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Management of Radiation Caries in a Patient with a History of Choroid Plexus Carcinoma; A Case Report

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CASE REPORT

ABSTRACT

Radiation caries is a significant dental complication often observed in patients who have undergone radiotherapy for head and neck cancers. This case report discusses the management of radiation caries in a 19-year-old male patient with a history of choroid plexus carcinoma, who received radiation treatment resulting in extensive dental damage. The patient's oral health was compromised due to xerostomia and changes in salivary composition, leading to the development of multiple carious lesions. A multidisciplinary approach was employed, including preventive dental care, conservative treatments, and restorative interventions. The findings highlight the importance of early detection, regular dental evaluations, and the need for tailored management strategies in patients with a history of head and neck radiation therapy to mitigate the effects of radiation caries. This case underscores the necessity for ongoing dental support in this vulnerable population to improve quality of life and preserve oral health.

KEYWORDS

Head and neck cancer, Plexus carcinoma, Radiation caries, Quality of life, Oral health

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INTRODUCTION

Radiation caries, also known as radiation-induced caries, is a significant dental complication primarily affecting patients undergoing radiotherapy for head and neck cancers. This condition arises due to radiation-induced damage to the salivary glands, leading to reduced saliva production and resulting in dry mouth (Xerostomia) and increased susceptibility to dental decay [1,2]. Approximately 30% of individuals receiving such treatment develop radiation caries, underscoring its clinical importance and impact on patients' quality of life [3,4].

Choroid plexus carcinoma (CPC), a rare and aggressive brain tumor, is particularly notable for its occurrence in children, often leading to increased cerebrospinal fluid (CSF) volume and hydrocephalus [5,6]. Classified as a World Health Organization (WHO) grade III tumor, CPC presents with a host of neurological symptoms, including headaches and developmental delays, making early diagnosis and intervention critical for improving outcomes. The aggressive nature of CPC typically necessitates extensive treatment, including surgical resection and potentially radiation therapy, which can further exacerbate oral health issues such as radiation caries.

The interplay between CPC and radiation caries highlights the multifaceted challenges patients face. While radiation therapy can be crucial for managing CPC, it poses risks of severe oral complications, including discomfort, dry mouth, and increased caries risk, thus necessitating proactive dental care and management strategies. Effective interventions include early dental involvement, patient education on oral hygiene, and fluoride treatments to mitigate the adverse effects of treatment on oral health.

This case report describes the presentation and management of radiation caries found in the oral cavity of a 19-year-old Syrian male.

CASE DESCRIPTION

A 19-year-old male patient presented to the endodontic clinic at the faculty of Dentistry in the International University for Science and Technology (IUST) in Ghabageb, Syria. The patient complained of discomfort when eating and drinking hot or cold drinks in his lower anterior teeth. The pain was intermittent, dull aching, and localized in nature.

Medical history revealed a surgical intervention for resecting a CPC 4 years ago, followed by radiotherapy. The patient appeared to be in good mental health, although his physical activity is limited due to relative loss of balance.

Extraoral examination revealed a noticeable tremor in the patient's lower lip, a slight Strabismus (abnormal alignment of the eyes), and a surgical scar on the back of his head (Figure 1).

Figure 1: The surgical scar at the location of tumor resection.

Intraoral examination revealed tongue clefts and multiple decayed teeth with moderate destruction (Figures 2 and 3).

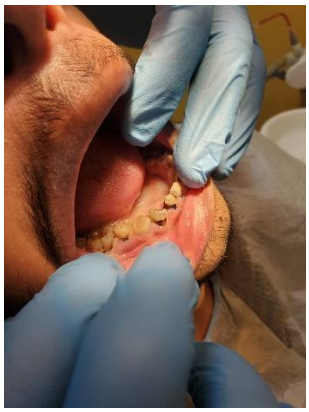

Figure 2: Rampant caries and a cleft tongue.

