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Case Note

A conservative approach towards oral rehabilitation of post-irradiated patients in a clinical set-up

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Abstract

Patient with post radiation dental complications present a great challenge to the dental practitioners. Following radiotherapy for the treatment of head and neck cancer, a number of complications are reported to occur like, mucositis, osteoradionecrosis, xerostomia, radiation caries etc. A multidisciplinary approach involving specialists from restorative dentistry, endodontics, prosthodontics and oral surgery are necessary for a functional oral rehabilitation of such patients. The case reports presented in this article discusses the interdisciplinary treatment protocol and clinical approach to be followed for the management, overall oral rehabilitation, long term stabilization, and re-establishment of occlusion along with appropriate clinical follow-up for the patients who have undergone radiation and reported with post-irradiated dental complications.

Key words: Radiation Caries, Oral Rehabilitation, Xerostomia, Multidisciplinary Approach.

Introduction

The reported incidence of oral cavity cancer in Indian Subcontinent in males and females is ≥6.9 per 100000 persons[1]. The treatment choices for such malignancies are surgery, radiotherapy or combination. Patient with head and neck cancer are submitted to high doses of radiotherapy which causes adverse reaction in the oral cavity like chronic fungal infection, mucositis, oesteonecrosis, xerostomia, caries, dysgeusia, trismus etc[2,3]. Post-irradiation maintenance of oral hygiene in these patients is difficult which can be a cause for multiple extractions of teeth and decline in the quality of health and life due to low compliance of these patients. Radiation caries is the most common and debilitating side effect of radiation therapy which is a highly destructive form of dental caries having a rapid onset and progression[4,5]. The predisposing etiology for this condition is xerostomia (dry mouth) that damages the acinar and ductal salivary gland cells resulting in diminished or obliterated salivary flow[6]. The salivary pH is also lowered to 5.45-6.05 resulting in increase incidence of caries in these patients[7]. In view of the rapid progression, it is surprising that there is rarely any acute pain associated with radiation caries, even in its most severe manifestations. Clinically, three types of caries lesions can be observed[4,5].

1. Type I- Starts on the labial surface at the cervical area of the incisors and canines. Extends superficially around the entire cervical area of the tooth, progresses inward, often resulting in complete amputation of the crown. Most striking and most difficult to treat.
2. Type II- Generalized superficial defect that first affects the buccal and later the lingual or palatal surfaces of the tooth crowns. Often begins as a diffuse, punctate defect and then progresses to generalized, irregular erosion of the tooth surfaces. Decay localized at the incisal or occlusal edges is often observed.
3. Type III- Heavy brown-black discoloration of the entire tooth crown, accompanied by wearing away of the incisal and occlusal surfaces. Less frequently observed.

   A combination of these lesions can also be seen.

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Along with the carious involvement, pulpal damage has also been reported in the form of decreased secretory function of odontoblasts[8] due to obliteration of pulpal vessels[9] and nuclear alterations in dental pulp following irradiation[10]. Osteoradionecrosis is also a commonly observed post-irradiated complication which is a chronic non healing lesion of bone observed after extractions of teeth in post-irradiation patients[11]. The most successful strategy for managing this oral complication involves prevention. So maximum efforts are directed towards restoring and preserving the remaining teeth in dentition for which a multidisciplinary/interdisciplinary approach may be needed to achieve this goal[12,13].

The case reports presented in this article gives an overview of an interdisciplinary treatment protocol for the patients reported with post-irradiated dental complications in a clinical set-up and discusses the clinical approach to be followed for the management, functional rehabilitation, and re-establishment of occlusion followed by long term stabilization with appropriate clinical follow-up for the patients who have undergone radiation therapy.

Case report 1

A 50 year old male patient was referred to the Department of Conservative Dentistry by the oncologist from Kasturba Medical College, Manipal. The patient complained of discolored teeth, burning sensation during consumption of hot and spicy food stuff and difficulty in chewing food. Patient gave a history of undergoing radiation therapy about 8years back for carcinoma of tongue, at that period he reported to have full complement of teeth along with good oral health. The radiation field had included all the major salivary glands. At the time of dental appointment the general health of the patient was fairly good.

