry out this research, a bibliographic survey was carried out in the following databases: PubMed, Scientific Electronic Library Online (SciELO). Using the descriptors: "Cancer; Radiotherapy; Osteoradionecrosis; Oral Health.

In total, 480 studies were found, the results were attached to a management software (Rayyan), where duplicate studies were removed, from this amount 21 articles were selected. For selection, the full text of each study was read by two reviewers separately, in order to ensure the relevance of this study.

As inclusion criteria, studies from the last 10 years were selected, in English and Portuguese, case studies, controlled and randomized clinical studies, quantitative and qualitative observational studies, which described and analyzed current approaches to dental treatment in post-radiotherapy patients.

The exclusion criteria were: studies that addressed a different cancer population, outside the head and neck region; studies that mentioned the theme in a secondary way; studies that were not freely available and literature review studies.

Results and Discussion

Radiotherapy oncological treatment aims at the destruction of neoplastic cells, however the elimination of these agents does not occur selectively, causing healthy cells without malignancy characteristics to also be affected, the treatment directed to patients with head and neck cancer includes chemotherapy, surgery and radiotherapy, the dose administered to the irradiated must take into account a specific protocol for the type of cancer diagnosed, the extent of the tumor and its location, and it is interesting to implement the technique of radiation modulated intensity therapy, which acts by adjusting and minimizing the effects and radiotherapy activities on the affected tissues.[3] Despite the effectiveness of radiotherapy in head and neck cancer treatments, with good performance against tumor recurrence and preservation of the functionality of the organs involved, the incidence of complications during and after this treatment is considerable.[8]

Cancer patients should undergo evaluative and preventive dental treatments before starting radiotherapy procedures in order to enable the oral environment to cope with the side effects of radiotherapy in the best possible way, avoiding additional complications and providing a better response to treatment.[9] The dental surgeon who works in the rehabilitation and treatment of complications that arise during and after radiotherapy treatment must have a baggage of knowledge about solid, effective, less invasive and humanistic rehabilitative and preventive measures, since the procedure brings painful consequences that interfere with the aesthetics and functionality of the stomatognathic system in a transitory or permanent way, The main side effects are xerostomia, radiation caries, mucositis, oral infection, altered glandular function, osteoradionecrosis, trismus, periodontal disease, and hypogeusia.[4,10,11,12]

These alterations are mostly described between the interval of 10 to 17 days following the beginning of radiotherapy sessions, where immediate alterations are verified, such as: dysgeusia, olfactory deficiency, mucositis, dysphagia, otitis, anorexia, infections of fungal, bacterial and viral origin. Regarding late-onset complications, osteoradionecrosis, trismus, ulcerations, fibrosis, endocrine disorders, caries and necrosis of the oral mucosa stand out.[13]

In an analysis of 289 medical records of patients who underwent radiotherapy at the Luxembourg Hospital in Belo Horizonte, Brazil, from 1999 to 2004, it was observed that the most prevalent complications in patients after radiotherapy were odynophagia, found in 30.70% of the cases, followed by xerostomia, reported in 17.99% of the individuals.[8] On the other hand, candidiasis and mucositis stand out as the repercussions that most extensively compromised the oral sites. Mucositis has a prevalence of 50% to 90% of the side effects caused by radiotherapy, bringing a series of complications in the oral mucosa, such as ulceration and inflammation. Xerostomia and another complication derived from this treatment, with an incidence of 29-76%, it causes a decrease in salivary volume, causing a sensation of dry mouth, pain, difficulty feeding, that is, a significant alteration in the entire oral microbiota that favors the incidence of periodontal diseases and caries, thus predisposing to the appearance of osteoradionecrosis, another pathology that can be derived from radiotherapy, where the jaw bone and mandible undergo necrosis.[14]