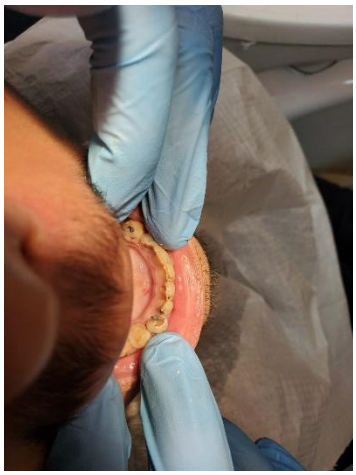

Figure 3: Incisal view of the lower anterior teeth.

The mucosa was dry and partly sticky. Apical radiolucency was found on teeth 31,32 and 44 on the panoramic radiograph, confirmed on periapical radiography (Figure 4).

Figure 4: Pre-operative panoramic radiograph.

No teeth were missing but teeth 31,32,33,41,42,43 and 44 were deeply decayed (Figures 5 and 6).

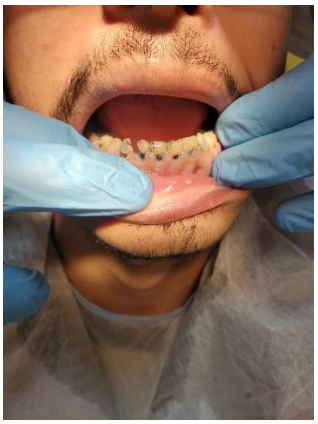

Figure 5: The cervical surfaces of all lower anterior teeth deeply affected by radiation caries.

Figure 6: Chapped lips due to decreased salivary flow.

TREATMENT

Based on the history given by the patient and the clinical findings, a diagnosis of radiation caries type 2 was made. Root canal treatment was completed on teeth 31,32,33,41,42,43 and 44 according to the clinical and academic standards using Crown Down technique taper 2% for preparation, calcium hydroxide pastes as an intracanal medicament applied on 31,32 and 44, and gutta percha with Zinc Oxide-Eugenol sealer for obturation using lateral condensation technique. Glass Ionomer Cement applied as a final restoration material. The root canal treatment was followed by a fixed prosthetic procedure in an outer dental office. Upon the patient's desire, Zirconium full crowns were built up only at teeth 33, 32, 31, 41, 42, 43.

Oral hygiene instructions and preventive measures were given to the patient [modified Bass technique for toothbrushing with fluoridated toothpaste].

Radiographic follow-up six months after treatment showed a decrease in the size of radiolucency on teeth 31,32 and 44 (Figure 7), and the restorations were in good situation (Figure 8).

Figure 7: Panoramic radiograph after treatment and 6 month-follow-up.

Figure 8: Clinical view after at 6-month-follow-up session.

DISCUSSION

Radiation caries, also known as radiation-induced caries, is a form of dental decay that predominantly affects patients undergoing radiotherapy for head and neck cancers. It is characterized by the development of cavities and structural changes in the teeth, primarily resulting from the side effects of radiation on salivary glands, leading to reduced saliva production and dry mouth (xerostomia).

Etiology and Risk Factors

The incidence of radiation caries is significant, with studies indicating that approximately 30% of patients receiving head and neck radiotherapy experience this condition. The primary mechanism involves damage to the major salivary glands, which impairs the mouth's ability to maintain an adequate flow of saliva, crucial for neutralizing acids produced by bacteria and facilitating the remineralization of tooth enamel. The resulting hyposalivation increases the risk of caries, as the protective functions of saliva are diminished. This condition can manifest as early as a few weeks post-radiotherapy and is often most rampant within the first three months following treatment.

Clinical Features

Radiation caries typically presents as a rapid form of decay that can lead to severe dental issues if not addressed promptly. The clinical features include increased susceptibility to cavities, changes in oral microflora, and alterations in food habits due to discomfort. Patients may also experience significant pain and difficulty in eating, further complicating their overall health and quality of life.

Management and Prevention

Preventive strategies are essential to mitigate the risk of radiation caries. Early involvement of dental professionals is crucial, with a focus on educating patients about the importance of maintaining oral hygiene, stimulating salivary flow, and using fluoride treatments. Additionally, prescribing medications such as Pilocarpine can help alleviate dry mouth symptoms and potentially reduce the risk of developing radiation caries. Regular dental check-ups and the implementation of dietary modifications can further enhance oral health and decrease the incidence of this common complication among patients undergoing radiotherapy for head and neck
cancer.

