

## "Oral Mucositis: A Sequel to Cancer Therapy" Prevention and Management

### Abstract

Cancer is a horrifying pathology, whose treatment (radiotherapy and chemotherapy) is accompanied by many side effects. The most challenging one is oral mucositis, which is sometimes so severe, that patient just refuses to take therapy anymore and gets ready to face the fatal consequences rather than living a compromised and painful life. As oral health care providers, we can help these patients by timely assessing, diagnosing, educating and making aware about oral mucositis and its management before, during and after oncotherapy. I wish to suggest through this paper that the dentist should be there full time or on call in every oncotherapy department for guiding management protocol for oral mucositis, prior to, during and after therapy, so that these patients can pass through the difficult phase of life with minimal stress and be able to win over this fatal disease by pursuing the treatment.

### Key Words

Mucositis, Erythema, Pseudomembrane, Ulcer, Dysphagia, Oncotherapy.

- 1 Raman Kapur
- 2 Ravi Kapur
- 3 Mannat Dogra
- 4 Rajat Kapur

<sup>1</sup> Associate Professor, Department of Pedodontics and Preventive Dentistry, M.M.C.D.S.R., Mullana, Ambala.

<sup>2</sup> Principal & Dean, Professor & Head, Department of Conservative Dentistry and Endodontics M.M.C.D.S.R., Mullana, Ambala.

<sup>3</sup> B.D.S intern, M.M.C.D.S.R., Mullana, Ambala.

<sup>4</sup> B.D.S intern, National Dental College, Derrabassi(Punjab).

### Address For Correspondence:

Dr. Raman Kapur  
Department of Pedodontics and Preventive Dentistry  
M.M. College of Dental Sciences and Research, Mullana,  
District Ambala, Haryana-133203, India.  
Mobile No.: 09815655553  
E mail - rrrk@yahoo.com

Date of Submission : 07-Jan-2011

Date of Acceptance : 25-Jan-2011

### INTRODUCTION

Cancer in whatever form it may occur, is a horrifying pathology till date, reason being its insidious onset, stealthy spread and fatal nature, treatment of cancer and measures adopted to curtail its spread are often accompanied by complications. These complications have oral and dental implications that are known to compromise the quality of life especially in children. Pediatric dentists play an important role in the diagnosis, prevention, stabilization and treatment of oral and dental problems which can compromise a child's quality of life before, during and after cancer treatment.

The mucosal lining of oral cavity as well as G.I.T is a prime target for treatment related to toxicity by virtue of its rapid cell turnover rate. The most common complications related to cancer therapies are mucositis, infection, salivary gland dysfunction and pain leading to dehydration, loss of taste and malnutrition. In myelo suppressed cancer patients, radiation of head and neck can irreversibly injure oral mucosa, vasculature and bone, further leading to xerostomia, rampant dental caries, trismus, soft tissue necrosis and osteonecrosis.

Oral mucositis is the most common problem, it occurs in 20-40% of patients treated with chemotherapy alone and up to 50% of patients receiving a combination of chemotherapy and radiotherapy.<sup>1</sup>

### DEFINITION

Oral mucositis may be defined as inflammation of oral mucosa with extensive ulceration and painful irritation. It is a complex biological process divided in to four phases, which are interdependent and can occur due to action of cytokines on epithelium. These phases are:

1. Inflammatory or vascular phase: day 0
2. Epithelial phase: days 4-5
3. Ulcerative or bacteriologic phase : days 6-12
4. Healing phase: days 12-16<sup>2</sup>

Following radiation and or chemotherapy the effect is visible on the oral mucosa within 5-7 days (Phase 1& 2). If unattended, the condition worsens within another 7 days making it unbearable within 6 - 12 days (Phase - 3 ), and then further on healing starts.<sup>3</sup>

### Causative agents Chemotherapeutic agents

#### Anthracyclines

- a) Daunorubicin
- b) Doxorubicin
- c) Epirubicin

#### Alkylating agents

- a) Cyclophosphamide
- b) Busulphan
- c) Procarbazine
- d) Thiotepa
- e) Mechlorethamine

### Vinca Alkaloids

- a) Vinblastin
- b) Vincristine

### Antimetabolites

- a) Methotrexate
- b) 5 - Fluorouracil
- c) Hydroxy urea
- d) Cytocine
- e) 6 - Mercaptopurine
- f) 6 - Thioguanine

### Antitumour Antibiotics

- a) Actinomycin
- b) Bleomycin
- c) Mitomycin

Combination of drugs may have more side effects.<sup>4</sup>

### Predisposing factors

These may be direct or indirect.

