

Palliative Dental Care - A Boon for Debilitating

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ABSTRACT

World Health Organization defines “palliative care” as the active total care of patients whose disease is not responding to curative treatment. Palliative care actually deals with patients at the terminal end stage of the disease. We always face a question why a dentist should be in a palliative team? What is the exact role of dentist? Dental treatment may not always be strenuous and curative, but also can focus on improving quality of life of the patient. Hence forth the present paper enlightens the importance of dentist role in palliative team.

Keywords: Dental expression, Residential aged care facilities (RACF'S), Geriatric oral health assessment index (GOHA), Granulocyte colony stimulating factor (G-CSF), Keratinocyte growth factor (KGF)

INTRODUCTION

Palliative care dentistry has been defined as the study and management of patients with active, progressive, far-advanced disease in whom the oral cavity has been compromised either by the disease directly or by its treatment [1,2]. Palliative team is a multidisciplinary approach where dental expression serves as ‘healing hands’ in pain control, social, psychological and spiritual problems. A dentist role in palliative team is oblivious, who actually can serve a crucial role in improving quality of life of the patient. The main role of palliative care is to assure affluent life, rather than a strenuous curative treatment. In palliative medicine an interdisciplinary approach is inexorable and essential. In addition, routine dental assessments may identify dental disease and facilitate dental interventions for caries, periodontal disease, oral mucosal problems and prosthetic needs. Changing demographics and improved medical management of disease are placing increasing demands on dental providers for increased knowledge of oral manifestations of systemic diseases and their dental management [3]. The overall intervention precludes oral comfort to the patient at the terminal end stage. The prevention of oral problems like xerostomia, mucositis, and candidiasis are some of the important aspects of palliative oral treatment, which impart positive attitude on patient's personality and boost them with self confidence. In Toto it has been projected that by 2031, the number of people requiring this type of accommodation (Palliative care) will increase from 520,000 to 1.4 million [4].

Methods

The present article employs review of literature describing the role of a dentist in palliative team. As a part of complete review and discussion of matter, by retrieving relevant sources, the search for articles were made through Google search engine using heading terms palliative dental care, hospice, terminally ill patients, Residential aged care facilities (RACF'S), Dental Expression and oral manifestations of palliative patients. Accordingly abundant research results were obtained but the articles included in the reference list were sufficient to fulfill the objectives in the review.

Dental expression in palliative care

Dental expression in palliative care may be defined as the extended dental services with a central goal of providing pre-eminent feasible oral care to terminally ill or far advanced disease patients, where oral lesions greatly impact on quality of remaining life of patients, also the initiation and progression of oral lesions may be related to direct or indirect succession of disease, its treatment or both [5]. Maintaining

proper oral hygiene will be a difficult task for sick and terminally ill patients, hence the main goal of dentist in palliative team should focus on oral comfort which comprise maintenance of oral hygiene, wipe out painful conditions like mucositis, infectious diseases, and ulcerative conditions of oral cavity. The strategy of dentist should owe on providing comfortable life style to patient rather than traumatic curative treatments. Giles and colleagues predicted that till 2031, there is likely to be a 70% increase in the number of older people with profound disability associated with musculoskeletal, nervous system, circulatory, respiratory conditions and stroke [6].

Oral considerations in palliative patients – Cause and care

The imperative and important problems faced by the palliative patients are discussed briefly. The symptoms that indicate terminal phase of life are categorized as [7]:

1) Bed-bound 2) Loss of appetite 3) Profound weakness 4) Trouble swallowing 5) Dry mouth 6) Weight loss 7) Becoming semi-conscious, with lapses into unconsciousness 8) Experiencing day to day deterioration that is not reversible.

Pain is one of the at most criteria which should be considered in palliative care. It remains a central feature of good palliative care. The common oral problems encountered in palliative patients include xerostomia, mucositis, candidiasis, dental caries, periodontal diseases, taste disorders, etc. [8]. Early clinical diagnosis of these oral lesions or conditions in palliative patients should be done to minimize pain and suffering. A thorough oral assessment based on a systematic approach is required for sound management of oral care and facilitate prevention or minimization of oral complications [9]. The most appropriate screening tool use with elderly is Geriatric Oral Health Assessment Index. (GOHA) [10].

Mucositis and Stomatitis

Mucositis is a painful condition of oral cavity with ulceration of mucosal linings in the mouth, pharynx and digestive tract. It usually occurs as a result of toxic chemotherapy like 5-fluorouracil and methotrexate, which are potent mucositis agents, radiotherapy and stem cell transplantation [11]. 80% of patients with head and neck malignancies receiving radiotherapy and chemotherapy are prone to mucositis [12]. Clinically it may present as red or white lesion in the mucosa, pseudo membrane formation and ulceration in the initial stages although late changes include fibrosis of connective tissue and hypovascularity [13]. Fractionated dose of 180-220 cGy/day results in mucositis within 1-2 weeks and increases throughout the course of therapy to maximum in 4 to 5 weeks [14]. The symptoms

include severe pain, compromised oropharyngeal function and oral bleeding that effect quality of life.