Irradiated patients tend to have serious complications in periodontal structures, since with treatment saliva, an important agent that maintains oral health, loses its properties, because the ionizing action does not act in a specific way, also reaching cells in good morphofunctional state, these changes make the oral cavity susceptible to a series of complications, especially infections.[15] Conditions like this tend to hinder the progress of treatment, as it is necessary to use antibiotics that are not recommended for patients in this state. Therefore, the dental surgeon must provide adequate guidance in relation to oral hygiene of cancer patients, with multidisciplinary action to provide a better quality of life and adequate treatment progress.[15]

A patient who undergoes head and neck radiotherapy treatment has a high probability of developing radiation-related caries, the pathology alters the production and constitution of saliva, as well as the chemical and mechanical characteristics of the teeth, causing carious manifestations to evolve rapidly in the cervical regions, cusp tips and incisal edges of anterior teeth, Presenting a color ranging from dark brown to silver, all these factors greatly interfere with

the homeostasis of the oral cavity.[11] These injuries directly affect the patient's well-being and health, since they compromise the execution of simple daily activities, such as eating behavior, consequently, there is a depression of the immune system, due to the deficiency of certain vitamins and nutrients, which makes the individual vulnerable to infectious processes. Other signs and symptoms diagnosed are weakness and prostration, as well as changes of a psychosocial nature.[3,14]

Understanding these effects is crucial for the implementation of preventive and interventional strategies in order to improve patients' quality of life.[16] The discussion of the long-term repercussions of radiotherapy, including sequelae such as osteoradionecrosis, offers an in-depth look at the challenges faced by patients after treatment. In addition, the approach to the interval between radiotherapy sessions and its impact on oral health highlights the importance of continuous monitoring during the course of treatment.[3]

The region that undergoes irradiation during cancer treatment commonly presents painful symptoms, erythema, blisters, desquamated areas, burning and, in more severe situations, necrosis, the most cited generalized complications are fatigue, nausea, vomiting and fatigue. Dentistry focuses its area of research, essentially, on localized complications.[3,17] Mucositis is an inflammation of the oral mucous membranes, pharynx, esophagus and larynx, whose main manifestations include the formation of ulcers, erythematous regions, whitish spots and pseudomembrane. Its development occurs instantaneously after treatment and its remission occurs spontaneously just 2 or 4 weeks after the interruption of radiotherapy.[16] In the meantime, patients diagnosed with this complication report discomfort when swallowing food, characterizing the occurrence of dysphagia, which is one of the most affected disorders in irradiated individuals. As aggravating factors of this injury, alcohol consumption, nutritional deficiency, smoking, prosthesis with poor adaptation and opportunistic infections are pointed out.[3,10]

The treatment of the signs and symptoms of mucositis should be carried out in a way that is compatible with the degree of impairment of the affected structures. Primarily, guidance on oral hygiene, mouthwash with bicarbonate and benzidamine solutions, guidance on a balanced diet, healthy lifestyle habits, and avoiding alcohol consumption. Analgesics, anti-inflammatories, and anesthetics may also be prescribed to produce analgesia, such as benzocaine and 2% lidocaine hydrochloride. Laser therapy is another therapeutic proposal used that, through its healing and regenerative properties, promotes the proliferation of growth factors, stimulating angiogenesis.[16,18]

Glandular function is one of the disorders that develop after radiotherapy. During treatment, the function of the serosa acinar cells from the salivary glands is compromised, with their morphological and functional characteristics altered, leading to a decrease in salivary flow, also called xerostomia. This problem consists of reducing saliva production to levels below 0.3 ml per minute.[14,17] Patients affected by xerostomia have dysphagia disorders and loss of taste, inducing weight loss and malnutrition. With the decrease in salivary flow, there is a propensity for the appearance of caries, since the saliva that previously performed the buffering function, regulating the oral pH, is in insufficient quantity to perform this attribution. In addition, xerostomia also favors the development of periodontal disease and oral candidiasis.[3]