### DIRECT

- i) Age - more in young individuals
- ii) Gender - more in females
- iii) Pre-existing dental hygiene - Ill fitting appliances, Periodontal diseases.
- iv) Nutritional status - more in under nourished persons.
- iv) Chemotherapy - the effect is directly related to the type of drug, its dosage and the duration of intake.
- vi) Radiotherapy - severity is directly influenced by dosage of radiation and its duration.

## INDIRECT

- i) Myelosuppression
- ii) Immunosuppression
- iii) Reduced secretory IgA
- iv) Infections - bacterial, viral, fungal

### Clinical features and assessment of mucositis

The first symptom to appear is erythema or redness of mucosa along with raised, discrete, white desquamative, slightly painful patches that are sensitive to touch and pressure (Fig:1). This is followed by larger, often confluent ulcers with pseudomembranes (Fig : 2). The ulcers when present in posterior pharynx are extremely painful and cause dysphagia, thereby disturbing and causing nutritional deficiency leading to delayed regeneration of healthy mucosal layer because of decreased resistance to secondary infections, thus vicious cycle sets up.<sup>3</sup>



Figure 1 - White desquamative patch on lateral border of tongue



Figure 2 - Ulceration in mucobuccal fold.

W.H.O has proposed the following grading system for assessment of oral mucositis with regard to severity of pain and ability of the patient to maintain adequate nutrition:

- Grade 0 - Asymptomatic.
- Grade 1 - Soreness, erythema, no ulceration.
- Grade 2 - Erythema, ulceration, but ability to swallow solid food.
- Grade 3 - Extensive erythema, ulceration, solid food cannot be swallowed.
- Grade 4 - Mucositis to the extent of impossible alimentation.<sup>6</sup>

### Remedial and preventive measures ,before, during and after therapy:

#### A)Dental and oral care before initiation of cancer therapy.

##### Objective:- these are two fold

- 1)To identify and stabilize/eliminate existing sources of infection and local irritants that can complicate therapy.
- 2)To educate the patient and care takers about importance of optimal oral care so as to minimize

oral discomfort during and after the treatment.

#### B)Initial evaluation

Involvement of a dental team experienced with oral oncology can reduce the risk of oral complications. The dentist should evaluate:

- 1)Medical History:- it should include type of cancer treatment protocol, medications, allergies and immunosuppression status too.
- 2)Dental History: it should include information like habits, trauma, symptomatic teeth care, preventive practices etc.
- 3)Oral/Dental Status:- it should include thorough head and neck and intraoral examination, oral hygiene assessment and radiographic evaluation based on history and clinical findings.<sup>7</sup>

#### ii)Oral hygiene:-

- 1)Brushing of teeth and tongue two- three times a day with soft toothbrush.
- 2)Ultrasonic brush and dental floss may be used by a properly trained patient.
- 3)Patients with poor oral hygiene and periodontal disease can use chlorhexidine rinses.

#### Fluorides :- it includes use of :

- Fluoridated tooth paste
- Fluoride supplements if indicated
- Neutral fluoride gels/rinses
- Fluoride varnish application (if patient is at caries risk or xerostomia)

#### iv) Diet

Should encourage a non carious diet and patient's attendants should be warned about high cariogenicity of dietary supplementary and pediatric medication rich in sucrose.

#### v)Trismus prevention /Treatment:

Patient receiving therapy may develop trismus, so daily stretching oral exercise should start before, throughout and during therapy. Trigger point injections, analgesics and muscle relaxants may be used.

#### vi) Reduction of radiation to healthy oral tissues :-

In case of radiation to head and neck, the use of lead lined stents, prostheses and shields, as well as beam - sparing procedures should be discussed with radiation oncologist.

#### vii)Education

Patient/ care taker education includes the importance of optimal oral care in order to minimize oral problems/discomfort during and after treatment and the possible acute and long term effects of therapy in the craniofacial complex.