Examination

On extraoral examination of patient frontal facial profile, drooping of lips along with reduced vertical facial height was observed (Fig. 1.1). On intraoral examination mucosa appeared dry and shiny displaying signs of xerostomia. Very little salivary flow was noticed. General oral hygiene was poor, which was attributed to observed xerostomia. The patient had a completely edentulous mandibular arch and missing bilateral maxillary molars. The patient was very keen to save the remaining teeth which were grossly carious. Caries was present in multiple teeth at occlusal/incisal and cervical regions (Class VI&V) (Fig. 1.2). Pulp testing confirmed that 13,12,11, 21, 22, 23, 24 were non-vital. Esthetics was poor and was one of the major concerns of the patient for which he opted for the dental treatment. Also, there was reduced vertical dimension of occlusion due to edentulous mandibular arch.

Treatment objectives

1. Relief of burning sensation
2. Prevention of further dental disease.
3. Treatment of existing dental disease.
4. Replacement of missing teeth.
5. Reestablishment of good functional occlusion.
6. Improvement of esthetics.
7. Long term maintenance of oral hygiene.

Management

The overall management protocol for the patient was divided into four basic phases[13]:

1. Stabilization phase
2. Provisional phase
3. Definitive phase
4. Maintenance phase

Stabilization Phase

Initial therapy consisted of intensive counseling about oral hygiene and various techniques to maintain it. Professional oral prophylaxis was done. To reduce the dryness and burning sensation of the mouth a salivary substitute was prepared in the Kasturba Medical College hospital pharmacy, so as to be cost effective and can easily be dispensed to the patient on long term basis. Restriction of dietary sugar intake was advised. Root canal therapy was initiated on 13,12,11,21,22,23,24, which were diagnosed as non-vital by pulp tests and confirmed by radiographs. Access opening was followed by placement of $Ca(OH)_2$ as intracanal medicament for a period of 2 months to aid in healing of periapical pathosis. 0.2% chlorhexidine mouthwash was prescribed for daily use. Posterior occlusal and cervical composite restorations were done for Class V & VI lesions on 15,14,25.

Provisional Phase

Prosthetic rehabilitation was initiated during the provisional phase. Diagnostic cast was prepared and upper partial and lower occlusal rim were fabricated for jaw relation (Fig. 1.3) followed by articulation at the required vertical height to compensate for loss of facial height. On subsequent completion of root canal treatment for the indicated teeth a diagnostic wax-up was done on the articulated cast followed by fabrication of a putty index (Fig. 1.4) to assist in core build-up and crown preparation. Crown lengthing (Fig. 1.5) was performed and prefabricated post and composite core build-up were done for 13,12,11,21,23. This was followed by crown preparation (Fig. 1.5) for porcelain-fused-metal crowns and cementation of temporary polycarbonate crowns for the above mentioned teeth. Due to lack of adequate coronal tooth structure 21,24 were prepared to receive Richmond crowns. After post space preparation, provisional Richmond crowns were cemented.

Definitive phase

The lower complete denture and the upper partial denture were delivered and the patient was under observation for a month to accommodate TMJ at the raised vertical height. Later porcelain-fused- metal crowns were cemented with glass ionomer cement on 13,12 ,11, 22, 23 and Richmond crowns were cemented with glass ionomer cement on 21, 24 (Fig. 1.6).

Following the completion of the treatment the facial height of the patient was restored along with an esthetic smile and overall improved facial appearance of the patient (Fig. 1.7).

Maintenance Phase

This phase emphasized on maintaining the gingival health of the patient and prevention of further progression of caries. Patient was advised to use fluoride mouthwash. The patient was recalled every 3 months upto 2 years for a follow-up check-up which included a through discussion with patient on his present dental and general health followed by a complete clinical and radiographical examination. At the end of 2 years the patient remained asymptomatic with no associated swelling or tenderness on percussion in relation to the teeth treated endodontically. No new carious lesions were observed in the retained and restored dentition. Patient had no complaint of burning sensation and dry mouth and was advised to continue the use of salivary substitute and keep sipping small amount of water at regular intervals. Clinical condition of gingiva was healthy with no observable gingival swelling (Fig 1.8). Follow-up OPG showed the resolution of periapical lesion with no new observable lesions (Fig. 1.9b).