In a similar study,[3] they described other consequences of xerostomia, such as chronic esophagitis, greater sensitivity to oral medications, and greater vulnerability to infections (glossitis, halitosis, and bacterial sialoadenitis). To prevent it, professionals indicate that, preferably, there should be less exposure of the gland to radiation during treatment, recommend the use of artificial salivary compounds to lubricate the oral cavity, a balanced diet with foods rich in ascorbic acid and malic acid, as well as increase fluid intake, avoid the intake of alcoholic beverages and smoking.[17]

Some authors also advocate a surgical procedure to transfer the submandibular salivary glands to the submental region, where dysfunction will be prevented and their physiological activity preserved.[10] Although osteoradionecrosis is not the most common post-radiotherapy complication, it is significantly relevant due to the characteristic signs and symptoms of this disease, and this pathology manifests mainly in the elderly (about 10% to 37%) and affects, in most cases, the mandible region.[10] Most cases appear approximately three years after radiotherapy and have a higher incidence in patients who received higher doses of radiation.[15]

Osteoradionecrosis is considered multifactorial and arises from the decrease in the caliber of blood vessels promoted by ionizing radiation, which consequently leads to reduced blood flow and makes the structures submitted to treatment more vulnerable to tissue degeneration and traumatic events. There is bone exposure, which later becomes infected and clinically involves paresthesia, fistulas, fractures and painful symptoms. Therefore, more invasive dental procedures, such as tooth extractions and endodontic treatments, can culminate in bone necrosis.[3,19] Interventions in the cavity should be performed as a priority within two weeks prior to the start of radiotherapy. As a way to prevent the development of osteoradionecrosis, hyperbaric oxygenation, debridement of necrotic tissue, and surgical resection are indicated as alternatives to improve the condition of these patients.[13]

Periodontal tissue, as well as other structures, suffer from the deleterious effects of radiotherapy treatment. The alterations with the greatest degree of observance, at the radiographic level, are the enlargement of the periodontal ligament space, as well as the degradation of the trabecular bone. This impairment also suggests that there is an increase in the risk of developing the disease and a decrease in the effectiveness of the proposed therapy.[15] In these situations, the dentist's role to promote the attenuation of signs and symptoms, producing a treatment plan directed to the particularities and conditions of each patient, including the adequacy of oral sites, scaling with the removal of bacterial plaque, elimination of unsatisfactory restorations and prostheses, and guidance on oral care and hygiene.[10,15]

Other sequelae discussed in the literature in patients undergoing ionizing radiation are trismus and hypogeusia. Trismus, of radiotherapy origin, manifests itself after about 3 to 6 months from the end of the sessions of this modality of oncological treatment, interfering with the quality of life of patients, since it implies masticatory function, range of mandibular movements and degree of mouth opening.[13] This pathology develops from the inflammation that occurs in the joint connective tissue and in the bundles of the muscles and that leads to atrophy of the joint structures.[16]

Scientific research indicates that the etiology of trismus is associated with the contraction of masticatory muscles, such as: pterygoids, masseter and

temporalis that leads to the fibrotic process. For the improvement of the clinical manifestations of pain and limitation of mouth opening, analgesics, non-steroidal anti-inflammatory drugs and muscle relaxants are indicated. Exercises promoted in the masticatory muscles and installation of a prosthetic device are recommended for the prevention of this pathology.[18,20]

Hypogeusia or dysgeusia can be understood as a disorder that includes the loss or deterioration of taste capacity due to histological changes. This pathology can affect patients undergoing cancer treatment from the second week of treatment. Studies corroborate the fact that the pathogenesis of this disorder is related to injuries to the taste buds and complications of similar etiology, such as xerostomia and stomatitis. This alteration can lead the patient to malnutrition, weakness and malaise, as there is a loss of food pleasure.[13,16]

