

# Radiation Therapy and Oral Health Guidelines- An Overview

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## Abstract

One of the most important general health aspects is patient's oral health status that may predispose to complications during and post radiation therapy and compromises the therapy and prognosis. Appropriate evaluation and elimination of potential source of dental infection before radiation therapy is warranted. The best management strategy involves both prophylactic local and systemic combination therapy that promote high standards of oral care. Hence this paper provides an insight on strategic oral management.

**Keywords:** *Osteoradionecrosis; Xerostomia; Radiotherapy; Candidiasis; Mucositis; Dentures.*

## 1. Introduction

Pre-radiation therapy oral management requires an appropriate evaluation and elimination of potential source of oral infection. This requires dental assessment prior to plan radiation treatment and ensure dental evaluation as close to appointment time of radiation therapy as possible. However, this is common scenario that dental specialist often assessed patients on an emergency or short notice basis and is usually postponed in situations where the patients were gravely ill or the dental treatment would delay radiation therapy. It is well established that radiation treatment can cause dental complications in the long term especially when teeth is in poor condition, in the radiation area or are adjacent to the tumour area.<sup>[1]</sup> Here, the best management strategy encompasses a prophylactic local and systemic combination therapy that provide post-treatment oral comfort and function.

This paper provides strategic advices regarding dental care as recommended by dental specialist.

## 2. Therapeutic Radiation and the Oral Tissues

The radiation therapy for oral cancer is associated with both short-term and long-term effects across hard and soft tissues in the field of treatment.

### 2.1 Short-term consequences:

1. Soreness of the oral cavity and associated structure, termed mucositis.<sup>[1,2]</sup>
2. Dysphagia (difficulty swallowing) usually occurs from second week of radiotherapy onwards. These effects, which may be severe during treatment, tend to resolve after treatment.

### 2.2 Long-term consequences

1. Salivary Glands: The salivary glands in the "field" of radiation treatment lose ability to produce quantity and quality of saliva due to unavoidable damage, termed xerostomia (long-term or permanent dry mouth). The reduction of saliva flow after radiation produces high risk of developing dental/tooth decay, termed radiation decay.<sup>[3,4]</sup>
2. Jawbone: The jawbone in the "field" of radiation treatment show decrease in blood

supply. This reduces healing ability of jawbone during any insult such as a dental extraction, infection or surgery. Hence, it is important to avoid, when possible, any procedure which might cause trauma to the area of irradiated bone. The resulting infection which may develop following trauma is called osteoradionecrosis.<sup>[5]</sup>

### 3. Management Strategies

#### 3.1 Dental Treatment before Radiation therapy

1. Diseased teeth should be extracted with a minimum of trauma while maintaining remaining teeth in the best possible condition. Before radiation treatment, if possible, primary closure should be achieved. Ideally allow three weeks for maximal healing time before radiotherapy. Ten days should be considered a minimum period.<sup>[6,7]</sup>
2. Dental Assessment involves dental treatment planning. An aqueous alcohol free chlorhexidine mouthwash i.e. 10ml of 0.2% aqueous alcohol free chlorhexidine gluconate mouthwash or 18ml of 0.12% aqueous chlorhexidine gluconate solution twice daily for at least one week prior to commencing treatment. Dental gel (using medication carrier tray for fluoride or chlorhexidine gel) in combination with thorough oral hygiene practices showed evidence of reduction in the incidence of oral complications.<sup>[8,9]</sup>
3. A radiation stent positions in the jaw during radiation or the use of mucosal shields and intensity modulated radiotherapy decreases severity of mucositis. Difflam (benzylamine hydrochloride mouthwash 15%) reduces the frequency and severity of mucositis is recommended [12]. A regime of 15ml four to eight times daily starting before radiotherapy and continuing during and for two to three weeks afterwards is recommended [13]. Topical application of antimicrobial pastes or lozenges shows some evidence of reduced severity of ulceration.<sup>[8-10]</sup>
4. Dietary, oral hygiene practice will be advice. Oral prophylaxis will be performed. Correction of poorly fitting dentures or sharp teeth reduces mucositis.<sup>[7]</sup>