Case report-2

A 42 year old male patient was referred to the department of conservative dentistry with a complaint of discolored upper front teeth and generalized sensitivity of teeth on consuming hot and cold food stuff and associated difficulty during mastication. Patient had undergone radiation therapy for over a year due to carcinoma in neck region a year back during which period he didn't have any dental oral health issues. At the time the patient reported to dental clinics, the systemic health of the patient was satisfactory.

Examination

Nothing relevant was observed on extraoral examination of the patient. On intraoral examination oral hygiene was reported to be poor that can be attributed to the discomfort (sensitivity) experienced by the patient during the oral hygiene procedures exercised by the patient at home. Mucosa and gingival appeared clinically normal but deficiency in salivary flow was observed. The patient had full complement of teeth in both the arches except 3rd molars with a generalized occlusal/incisal and cervical region caries (Class VI&V) (Fig. 2.1; Fig. 2.2). A deep class II caries lesion was observed only in relation to 36. Pulp testing confirmed that all the teeth were vital including 36.

Treatment objectives

1. Relief from sensitivity
2. Maintenance of oral hygiene with follow up's
3. Stabilization of current caries progression
4. Treatment and prevention of further dental caries
5. Improvement of esthetics.

Management

The overall management protocol for the patient was divided into three basic phases:

1. Stabilization phase
2. Definitive phase
3. Maintenance phase

Stabilization Phase

The patient was motivated to maintain oral hygiene by regular and repeated counseling and re-evaluation. The whole initial impetus of the treatment protocol was directed to improve the patient oral hygiene habits and bring down the plaque and calculus scores to a clinically relevant point to initiate the definitive phase of treatment. Restriction of dietary sugar intake was advised along with regular brushing of teeth with a fluoride containing desensitizing toothpaste. Along with this the patient was advised to use 0.2% chlorhexidine mouthwash twice daily. Excavation of soft caries was performed in all the teeth quadrant-wise and caries control restorations of reinforced-zinc oxide eugenol were given (Fig. 2.3). Indirect pulp capping was done in relation to 36 using $Ca(OH)_2$ as the pulp capping material.

Definitive phase

Incisal edge build-up was done with composite resin for maxillary and mandibular anterior teeth. Class V lesions were restored with Glass-ionomer cement. Class VI lesion were (maxillary and mandibular) restored with posterior composite resin. In 36 Class II bonded amalgam restoration was done (Fig. 2.4; Fig. 2.5).

Maintenance Phase

The patient was recalled on weekly basis for initial one month for a check-up which included evaluation of current status for sensitivity of the restored teeth, reinforcement of oral hygiene instructions and evaluation of compliance of the patients to these instructions. Later the patient was recalled every 3 months. Patient was advised to use fluoride mouthwash twice daily to prevent further progression of caries.

