Oral & Dental Health Care in Oncology

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Aim of any cancer therapy in the past was "saving patients at all costs". Now the stress is shifted to "saving patients at least cost". As more people survive, health care providers are likely to encounter patients in later life. This paper highlights the side effects of chemotherapy and radiotherapy on oro-facial structures and suggests an updated current management protocol.
Key words: Oncology, oral dental care.

Oral Cavity is a site where complications develop as a result of malignancy or as a side effect of its treatment[1,2,3]. The treatment modalities available for various head and neck malignancies are surgery or irradiation and more recently anti-neoplastic chemotherapy. Dental development begins in utero (7 weeks) and is complete once the roots of third permanent molar have developed (early adult hood)[4] It is a prolonged process and, therefore, a "window of susceptibility" to many external and internal influences exists. The degree of damage of oral structures depends on the timing, duration and severity of extrinsic or intrinsic insults[5].

External insults
- Irradiation
- Trauma

Internal insults
- Anti neoplastic chemotherapy
- Antibiotic therapy
- Fevers
- Metabolic

Chemotherapy

Drugs used with selective toxicity towards tumor are referred as Chemo- therapeutic agents. The effectiveness of antineoplastic agents depends primarily on the ability to interfere with the metabolism or reproductive cycle of the rapidly dividing tumor cells and destroying them. These agents are labelled as cycle dependent or cycle independent. Some normal cells exhibit a faster metabolic or reproduction cycle than slowly growing malignant cells and, therefore, these drugs would induce some damage to normal cells. (e.g. hair, skin, mucous membrane, haemopoietic system). Antineoplastic agents commonly used are vincristine, doxorubicin, actinomycine and cyclophosphamide.

Complications associated with Chemotherapy

Chemotherapeutic agents have been implicated with oral complication. They produce either direct or indirect toxicity.

a) Direct Effects lead to inflammation, thinning and ulceration of the mucosa along with reduced function of the salivary glands, though this does not seem to be commonly encountered in children[6]. Dental complications seen are tooth agenesis, microdontia, enamel hypoplasia and disturbed root formation[7,8,9,10] Development of a Complex Odontome has also been associated with chemotherapy[11]. Conflicting reports have emerged regarding dental caries in children[12, 13, 14, 15].

b) Indirect effects: Anti neoplastic drugs affect cell pools and most important of which is the bone marrow. Bone marrow suppression leads to thrombocytopenia and neutropenia, which in turn leads to abnormal bleeding and lowered resistance to infection[16].(Table 1).

Table 1

Abnormal bleeding	-Punctate petechiae
	Sub-mucosal hemorrhage
	Gingival bleeding
	Bleeding from recent extraction site
Lowered Resistance	Acute dental infection
	Periodontal disease
	Pulpal Necrosis
	Candidiasis
	Herpes Simplex

Some of these patients may also complain of vague jaw pain, paresthesia and weakness of facial muscles secondary to the administration of vincristine.

Radiotherapy

Radiotherapy plays an important role in the treatment of lymphomas, brain tumors and many head and neck tumors. The aim of radiotherapy is to deliver lethal doses of radiation to the tumor whilst minimizing the dose to the surrounding tissues. However, damages are often unavoidable and can lead to a variety of problems.

Complications associated with Radiotherapy

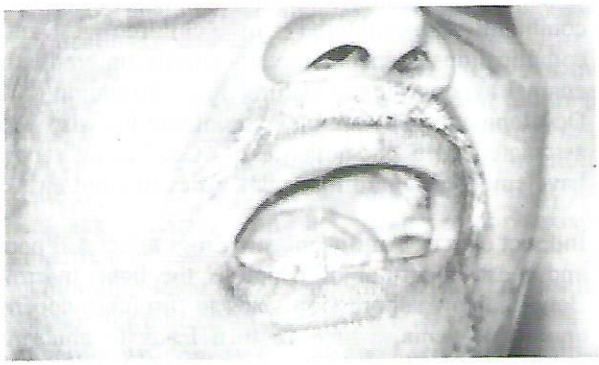
Radiation therapy to the head and neck region leads to acute and chronic changes in the oral cavity.

Acute Effects:

Mucositis

Mucosal cells of the oral cavity, pharynx and larynx have a high turn over rate and low radiation resistance[17]. Due to radiation there is decreased mitotic activity and, therefore, longer retention of superficial cells leading to highly keratinized surface. As these cells are lost, they are not replaced in sufficient numbers by the underlined epithelium, as a result the mucosa becomes thin and red leading to ulceration covered by white or yellow fibrin exudate[18]. (Fig.1). This makes speaking, eating and swallowing difficult.