#### viii)Data provided by dentists to oncologist

- a)Dental caries
- b)Number of teeth requiring restorations
- c)Endodontic disease
- d)Teeth with pulpal infection
- e)Teeth requiring endodontic treatment

- f)Periodontal disease status
- g)Number of teeth requiring extractions
- h)Other urgent care required
- i)Time necessary for complete stabilization of oral disease

#### ix)Pulp therapy :-

In primary teeth before therapy, if this treatment is complete it would impose minimum risk. However, extraction is the choice of many dentists as pulp infection during immunosuppression can have significant effect on cancer therapy and become life threatening. In permanent nonvital teeth, root canal treatment can be done one week prior to initiation of cancer therapy, as there is sufficient time to assess success of treatment but if it is not possible then extraction is the choice followed by antibiotic therapy. Asymptomatic needs can be delayed till the patient is stable.

#### x)Ortho-appliances and space maintainers:-

These should be removed. If bands and loops or lower lingual arches are difficult to remove, then orthodontic wax should be used to reduce tissue trauma.

#### xi)Periodontal treatment:-

If hematological status permits in case of partially erupted teeth, over lying gingival tissue should be excised otherwise it can be a source of infection.

#### xii)Extraction:-

Loose teeth should be left to exfoliate naturally. Impacted teeth should be removed two weeks prior to start of therapy to allow healing.<sup>8</sup>

## B. DENTAL CARE PROTOCOL DURING THERAPY:-

### Objectives:-

1. To maintain optimal oral health during therapy.
2. To manage side effects which may develop as a consequence of therapy.
3. To educate patient/care taker about optimal oral care to minimize oral problems and discomfort during therapy.

Oral hygiene needs softer tooth brush e.g. end tufted brush, foam brush or super soft brush soaked in chlorhexidine solution for brushing. Brush should be air dried. Electric or ultrasonic brushes may be used if patient is able to use them atraumatically.

#### i) Lip care

Lanolin based creams and ointments should be used to protect and moisturize lips.

#### ii) Education

Patient caretaker should be properly educated about oral care protocol and prepared about short and long term side effects of therapy.<sup>9</sup>

#### iii) Psychological support

As mucositis being the most devastating

complication of cancer therapy, affecting eating, swallowing and communication, which are the most basic of human activities. Patients become withdrawn and socially avoidant, depressed and frustrated. Care should be taken while giving psychotropic drugs as these should not worsen their existing oral problems. Anticholinergic drugs should be avoided in patients with xerostomia and salivary problems. Its important to monitor each patient's level of distress, ability to cope and respond to treatment. Education of patient and caretaker, symptom management and demonstration of concern for patient's discomfort and supportive care from staff and family can help the patient to cope better with the problem.<sup>10</sup>

### C. MANAGEMENT FOLLOWING CANCER THERAPY:-

Management of patient undergoing high dose chemotherapy or upper mantle radiations requires specialized oral care protocol aimed at reduction of physical trauma to oral mucosa.<sup>10</sup>  
Routine oral hygiene care:-

#### i) Tooth Brushing

- Use soft Nylon 2-3 rows tooth brush.
- Brush all surfaces gently for 90 seconds using Bass sulcular method.
- Rinse frequently with water.
- Foam tooth brush should be used if regular one can't be used.
- Rinse with antimicrobial rinses when possible.

#### ii) Dentrifice

Fluoridated is recommended.

#### iii) Flossing

Atraumatically once daily.

#### v) Bland rinses

Rinses with a solution of salt and baking soda 4-6 times daily per day (½ teaspoonful salt and ½ teaspoon soda) in one cup warm water to clean and lubricate

#### vi) Fluoride

1.1% neutral sodium fluoride gel  
4% stannous fluoride gel  
Brush on gel for 2-3 minutes  
Expectorate and rinse mouth gently  
Apply once a day.

#### vii) Antimicrobial rinses

0.12% to 0.2% chlorhexidine oral rinses.  
Povidone iodine oral rinses.  
Tetracycline oral rinse.  
Rinse, hold 1-2 minutes, expectorate.

#### viii) Cryotherapy

Ice chips and flavoured ice pops.

#### ix) Anaesthetic cocktails

Viscous lidocaine and diclonine HCL relieves pain.

#### x) Laser therapy

It is beneficial in reducing the severity and

duration of mucositis.