Choroid plexus carcinoma is a rare and aggressive type of brain tumor that arises from the choroid plexus, the structure responsible for producing cerebrospinal fluid (CSF) within the brain's ventricles. Classified as a World Health Organization (WHO) grade III tumor, CPC has a poorer prognosis compared to lower-grade tumors such as choroid plexus papilloma (WHO grade I) and atypical choroid plexus papilloma (WHO grade II).

Characteristics and Symptoms

CPC primarily affects children, particularly those under two years of age, though it can occur in adults as well. The tumor typically leads to an increase in CSF volume, resulting in hydrocephalus, which can cause increased intracranial pressure and various neurological symptoms.

Diagnosis and Treatment

Diagnosis often involves neuroimaging studies such as MRI or CT scans to visualize the tumor and assess its size and location. Treatment typically includes a multidisciplinary approach involving neurosurgeons, neuro-oncologists, and radiation oncologists. Surgical resection of the tumor is often the first step, aiming for complete removal, which significantly improves prognosis. However, due to the tumor's aggressive nature, complete surgical removal may not always be possible [7].

In cases where complete resection is not achievable, or for patients with recurrent disease, aggressive chemotherapy regimens are often utilized, including high-dose chemotherapy combined with stem cell transplant, which has shown promising outcomes in preliminary studies [8]. Radiation therapy may be reserved for patients with recurrent tumors or those who do not respond to chemotherapy, though caution is warranted due to potential toxicity to the developing brains of young children.

Prognosis and Factors Influencing Outcomes

The prognosis for patients with choroid plexus carcinoma varies significantly and depends on several factors, including tumor size, location, whether metastasis has occurred, and the success of surgical intervention. Generally, patients with complete surgical removal of the tumor have the best long-term outcomes, whereas those with residual disease or metastasis face more challenging prognoses.

Given its complexity and the need for tailored treatment approaches, early detection and intervention are crucial for improving survival rates and quality of life for individuals diagnosed with CPC.

Relationship between Radiation Caries and Choroid Plexus Carcinoma

Given the aggressive nature of CPC and the treatments employed, including radiation therapy, patients with this condition may experience a range of oral health complications, notably radiation caries.

Radiation therapy is frequently utilized as a treatment modality for patients with CPC, especially in cases where surgical removal is insufficient or as an adjuvant treatment following surgery. However, radiation therapy can lead to significant oral health issues, including the development of radiation

caries. This condition arises due to damage to the salivary glands and surrounding tissues, resulting in reduced saliva production and an increased risk of dental decay.

Symptoms and Complications

Patients undergoing radiation therapy for CPC often report symptoms such as dry mouth, difficulty swallowing, and altered taste, all of which contribute to an environment conducive to the development of caries. In addition, the increase in the volume of CSF caused by CPC can lead to hydrocephalus, further complicating treatment and recovery, and potentially exacerbating oral health issues related to radiation exposure.

Need for Dental Care and Prevention Strategies

Given the interplay between CPC treatment and oral health deterioration, it is crucial for healthcare providers to monitor and address dental issues proactively. Patients are advised to maintain rigorous oral hygiene practices and to receive regular dental evaluations to mitigate the risk of radiation caries and other complications. Clinical trials and emerging therapies, such as targeted therapies and immunotherapy, are also being explored to improve outcomes in CPC patients, potentially reducing the necessity for radiation therapy and its associated side effects.

CONCLUSION

Adverse effects of radiation and chemotherapy are common in patients, particularly in the orofacial area, but effective maintenance and care during the post-radiation period can help avoid or minimize these effects. Advances in radiotherapy techniques, such as image-guided radiation therapy and intensity-modulated radiation therapy, have reduced post-treatment complications. Education for patients and their families about potential consequences and preventive measures is critical for better outcomes. Clinicians must remain cautious to identify early signs of adverse changes so that they can intervene promptly, and collaborative efforts between healthcare providers and patients can enhance the quality of life for those affected by treatment-related side effects. In the current case, the patient's desire to aesthetically restore only 6 anterior lower teeth was respected, although better aesthetical result could have been obtained.

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