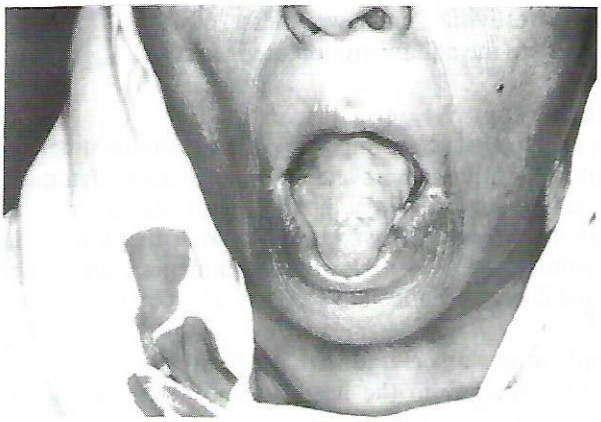
Fig. 1



Salivary Gland dysfunction

Radiation effect on salivary gland is very rapid occurring within fourteen hours after the administration of 2 Gy reducing the salivary flow by 50%[19]. In some patients salivary flow begins to return after two months while in some it may take 1–2 years. Xerostomia may be irreversible at doses higher than 50 Gy[20]. Not only the salivary flow is less it becomes more viscous and acidic. This occurs more commonly in the parotid glands, since they secrete the serous component of saliva. Mucous acini are less sensitive to irradiation[21]. Tongue in xerostomia becomes atrophic and lobulated. (Fig. 2).

Fig. 2



Changes in Microbial flora

There is a definite increase in cariogenic microbes like Streptococcus mutans and Lactobacillus. Candidial microbial population also increases[22].

Taste loss

Damage to the taste buds and lack of saliva causes alteration in the taste sensation. Salty taste for all foods is common. Usually is recovered after 2 – 4 months.

Sensitivity of Teeth

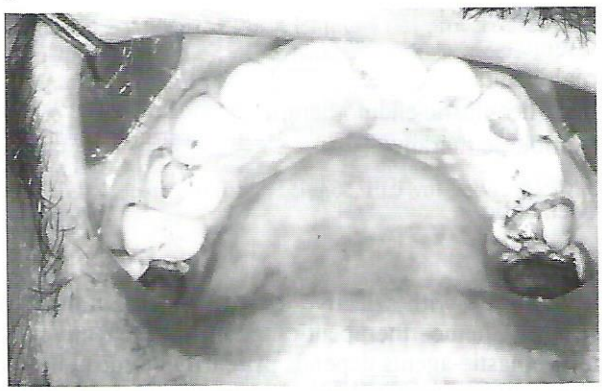
Without the protective action of saliva the teeth become extremely sensitive to hot and cold. This is further aggravated due to tooth wear.

Chronic Effects

Dental Caries

Patients treated with Radiotherapy often develop xerostomia. The oral flora changes to more cariogenic organisms. In addition to this these patients choose diet consisting of fermentable carbohydrate like liquids and soft food. As a result caries ensues at the incisal edges of anterior teeth, cusp tips of the posterior teeth and cervical margins, (Fig.3). Root surface is more prone to caries and cause restorative problems.

Fig. 3



Periodontal Disease

Since vascularity is reduced and repair capacity of the bone is impaired along with reduced salivary flow and increased plaque deposition all contributing to periodontal disease.

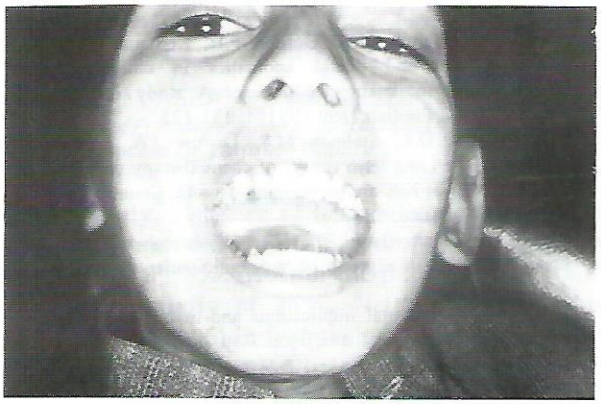
Infection

Due to immunosuppression and xerostomia there is an increased susceptibility to Candidiasis and Herpes simplex infection. Patients wearing dentures are particularly prone to Candidiasis.

Trismus

Radiation induced muscle fibrosis and fibrotic changes in the TMJ capsule with progressive endartritis of affected tissues leads to limited opening of the mouth[23]. (Fig. 4).

