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CASE REPORT

RADIATION CARIES IN IRRADIATED PATIENT OF NASOPHARYNGEAL CARCINOMA – A CASE REPORT

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ABSTRACT:

Radiotherapy (RT) plays an important role in the management of head and neck cancer, especially oropharyngeal and nasopharyngeal cancer. It is also associated with several undesired side effects such as radiation caries which is a common, yet serious, complication. We are presenting a case of radiation caries in 55 year old male patient who had undergone radiotherapy for nasopharyngeal carcinoma.

KEYWORDS: nasopharyngeal carcinoma, radiotherapy, radiation caries

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INTRODUCTION:

Worldwide, oral carcinoma is one of the most prevalent cancers and is one of the 10 most common causes of death. Of the more than one million new cancers diagnosed annually in the United States, cancers of the oral cavity and oropharynx account for approximately 3% [1]. Of these, 40% will receive curative benefit from

surgery, radiation, chemotherapy, or a combination modality [2]. In dealing with patients with cancer of the head and neck a team approach is required for effective management. When RT is indicated, it is imperative that health of the oral cavity be assessed initially as well as throughout therapy.

Nasopharyngeal carcinoma is a relative rare malignancy of Indian subcontinent. Patients with malignant tumours of the nasopharynx have bewildering arrays of signs and symptoms [3]. Nasopharyngeal carcinoma is radiosensitive, the primary treatment modality external beam radiotherapy. The usual radiation dose delivered to the nasopharynx ranges from 66 to 70 Gray (GY) and approximately 60 GY to neck. This dosage is usually given 1.8 to 2.0 GY daily fractions through two lateral opposing fields with or without an anterior field [4].

Although RT plays an important role in the management of patients with head and neck cancer, it is also associated with several undesired reactions [2]. The RT field of exposure frequently includes the salivary glands, oral mucosa, and jaws, thus, leading to various side effects including hyposalivation, xerostomia, radiation caries, mucositis, and taste loss [5,6,7]. Radiation caries is a rampant form of dental decay that may occur in individuals who receive a course of radiotherapy that includes exposure of the salivary glands. The carious lesions result from changes in the salivary glands and saliva, including reduced flow, decreased pH, reduced buffering capacity, and increased viscosity [8]. Because of the reduced or absent cleansing action of normal saliva, debris accumulates quickly. Irradiation of the teeth by itself does not influence the course of radiation caries [8]. A systematic review of dental disease in patients undergoing cancer therapy was conducted out of

which, sixty-four published papers between 1990 and 2008 were reviewed where the overall prevalence of dental caries was found to be 28.1%. The overall decay missing filled teeth (DMFT) indices for patients who were post-antineoplastic therapy was 9.19 [9].

CASE REPORT:

A 55 year old male patient came to the Department of Oral Medicine and radiology with the complaint of decayed tooth in the upper and lower left and right back tooth region since one year. His past medical history revealed that he has been under treatment for undifferentiated nasopharyngeal carcinoma of neck. Surgery included a local tumor resection with radical neck dissection. Radiotherapy was accomplished within 100 days postoperatively. He was irradiated with 60 Gy, at single doses of 2 Gy. Radiotherapy parameters, such as radiation dose and technique used, were recorded. The patient had no muscle tenderness or facial asymmetry and denied any symptoms of temporomandibular joint disorder or myofascial pain dysfunction.

On Intra oral Examination, blanching of the buccal mucosa with physiological melanin pigmentation noticed. The salivary flow appeared to be within normal limits. On hard tissue examination there was multiple root stumps in both maxillary and mandibular teeth with blackish discoloration (Figs 1 & 2).

The Provisional diagnosis of radiation caries was considered. Patient was referred to the department of oral and maxillofacial surgery for

total extraction followed by prosthetic rehabilitation with the complete denture.



Figure 1: shows blackish discolored multiple root stumps in the posterior maxilla and right central incisor with class V caries in maxillary anteriors



Figure 2: shows multiple black discolored root stumps in mandible.

DISCUSSION:

The location of the primary tumor or lymph node metastases dictates the inclusion of the oral cavity, salivary glands, and jaws in the radiation treatment portals for patients who have head and neck cancer [7]. In the management of patients with head and neck cancer, RT plays a very important role but it is also associated with several undesired effects. The clinical sequelae of the radiation treatment include mucositis, hyposalivation, loss of taste, osteoradionecrosis, radiation caries, and trismus. These sequelae may be dose-limiting and have a tremendous effect on the patient's

quality of life [1, 7]. In irradiated patients there is increased risk for the development of a rapid, rampant carious process known as radiation caries. Usually it affects atypical areas of teeth, such as the lingual surface, incisal edges, and cusp tips and it tends to develop four weeks after completion of RT [5].