Case report 1-Figures

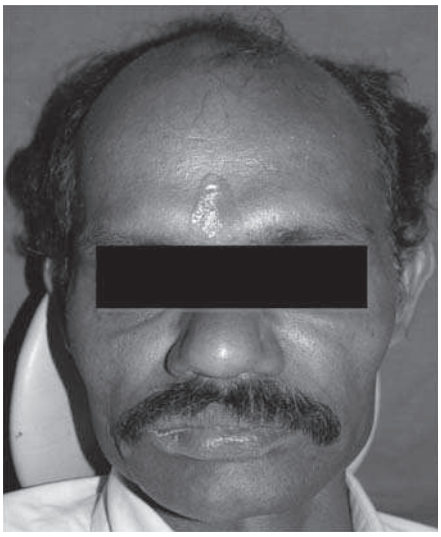

Fig. 1.1: Pre-operative Facial Profile

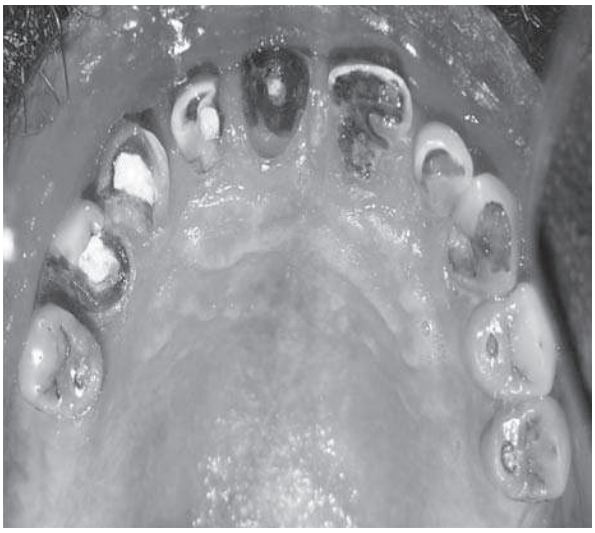

Fig. 1.2: Pre-operative occlusal view of maxillary arch

Fig. 1.3: Jaw relation record

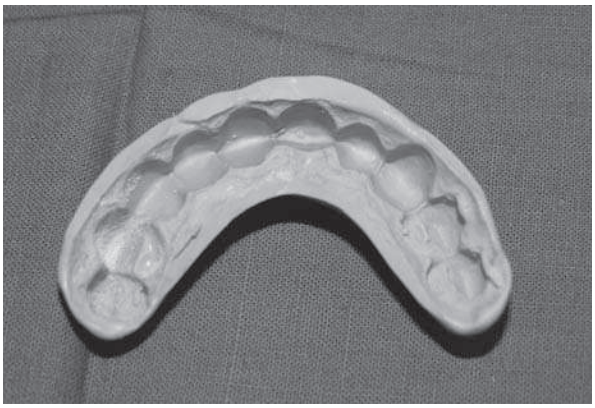

Fig. 1.4: Fabrication of putty index following diagnostic wax-up of maxillary arch

Fig. 1.5: Crown lengthing and tooth preparation following Fabrication of lower complete and upper partial denture

Fig. 1.6: Post-operative frontal view of maxillary and mandibular rehabilitated arches

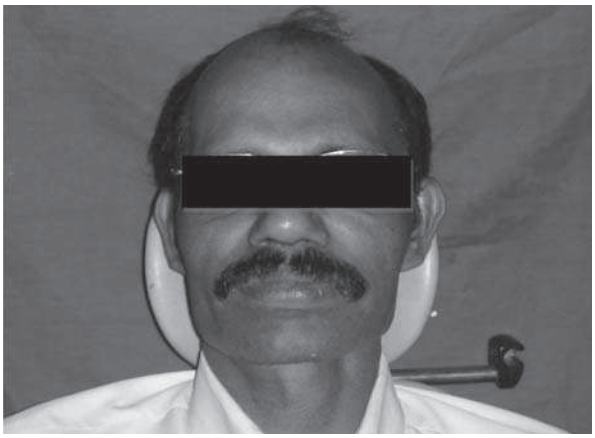

Fig. 1.7: Post-operative facial profile

Fig. 1.8: Follow-up post-operative frontal view of maxillary and mandibular arches