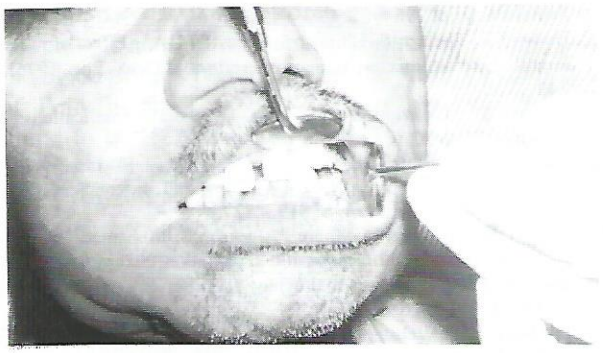
Fig. 4



Osteoradionecrosis

This is the most severe complication of head and neck radio therapy. Repair capacity of the bone is impaired due to reduced vascularity and reduction in osteocyte population[24]. (Fig. 5).

Fig. 5



Principles of Management

All the above discussed complications considerably affects the quality of life of a patient. Some of these are unavoidable but others could be transitory. The severity varies depending on the volume, dose and duration of the treatment. An effort should be made to minimize these effects by incorporating a working relationship between a General Dental Practitioner, Maxillo–Facial Surgeon, Radiation Oncologist, Child and Adult Oncologist, Nutritionist and Speech Pathologist. Strategies of management should aim at prevention, anticipation and appropriate treatment. Treatment strategy consists of the following three components of oral care:

1. Pre-treatment
2. During treatment
3. Post treatment,Maintenance and Monitoring

Pre-treatment:

The goal of pre treatment assessment is to eliminate the need for invasive and high risk procedures, therefore, a complete clinical examination of soft tissues, dentition and periodontium is required. Identify conditions like poor oral hygiene, broken teeth, deficient restorations and periodontopathy. Radiographs are essential to evaluate any pathology including the existence of metastatic disease. All teeth with questionable prognosis should be extracted. (e.g. pulpally involved, advanced periodontal disease and periapical pathology). Teeth with relatively good prognosis should be dressed and scaling and polishing carried out. Base line salivary flow levels, bacterial count (Lactobacilli and mutans Streptococci) and presence of Candida should be established. Proper oral hygiene instructions be given and use of potent antimicrobial like 10 ml of .2% Chlorhexidine in the form of mouth wash twice daily for about a week before radiotherapy. Sodium bicarbonate mouth rinses may also increase salivary pH and buffering capacity. It would be a good opportunity to give dietary counseling regarding carbohydrate and sugar diet. Nystatin (100000 unit per ml.) may be used for antifungal prophylaxis.

During Treatment

Patient should be seen atleast weekly during the treatment to address to their problems and provide encouragement. When mucositis starts to appear several topical agents could be used like Benzydamine Hydrochloride (Difflam)[25], Indomethacin[26], Prostaglandin E-2[27], and Hydrocortisone Lozenges. Magnesium Hydrooxide (Mucaine) could also be used. Chlorhexidine is recognized as a potent antimicrobial against bacteria, fungal and yeast organisms. Its usefulness in reducing the severity of mucositis in xerostomic patients is limited. Continuing dental care with fluoride like .4% Stannous fluoride and .5% Sodium[28] fluoride in the form of mouth wash and gel should be used. This would help in combating radiation caries and would alleviate sensitivity. A test for candida should be carried out every week. If positive, sugar free suspension of Nystatin or Amphotericin applied topically or Oral Fluconazole may be taken. Xerostomia can be helped by using sugar free chewing gums, salivary stimulants like Pilocarpine provided some saliva is being produced. Patients are also encouraged to take frequent sips of cold water, milk, ripe bananas, salad oil and butter. Salivary substitutes can be helpful if salivary function is significantly reduced. Available in the market are Saliva Orthana, Loborant, Glandasone and Oral Balance[29].

Post Treatment Maintenance and Monitoring

Post treatment phase demands special emphasis in terms of maintenance of existing dental and oral health and its subsequent monitoring. Diet counseling should be emphasized with reference to sugar and acid consumption. Plaque control and oral hygiene instructions reinforced. Continuous use of Fluoride and Chlorhexidine stressed.Due to progressive endarteritis every effort should be made to avoid Osteoradionecrosis like Antibiotic cover before extractions, minimize invasive procedures and be as atraumatic as possible. Institute jaw exercises to minimize progressive jaw stiffness. Restorative dental work should be done with flouride release conventional Glass

Ionomers or Light activated, Resin modified Glass Ionomer restorartive materials.
All this has to be monitored and reinforced at regular intervals.

Conclusion

Management of complications following radiotherapy and chemotherapy in patients with head and neck malignancies pose great challenges to Oral Physicians. These problems can significantly alter patient's life both physically and psychologically. However, appropriate intervention at a proper time could protect our patients from considerable pain and suffering.

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