Radiation caries can be observed within three weeks to one year after the start of radiotherapy and usually present in the cervical region of the tooth. These lesions have an etiology related to the alteration of the pH, which compromises the buffer function, which is responsible for the remineralization process of the dental unit. The treatment is characterized by guidance on oral hygiene, prescription of artificial saliva, fluorotherapy, application of fluoride varnish and restorations using resin-modified glass ionomer cement (CIV) as a restorative material.[3,11]

The occurrence of opportunistic infections, whether fungal, bacterial or viral, in irradiated patients is common, since these individuals have a weakened immune system. These infectious processes aggravate oral conditions derived from cancer treatment and have a majority origin associated with endodontic and periodontal pathologies, the most prevalent of which are oral candidiasis and herpetic infections.[15,20] The treatment of choice for disorders of fungal origin consists of the application of topical antifungals or the use of hydrogen saline peroxide and 0.12% chlorhexidine. In more severe cases, the use of antifungals with systemic action is recommended, such as ketoconazole 200 mg or fluconazole 100 mg. In situations of bacterial infection, the indicated drug therapy is limited to topical and systemic antibiotics, while for viral infections, such as herpes, the use of acyclovir 400 mg is indicated.[18]

Scientific research indicates that some factors should be evaluated for the referral of irradiated cancer patients for certain dental procedures: general condition of the dental structure, importance of the unit in the mouth, location, presence or absence of comorbidities, and radiation dose to which the patient is being subjected during therapy.[13,21] The prevention and minimization of sequelae and complications after radiotherapy can be achieved through the interaction between the medical team and the dental team. These professionals must perform an analysis of the patient's health conditions, the area that will be exposed to radiation during antineoplastic treatment and the amount of radiation emitted, thus, the dental surgeon has the responsibility to assess the need, possibility and urgency of the dental procedures that the patient needs.[16]

Infectious foci should be removed prior to initiation of radiotherapy, preferably two to three weeks prior to initiation of therapy. Thus, units with no possibility of rehabilitation or semi-included with risk of pericoronitis have a recommendation for tooth extraction; Endodontic treatments are considered urgent procedures and, therefore, should be classified as a priority in order to reduce the chances of progression of bacterial contamination. Dental units with advanced periodontal disease are referred for extraction.[5,13,22]

During antineoplastic therapy, follow-up with the dentist before, during, and after cancer treatment is essential to control injuries and injuries derived from irradiation. Information about the importance of maintaining oral hygiene care, such as the use of brushes with soft bristles and a small head, toothpastes with fluoride in the composition, daily use of dental floss, as well as mouthwash with solutions and mouthwashes are some of the basic guidelines.[13,21,23]

O The dental surgeon's proactive role in the prevention and management of radiation caries is carefully analyzed, recognizing the need for a personalized and adaptive approach to address the different challenges presented by each patient. The inclusion of specific care for those on bisphosphonates demonstrates the holistic approach required for the provision of dental care during cancer treatment. Thus, it is up to the dental surgeon to have a comprehensive and in-depth view of the challenges faced by patients undergoing radiotherapy treatment, providing not only essential clinical information, but also promoting the need for interdisciplinary collaboration and personalized strategies for the optimization of oral health in this challenging context.[24]

Conclusion

Oral lesions resulting from radiotherapy treatment have significant implications for the patient's general health, the pain and dysfunction resulting from these lesions can impact the patient's quality of life, interfering with the ability to eat properly and maintain adequate nutrition, contributing to weight loss, general weakness and impairment of the immune system, increasing vulnerability to infections and prolonging post-treatment recovery time.[13]

The importance of dental treatment prior to the start of radiotherapy cannot be underestimated, preventive interventions such as caries treatment, dental restorations, elimination of infection foci and periodontal treatment, are essential to reduce the risk of complications during and after radiotherapy treatment. Proper preparation of the oral cavity prior to cancer therapy not only minimizes acute side effects but also contributes to a less traumatic recovery.[10,15]