5. Jaw stretching exercises will be instructed.
6. Smoking cessation.

#### 3.2 Dental Treatment during Radiation therapy

1. Radiation treatment across oral cavity and associated structure will make sore and swollen and make prone to oral infection, termed "mucositis". It is very important to maintain dietary, and oral hygiene practice. The effect of radiation on oral cavity is severe during treatment but the soreness will decrease after completion of treatment.
2. Brushing teeth gently using a soft toothbrush. Rinsing mouth daily with a mouthwash before & after eating as recommended.<sup>[6,7]</sup>
3. Follow instructions as recommended until oral cavity healed properly. This may take 6-8 weeks following radiation treatment. Suck an ice cube which reduces soreness (mucositis). Use a diluted chlorhexidine mouthwash to control infection as recommended.<sup>[10]</sup>
4. Denture wearer: Prosthesis hygiene is very important if there is fungal infection. Miconazole oral gel should be applied to the fit surface prior to insertion. Clean dentures with a soft cloth/toothbrush after every use. Keep dentures out of mouth and soak overnight in a recommended denture cleaner. Dentures with dimensional changes or not fitting properly or feel uncomfortable, should not be wear. In xerostomia, it is difficult to wear dentures. Put a thin film of chlorhexidine gel onto denture before insertion. Post radiation xerostomic patients showed cervical caries, conservative restorative management is recommended initially and later full/partial coverage crowns should be considered if good oral hygiene is maintained. Fluoride releasing restorative materials such as conventional glass ionomer restorations perform more properly than amalgam restorations, resin modified glass ionomer and composite resin. Edentulous patients, artificial saliva reservoir can be provided within the prosthesis; this may help to alleviate xerostomia temporarily.<sup>[11-14]</sup>
5. The muscle changes around oral cavity may be associated with restricted mouth opening

and it is important to perform jaw stretching exercises. Instruct the patient to use own fingers as a measure of mouth opening.

### **3.3 Dental Treatment after Radiation therapy**

#### **3.3.1 Safe Dental Procedures following radiation**

1. Routine oral hygiene methods.
2. Routine dental restorations such as fillings & crowns.
3. Routine endodontic (root canal) treatments.
4. Precise made dentures to avoid overloading of underlying supporting tissues and remaining teeth.
5. Daily use of fluoride/chlorhexidine containing trays.

#### **3.3.2 Unsafe Dental Procedures following radiation**

1. Any procedure, which cause injury to the jawbone. For example: extractions or surgery in the radiation area, dentures causing pressure.
2. If dental extraction is required, prophylactic antibiotics will be provided and procedures must be carried out by dental specialist. There is no difficulty with any of these procedures in areas outside the field of radiation.

#### **3.4 Appointment visits following radiation treatment**

Dental assessment following radiation treatment should be after 1 month, 6 months, 1 year & 2 years. The dental decay & periodontal disease, dietary & oral hygiene practice, jaw stretching exercises, salivary flow will be assessed and measured. The following suggestions may help <sup>[12-14]</sup>

1. Keep oral cavity clean. Saliva acts as a natural mouthwash and therefore artificial salivary substitute may make up for loss of natural protection. Prefer sugar free diet. Use the fluoride and chlorhexidine gel as recommended by dental specialist.
2. Do not smoke.
3. Moisturise lips with lip balm/water soluble moisturizer.
4. Carry a small water bottle to sip during the day or keep at bedside. Chew sugar free chewing gum – this may help to stimulate the saliva flow, if there is some remaining saliva gland function. There are also some tablets to help stimulate saliva. If natural teeth present, avoid products that contain citric acid as these will erode teeth. Use flavourless salad oil at night to lubricate mouth.
5. Increase intake of fluids. Avoid too much fruit juice as they are acidic and will make teeth sensitive. After meal times, take plenty of water. Avoid very hot or spicy foods, hard coarse food (crackers, toast), smoking, alcohol, lemon glycerine swabs.
6. Fluoride and chlorhexidine gels may be applied to surfaces of teeth. To ensure that there is thorough contact of gel with the teeth, professionally made trays are used. These fit over the remaining teeth, like a mouth guard.
7. Daily application will counteract the absent protective effects of the saliva. Gel applications should be continued long-term.
8. Before application, clean and floss teeth. Place the tray over the teeth for 10-15 minutes or brush with toothbrush. Do not swallow the gel and spit out any excess and avoid rinsing for an hour after the application – this will allow the gel to be effective for longer. The tray should be washed with cold water before next application.

## 4. Guidelines for Oral Care (Figure 1)

1. Daily brushing and flossing of teeth.
2. The use of an alcohol free chlorhexidine mouthwash should be recommended if toothbrushing alone is inadequate; it can be used in addition or as a short-term alternative to tooth brushing. Chlorhexidine is available in concentrations 0.12-0.2% alcohol free preparations and 10ml should be rinsed round the mouth for 1 minute/twice daily. The 0.2% concentration may be diluted 1:1 with water if it causes mucosal discomfort
3. Avoid sugary food or drink.
4. Daily jaw exercises to maintain mouth opening.
5. Following radiation therapy progressive jaw stiffness and limited mouth opening occurred. Various mouth exercises are advisable to minimize the problem. A wedge made by taping together tongue spatulas can be used as aid which can act both as a guide to improved opening and as a target at least 3-4 times daily. [2]. Trigger point injections, analgesics and muscle relaxants can also be used.
6. Do not smoke.
7. Regular attendance with dentist and dental hygienist for routine dental care.
8. Keep mouth moist and lubricated.



Figure 1: Radiation Therapy and Oral Health Guidelines.

## 5. Conclusions

The dental specialist must recognize that therapeutic radiation are not selective for malignant cells and may produce the adverse effects. The dental specialist must focus on monitoring and minimizing adverse effects. Hence, dental treatment should be agreed with the oncology team along with special oral care is warranted before, during and after radiotherapy.

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