Radiation caries is mainly an indirect effect of irradiation induced changes in salivary gland tissue that result in hyposalivation, altered salivary composition, a shift in oral flora toward cariogenic bacteria (*S. mutans*, *Lactobacillus* species), and dietary changes. For this reason, prevention of hyposalivation will invariably

contribute to the prevention of radiation caries [7]. In the case presented here, hyposalivation might be the possible reason for initiation of the radiation caries as the patient gave the history of xerostomia during and after the course of RT. Few studies have shown that some patients do not clinically appear to be xerostomic after radiation therapy, but may experience a change in the quality of their saliva, leading to rapid dental demineralization. Even a 25 percent decrease in saliva may result in dental breakdown [10]. This may be the other probable cause behind the development of radiation caries in our patient.

In the early days of radiotherapy, extraction of the teeth prior to irradiation was proposed. Advocates for oral hygiene regimens and restorative procedures met with limited success in caries prevention in those days. Since then, comprehensive preventive measures have been recommended for head and neck cancer patients before, during, and after radiotherapy [7]. The level of radiation-induced caries due to xerostomia can be limited by optimal concepts of oral hygiene. In case of a lack of oral hygiene, an indication for dental extraction occurs [11]. In the case reported here, due to lack of proper dental care before, during and after radiotherapy, extraction was the only option left as the treatment due to rapid progression of the radiation caries.

Clinically, three different patterns of radiation caries have been identified. The most common

pattern [Type 1] affects the cervical aspect of the teeth and extends along the cemento-enamel junction. A circumferential injury develops and crown amputation often occurs. The second pattern [Type 2] presents with areas of demineralization on all dental surfaces. Generalized erosions and worn occlusal and incisal surfaces are not uncommon. The third and least common pattern [Type 3] presents as color changes in the dentin [5,8]. The crown becomes dark brown/black and occlusal and incisal wear may be seen [5, 8]. In the present case it was type 3 radiation caries.

It is now generally accepted that almost complete caries prevention can be achieved by the daily use of fluoride in conjunction with strict oral hygiene in irradiated patients [12,13,14]. Interdental techniques such as flossing, along with plaque-disclosing agents, can also be beneficial [13,15]. Carious lesions have to be restored before radiotherapy is initiated. Dietary instructions about noncariogenic foods should be given. The preventive caries program consisting of daily oral hygiene and daily topical 1.0% NaF gel application by means of custom made fluoride carriers. In a study done by Horiot et al. [16] with 935 head and neck cancer patients with more than 10-year experience, concluded that this fluoride protocol was a highly reliable method for the prevention of radiation caries, and that the use of a toothpaste with a high

fluoride content (3.0% NaF) twice a day was a good alternative, provided its pre-requisites (higher level of compliance) were well-understood by both clinician and patient [16]. In addition, fluoride mouthwashes have been used with considerable success [17,18].

The restoration of carious teeth in patients who have undergone cervicofacial radiotherapy can be extremely demanding on both patients and dentists. An increased prominence of cariogenic microorganisms leads to the rapid circumferential progress of cervical lesions [19]. As it is very difficult to gain access to the cervical lesions, the excavation of caries might be incomplete, the cavity preparation margins can be difficult to define and the preparations might provide little mechanical retention for the restorations. Selection of the most appropriate restorative material is also difficult under these circumstances, with the more-viscous aesthetic conventional glass ionomer cements appearing to offer a reasonable compromise in terms of desirable handling, adhesive, anticariogenic and physical properties [20].

Although radiation caries is a multifactorial condition, its main risk factor in head and neck cancer patients is RT-induced reduction of salivary flow. Thus, the ideal approach to prevent radiation caries would be to avoid radiation-induced hyposalivation caused by damage to the salivary glands. This could be achieved with exclusion of the major and minor salivary glands from the irradiation field [5]. In

this context the integration of intensity-modulated radiotherapy (IMRT) techniques into broad routine will be of great benefit to patients [21]. Despite a multifactorial etiology, radiation caries is primarily a consequence of hyposalivation. Therefore, radiation caries would ideally be prevented by sparing salivary glands from radiation. In cases where this is not possible, prevention is achieved with comprehensive dental care before, during, and after RT.

CONCLUSION:

Radiation caries is a one of the undesired effect of RT. So the dentists should be aware about the consequences of RT in head and neck region and about the various preventive measures with optimal treatment when needed. In this context, motivation of patients, adequate plaque control, stimulation of salivary flow, fluoride use, and nutritional orientation are essential to reduce the incidence of radiation caries and ultimately improve the quality of life of in irradiated patients.

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