Collaboration between dentists, oncologists, and other healthcare professionals allows for a holistic approach to the

patient's health needs, providing integrated care that addresses both the dental aspects and the systemic impacts of treatment, and this cooperation is essential for the development of an appropriate and individualized patient-centered treatment plan, thus promoting better long-term outcomes.[24]

In short, post-radiotherapy dental treatment is not just limited to restoring oral health, but is an essential component in mitigating the adverse effects of head and neck cancer treatment. By prioritizing preventive intervention, regular monitoring, and interdisciplinary collaboration, we can significantly improve patients' quality of life and overall well-being.[16]

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References

1.Silva, F; Roussenq, SC; Tavares, MGS; Souza, CPF; Mozzini, CB; Benetti, M; et al. Perfil epidemiológico dos pacientes com câncer de cabeça e pescoço em um Centro Oncológico no Sul do Brasil. Rev. bras. Cancerol. 2020; 66(1). DOI: https://doi.org/10.32635/2176-9745.RBC.2020v66n1.455.

2.Kodaira, T; Nishimura, Y; Kagami, Y; Ito, Y; Shikama, N; Ishikura, S, et al. Definitive radiotherapy for head and neck squamous cell carcinoma: update and perspectives on the basis of EBM. Jpn J Clin Oncol. 2015; 45(3):235-243. DOI https://doi.org/10.1093/jjco/hyu209 .

3.SANSON, IP; FIGUEIREDO, CBR; PEREIRA, KA; NUNES, MS; VALE, MCS; SEROLI, W. Impacto da radioterapia na saúde bucal: principais complicações em pacientes com câncer de cabeça e pescoço. E-Acadêmica. 2023; 4(2). DOI: https://doi.org/10.52076/eacad-v4i2.448 .

4.SROUSSI, HY; EPSTEIN, JB; BENSADOUN, RJ; SAUNDERS, DP; LALLA, RV; MIGLIORATI, CA, et al. Common oral complications of head and neck cancer radiation therapy: mucositis, infections, saliva change, fibrosis, sensory dysfunctions, dental caries, periodontal disease, and osteoradionecrosis. Cancer Med. 2017; 6(12);2918-2931. DOI https://doi.org/10.1002/cam4.1221

5.ALBUQUERQUE, ACL; SOARES, MSM; SILVA, DF. Mucosite oral: patobiologia, prevenção e tratamento. Com. Ciências Saúde. 2010; 21(2):133-138.

6.FREITAS, DA; CABALLERO, AD; HERRERA, AH; MERCADO, LF; FREITAS, FA; ANTUNES, SLNO. A saúde oral e a radioterapia de cabeça e pescoço. ACM. 2011; 40(3):12-16.

7.LIMA, DC; SALIBA, NA; GARBIN, AJI; FERNANDES, LA; GARBIN, CAS. A importância da saúde bucal na ótica de pacientes hospitalizados. Ciênc. saúde coletiva. 2011; 16(1). DOI https://doi.org/10.1590/S1413-81232011000700049 .

8.ANDRADE, LM.; VIANA, AMFCS. Estudo das complicações pós-radioterapia para o tratamento de tumores de cabeça e pescoço para o aumento da qualidade de vida. Revista Dentística on line. 2006; 7(14):31-37.

9.NASCIMENTO, ACC; LIMA, NNM; CAMPOS, RS; SILVA, TWS; BARBOSA, IS; FILHO, JLF. Efeitos colaterais bucais da radioterapia nas regiões de cabeça e pescoço e a atuação do cirurgião-dentista: revisão de literatura. JOAC. 2016; 2(6):136-141.

10.SALAZAR, M; VICTORINO, FR; PARANHOS, LR; RICCI, ID; GAETI, WP; CAÇADOR, NP. Efeitos e tratamento da radioterapia de cabeça e pescoço de interesse ao cirurgião dentista Revisão da literatura. Odonto (Säo Bernardo do Campo). 2008;16(31)62-68.

