



PREVALENCE OF DELAYED COMPLICATIONS OF RADIOTHERAPY IN HEAD AND NECK REGION-A CLINICAL SURVEY

Oral Medicine & Radiology

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ABSTRACT

Radiation therapy, in combination with surgery or chemotherapy, has led to a significant increase in alleviating malignancies of the head and neck region. As the patients undergo radiotherapy, the deleterious effects of radiotherapy come into view and compromise the quality of life of patients suffering from head and neck malignancies. Therefore a detailed knowledge of dental professionals regarding the effects of radiotherapy can guide as well as educate the patients to have a better quality of life after radiotherapy.

KEYWORDS

Head and neck malignancies, Radiotherapy.

INTRODUCTION

Malignancy of head and neck (MHN) is one of the common causes of death globally. [1]. Multiple treatment options are present for the management of MHN that includes surgery, radiotherapy (RT), chemotherapy and combination of these. RT is a key component in the treatment approach of MHN but it may result in severe dento-oral adverse effects [2]. These adverse effects presents as changes in oral mucosa, dentition and muscles of head and neck region which are further classified as short or long term effects depending upon the time lapse between the RT and the first appearance of the symptoms in the oral cavity and surrounding tissues. Damage to oral mucosa is strongly related to key factors like radiation dose, fraction size, volume of tissue exposed to radiation and the type of ionizing radiation. From acute effects like xerostomia and its associated sequelae like mucositis, difficulty in chewing, altered taste sensation, patient recovers with time but chronic effects like radiation caries, osteoradionecrosis, abnormal development of dentition, fibrosis and limited mouth opening result in significant symptom burden. [1, 2].

Aim

To study the prevalence of delayed complications of radiotherapy in the patients undergoing radiotherapy for MHN region.

Methodology

This study was conducted in the Department of Oral Medicine and Radiology, Genesis Institute of Dental Sciences and Research, Ferozepur, Punjab, India from February 2018 till September 2022. A total of 53 patients with history of RT in the region of head and neck were subjected for this study. Out of these 53, 44 patients constituted the study group who had received their last RT dose atleast 6 months ago. Consent was taken, detailed history was recorded and thorough clinical examination was done.

The obtained data was subjected to analysis using SPSS 15 software version. Chi square and ANOVA tests were performed and results were obtained. The results were calculated on the basis of time duration of last radiotherapeutic dose being taken and they were divided in to 3 groups, patients who had undergone RT within last 6-12 months, within last 12-24 months, more than 24 months.

RESULTS (Table 1, Graph 1)

In our study population undergoing RT, 53.66% complain of oral mucosal soreness, 73.17% were suffering from xerostomia, 41.46% were suffering from radiation caries, 9.76% were suffering from osteoradionecrosis. 4.88% patients presented with post radiation fibrosis of masticatory muscle while 4.88% showed malformation of dentition.

Majority of findings were detected among the subjects having history of RT more than 2 years ago except fibrosis which was detected among 4.5% individuals who had undergone RT 1-2 years ago.

As per ANOVA analysis, most of the mean scores were found in the group of subjects having last RT less than 2 years ago. A significant difference was observed among the xerostomic patients at different intervals of time. ($p=0.010$).

DISCUSSION:

Radiation therapy may be either an effective alternative to surgery or a valuable adjuvant therapy to surgery and/or chemotherapy in the treatment of malignant head and neck lesions. However, radiation causes damage to the surrounding healthy cells, affecting their normal form and function.[3].

Mucositis: One of the common complaint of patients undergoing RT for MHN is the oral mucosal soreness. [1]. Mucositis is characterized by erythema, edema, mucosal shedding, ulceration and pseudo membrane formation. The oral basal epithelium experiences rapid cellular turnover during RT, making it more susceptible to radiation damage. [4]. These symptoms limit the ability of patient to tolerate RT therefore leading to delay in the treatment. [5]. In patients with MHN receiving RT, up to 80% may develop mucositis, typically appearing within 7-10 days into treatment and possibly persisting for months. [4], [6]. Our study reported the prevalence of mucositis in 50 % patients which may be attributed to the effect of long duration whereas in a study Epstein JB et al detected oral mucosal soreness in 33% of patients.[2]

Effect On Salivary Glands

Xerostomia is the one of the most common complication among the patient's receiving RT. RT to the salivary glands leads to glandular tissue damage leading to fibrosis, degeneration, acinar atrophy and cellular necrosis; all leading to dry mouth. This symptom develops early, and up to 80% of patients presents with complaint of dry mouth during RT[7]. Dirix P et al had reported the prevalence of xerostomia in 73.5% to 93% of the patients while our study reported the prevalence of xerostomia in 73.17% of patients. [8].