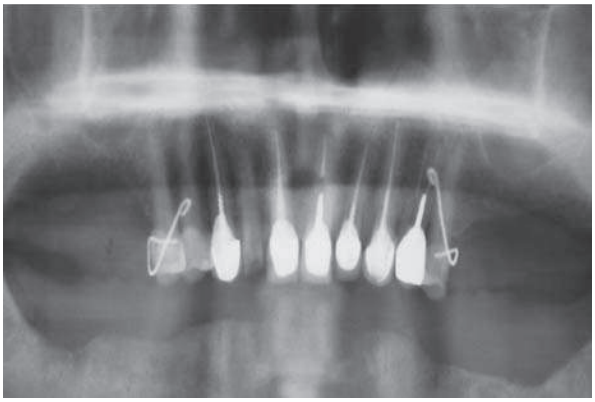

Fig. 1.9a: OPG at completion of treatment

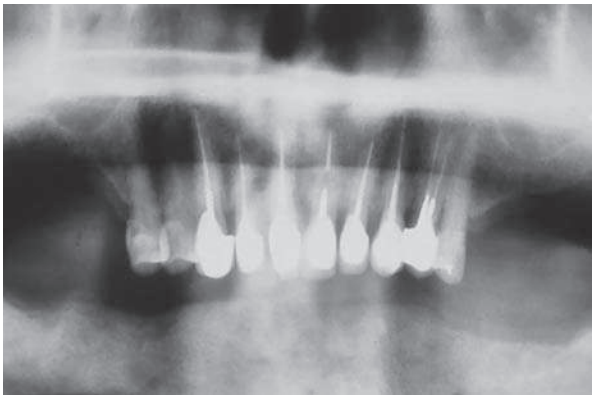

Fig. 1.9b: OPG after follow-up period

Case Study 2-Figures

Fig. 2.1: Pre-operative occlusal view of maxillary arch

Fig. 2.2: Pre-operative occlusal view of mandibular arch

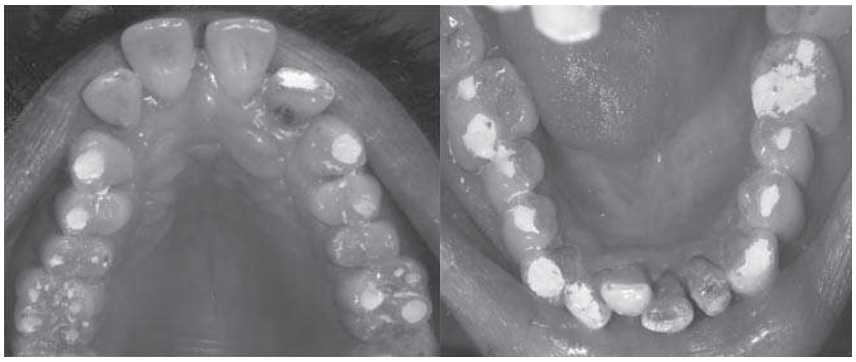

Fig. 2.3: Stabilization phase - Caries Control Restorations

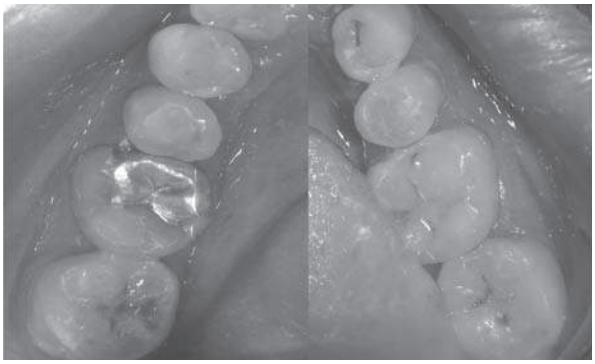

Fig. 2.4: Post-operative views of occlusal maxillary arch following definitive restorative phase

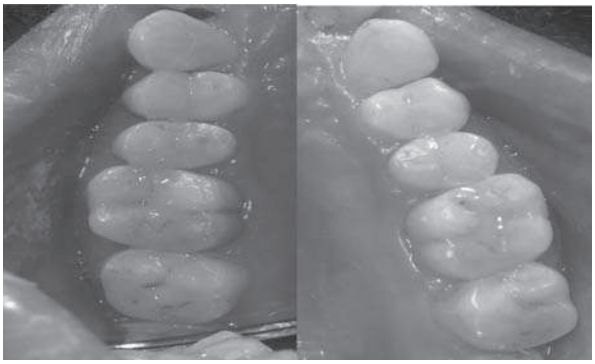

Fig. 2.5: Post-operative views of occlusal mandibular arch following definitive restorative phase

Discussion

Radiotherapy though associated with several adverse effects is a treatment of choice for cancer patients because it increases the chances of survival of the patients[14]. Improvement in the oral health during the post radiation phase is essential to improve the quality of life. So in the above described cases complete oral rehabilitation was planned along with a long term maintenance phase. Xerostomia which is a radiotherapy induced effect needs to be addressed to maintain the oral hygiene and reduce burning sensation, improve the taste sensation and prevent further caries progression. The patients were given a locally manufactured artificial salivary substitute for long term use which was also cost effective. Grossly decayed teeth were endodontically treated and in cases of lesser involvement they were adequately restored to avoid extraction which can cause osteonecrosis in cases of multiple extractions. The edentulous jaws were restored with removable dentures to enable the patient to chew properly and enhance the patient's profile.

Conclusion

Dentist plays a crucial role in the treatment of head and neck cancer patients. An ideal approach of managing oral complications of radiation therapy is pre-radiation consultation and undertaking appropriate preventive measures along with reinforcement of oral hygiene protocol. This helps in identification of non restorable teeth for extraction and restoring the carious teeth before they are destroyed to the extent that they cannot be restored. Salivary glands can be protected from adverse effects of radiation by the use of proper shields. The dental management of these patients should continue through the course of treatment and post-irradiation as per required.

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