#### xi) Mucosal coating agents

Kaolin - Pectin, Diphenhydramine in orabase and oratect gel.

#### xii) Capsaicin

Active ingredient is chilly pepper in candy vehicle, increases pain threshold, effective for symptomatic pain relief.

#### xiii) Narcotics

May be Oral, Transmucosal, Parenteral, Topical  
Opioid morphine 0.08% gel.

#### xiv) Dental care

##### a) Periodic evaluation

Patient needs to be checked up every six months to rule out any Oro- dental problem reappearing after therapy.

b) Orthodontic treatment can be started only after two years of disease free survival. During treatment care is taken to:

- Use appliance with minimum risk of root resorption.
- Use lighter forces to move teeth.
- Terminate the treatment earlier.
- Choose the simplest treatment method.
- Don't treat lower jaw.<sup>11</sup>

c) There is marked alteration of growth and development of children who have long term cancer therapy. In children younger than 12 years undergoing therapy, disturbance in size, shape and eruption sequence of teeth occurs. Usually decreased crown size, short and conical roots, microdontia and sometimes complete agenesis may occur. Alveolar processes are diminished causing decreased occlusal and vertical dimension. If growth centers are affected, then size of mandible and maxilla also gets compromised. Role of orthodontic treatment in these therapy related malocclusions is still not fully established.<sup>12</sup>

#### d) Oral Surgery-

Simple oral surgical procedures like extraction or excisional biopsy require preoperative and post operative hyperbaric oxygen to avoid osteomyelitis if patient had radiotherapy previously.

### SUMMARY

Children or their caretakers should be properly evaluated about their dietary and oral hygiene habits. Then they should be educated about oral hygiene measures, preventive procedures like fluoride gels, pastes and rinses and frequent rinsing and wetting of mouth. Information about anaesthetic cocktail rinsing gels and pain relieving preparations should be given. This can be well achieved by proper coordination between pediatric oncologists and pedodontists. This

helps the patient to tide over difficult situations with relative ease and complete the whole treatment to get well.

### References

- Earnest H. Rosenbaum, Isadora R. Rosenbaum. Everyone's Guide to Cancer supportive care. 4th ed. Kansas city: Andrews Mc Meel Publishing; 2005. pp257-62.
- Sonis ST. Mucositis as a biological process. A new hypothesis for the development of chemotherapy induced stomatotoxicity. Oral oncol. 1998; 34(1):39-43.
- DeVita VT, Hellman S, Rosenberg SA. Cancer: Principles and Practice of oncology. 4th ed. Philadelphia; JB Lippincott, 1993. pp2385-92.
- Wilkes J.D. Prevention and treatment of oral mucositis following cancer chemotherapy. Semin Oncol. 1998;25:538-51.
- Dodd M.J, Miaskowski C, Shiba G H etal. Risk factors for chemotherapy induced oral mucositis: Dental appliances, oral hygiene, previous oral lesion, and a history of smoking. Cancer Invest. 1999;17(4):278-84.
- Sloan JA, Loprinzi CL, Novotny PJ etal. Sex differences in Fluorouracil induced stomatitis. J Clin Oncol. 2000;18(2):412-20.
- Sonis ST, Eilers JP, Epstein JB. Validation of a new scoring system for the assessment of clinical trial research of oral mucositis induced by radiation or chemotherapy. Cancer. 1999;85(10):2103-13.
- Sonis ST, Wood PD, White BA. Oral complications of cancer therapies. Pretreatment oral assessment. NCI Monogr. 1990;9:29-32.
- Sonis S, Kunz. Impact of improved dental services on the frequency of oral complication of cancer therapy for patients with non head & neck malignancies. Oral Surg Oral Med Oral Pathology. 1988;65(1):19-22.
- Dodd MJ, Dibble S, Miaskowski C et al. A comparison of effective state and quality of life of chemotherapy patients who do and who do not develop chemotherapy induced oral mucositis. J Pain Symptom Manag. 2001;21(6):498-505.
- Dahllof G, Bolin P etal. Disturbances in dental development after total body irradiation in bone marrow transplant recipients. Oral Surg Oral Med Oral Pathol. 1988;65(1):41-44
- Dahllof G. Craniofacial growth in children treated for malignant diseases. Acta Odontol Scand. 1998;56(6):378-82.