Radiation Caries

Radiation caries is highly destructive with a rapid onset, progression and nonspecific localization [9]. Clinically there are 3 types of radiation caries: [10]

Type 1: The lesion usually encircles the neck of the tooth.

Type 2: This type of caries begins with brown discoloration of the

crown.

Type 3: This type of caries begins as spot which progresses from occlusal surfaces to the buccal and lingual surfaces.

There is no common consensus over whether radiation caries results from the direct effects of irradiation on teeth, indirect effects, or a combination of both. Several researchers have found that the development of radiation caries does not depend on whether the teeth are within the irradiation field, but rather on whether the major salivary glands are exposed to radiation. [11].

Trismus

Trismus can occur either due to tumor invasion of the masticatory muscles and/or temporomandibular joint or as a result of RT when these areas are within the radiation field or a combination of both [12]. With every increase in 10 Gray to the pterygoid muscles, the probability of trismus increases by 24%. Dijkstra et al detected mouth opening of less than 35 mm in patients with history of radiation therapy for MHN [13,14,15].

Effect On Developing Dentition: The effects that irradiation can have on the development and eruption of teeth are related to dosage, period of exposure, stage of tooth development and the proximity of the teeth to the center of maximum dosage [16]. It has been ascertained that if the radiation precedes the stages of morpho differentiation and calcification, the tooth bud may not be developed. Irradiation at a later stage, after calcification has been initiated, may alter cellular differentiation causing malformations or arrested growth. The effects of irradiation are: anodontia, microdontia, altered morphology of the crown and roots and delayed tooth eruption [17].

Osteoradionecrosis (ORN)

It is a well-known complication after extraction of the tooth in a patient receiving RT for MHN. In 1983, Marx had laid down the pathophysiology of ORN as being the defect in wound healing in hypovascular, hypoxic and hypocellular tissue. [18,19]. Tong et al had detected the risk of ORN in 10.5% cases in patients undergoing RT.[20] In our study 9.76% were diagnosed with ORN.

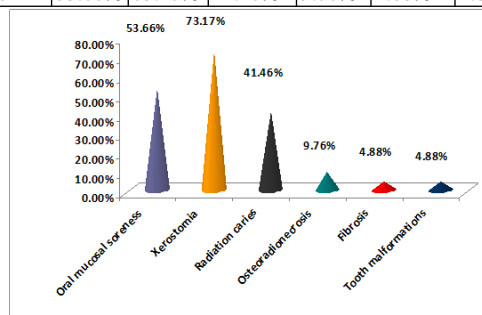
The risk of ORN can be minimized by extracting all the teeth having poor prognosis before the initiation of RT. Sufficient time for the healing of the wounds should be given.

CONCLUSION

RT is one of the treatment option for treating malignancy of head and neck region, but it may result in severe dento-oral side effects because of the radiation used. Knowledge about the patient's disease, treatment, and consequences of treatment will prepare the dentist to create a long-term plan of care for the patient. Therefore the potential oral sequelae after RT can be prevented and reduced with careful dental care.

Table 1: Depicting the prevalence of effects of radiotherapy in Head and Neck region

Duration	Mucositis	Xerostomia	Radiation caries	ORN	Trismus	Tooth malformations
6 months-1 yr	4.00	2.00	3.00			
1 yr-2 yr	8.00	4.00	4.00	1.00	2.00	
> 2 yrs	10.00	24.00	10.00	3.00		2.00
Total	22.00	30.00*	17.00	4.00	2.00	2.00
%age	53.66%	73.17%	41.46%	9.76%	4.88%	4.88%



Graph 1: Representing percentage of effects of radiotherapy in head and neck region.

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