11.RODRIGUES, RB; SOUZA, ACA; CARVALHO, AJD; LOPES, CCA; MIRANDA, RR; MACEDO, DR, et al. Management of radiation-related caries in head and neck cancer patients: Scientific evidence. Research, Society and Development. 2021; 10(7). DOI: https://doi.org/10.33448/rsd-v10i7.16733.

12.SILVA, AB; SANTANA, BA; CAVALCANTE, HRS; CAVALCANTE, DF. Assistência odontológica frente às alterações bucais em pacientes submetidos à radioterapia de cabeça e pescoço. Ciências Biológicas e de Saúde Unit. 2023; 8(1):104-115.

13.FERNANDES, JDL; LOPES, GM; FERNANDES, NDL; RODRIGUES, MC; CARNEIRO, GKM; CARNEIRO, KHS, et al. Oral surgery in patients undergoing head and neck radiotherapy. Research, Society and Development. 2022; 11(8) 2022. DOI: https://doi.org/10.33448/rsd-v11i8.30684.

14.Ferreira, RMOSV; Campos, MS; Darze, D; Meira, R. Manifestações orais associados a radioterapia: revisão de literatura. Revista Científica Multidisciplinar da UniSãoJosé. 2021; 17(1).

15.Rolim, AEH; Costa, LJ; Ramalho, LMP. Repercussões da radioterapia na região orofacial e seu tratamento. Radiol Bras**.** 2011; 44(6):388–395.

16.Barbirato, DS; Silva, QYS; Pacheco, TC; Chaia, W; Rodrigues, MO. Radioterapia de cabeça e pescoço: complicações bucais e atuação do cirurgião-dentista. Revista Científica Multidisciplinar das Faculdades São José. 2017; 10(2):02-15

17.Bomfim, RM; Santana, LDA; Rodrigues, MC; Carneiro, GKM; Aragão, FAA; Santos, MG, et al. Effects of radiotherapy on the oral conditions of cancer patients. Research, Society and Development. 2022; 11(9). DOI: https://doi.org/10.33448/rsd-v11i9.32452 .

18.Centurion, BS; Garcia, AS; Rubira-Bullen, IRF; Santos, PSS. Avaliação clínica e tratamento das complicações bucais pós quimioterapia e radioterapia. Rev assoc paul cir dent. 2012; 66(2):136-141.

19.Tolentino, ES; Centurion, BS; Ferreira, LHC; Souza, AP; Damante, JH; Rubira-Bullen, IRF. Oral adverse effects of head and neck radiotherapy:

literature review and suggestion of a clinical oral care guideline for irradiated patients. J Appl Oral Sci. 2011; 19(5):448-454.

20.LÔBO, ALG; MARTINS, GB. Consequências da Radioterapia na Região de Cabeça e Pescoço: Uma Revisão da Literatura. Sociedade Portuguesa de Estomatologia e Medicina Dentária. 2009; 50(4):251-255.

21.Borges BS, Vale DA, Aoki R, Trivino T, Fernandes KS. Atendimento odontológico de paciente submetido à radioterapia em região de cabeça e pescoço: relato de caso clínico. Rev. Odontol. Univ. 2018; 30(3):332-340.

22.Rosales, ACMN; Esteves, SCB; Jorge, J; Almeida, OP; Lopes, MA. Dental Needs in Brazilian Patients Subjected to Head and Neck Radiotherapy. Braz Dent J. 2009; 20(1):74-77.

23.Macedo, DR; Anjos, ACY. Experience of radiotherapy in head and neck. RGO, Rev Gaúch Odontol. 2019; 67:1-9. DOI https://doi.org/10.1590/1981-86372019000263529.

24.Izquierdo, CM; Oliveira, MG; Weber, JBB. Terapêutica com bisfosfonatos: implicações no paciente odontológico – revisão de literatura. RFO, Passo Fundo. 2011; 16(3):347-352.

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