The patient judged mucositis scale, a modified version of WHO mucositis scale used by Mahmood et al., Papadeas et al., and karagogzoglu et al., is best assessed for general, physical and nutritional status as well as inspection of oral cavity [15]. The new modalities include cell morphology and assessment of viability of cells by tryptan blue dye exclusion test. Palliative treatment for mucositis [Table/Fig-1] Maintenance of proper oral hygiene, good nutrition and hydration is also needed [16,17]. Prevention of mucositis following chemo and radiotherapy can be done by administration of amifostine that scavenges free radicals generated in the tissues which are known to potentiate mucositis and promote repair of damaged DNA

Diluting agents	Saline, Bicarbonate rinses, Frequent water rinses, Ice chips
Coating agents	Kaolin-pectin, Aluminum chloride, Aluminum and Magnesium Hydroxide, Hydroxypropyl cellulose, Sucralfate
Lip lubricant	Wax, Water based lubricants, Lanolin
Topical anesthetics	Dyclonine Hcl, Xylocaine Hcl, Benzocaine Hcl, Diphenhydramine Hcl, Doxepin Hcl

[Table/Fig-1]: Management of mucositis [16]

[18]. Studies have been conducted on new modalities like biological response modifiers granulocyte colony stimulating factor (G-CSF) and keratinocyte growth factor (KGF) [2].

The Severity of mucositis can be assessed by World health organization mucositis grading [9]

Grade 0 - None

Grade 1 - Erythema, painful ulcers, mild sore throat

Grade 2 - Painful erythema and ulcers, oedema of oral mucosa, but able to eat solid food.

Grade 3 - Painful erythema and ulcers, painful oedema of oral mucosa that interferes with eating solid food

Grade 4 - Need for parenteral or enteric support due to severe stomatitis.

Xerostomia

The subjective report of oral dryness is termed xerostomia, which is a symptom and not a diagnosis or disease. Xerostomia may not always be associated with hyposalivation. It is common in palliative patients mostly as a result of radiotherapy and medication [1]. It is practically difficult to assess the severity of xerostomia as it may sometimes be totally subjective, and impart serious negative effect on patient's quality of life effecting dietary habits and nutritional status. Causes of xerostomia are included in [Table/Fig-2] [19]. The symptoms include oral dryness, burning sensation, difficulty in chewing, swallowing, altered taste etc. Clinical signs that aid in diagnosis include thick ropey saliva, [Table/Fig-3] lip stick sign, tongue blade sign, bald and fissured tongue, candidiasis, increased rate of dental caries and erosion of teeth etc. Simon et al., assumed that plaque retention, fissured tongue, and oral ulceration are considered the main problems regarding oral health [20].

Developmental	Salivary gland aplasia
Water/metabolite loss	Impaired fluid intake, hemorrhage, vomiting/diarrhoea
Iatrogenic origin	Medications, radiation therapy to head and neck, chemotherapy
Systemic diseases	Sjogren's syndrome, diabetes mellitus, sarcoidosis, HIV, hepatitis C infection, graft versus host disease, psychogenic disorders
Local factors	Decreased mastication, smoking, mouth breathing

[Table/Fig-2]: Etiology of xerostomia

Management include preventive, symptomatic and curative modalities. "Magic mouth wash" composed of antacids, diphenhydramine and the topical antifungal nystatin and viscous lidocaine in various formulations has gained importance due to its pronounced therapeutic effect now days [21].

Preventive therapy includes maintenance of meticulous oral hygiene, frequent visits to dentist, supplemental fluoride, remineralizing solutions and noncariogenic diet [19,22]. Nevertheless symptomatic therapy like water intake, oral rinses and gels, alcohol free mouthwashes, humidifiers, use of topical salivary stimulants like sugar free gums, artificial salivary substitutes, systemic secretagogues like bromohexine, anetholtrithione, pilocarpine Hcl and cevimeline Hcl [23-25]. New modalities include electrical stimulation of salivary glands for salivary hypofunction which delivers low voltage electric charge to tongue and palate [16,26]. when meta-analysis of randomized control trial of pilocarpine was done by schuller et al., the overall improvement in condition of xerostomia was superior with pilocarpine. Hence, pilocarpine is superior to other novel agents [27]. Curative treatment needs proper diagnosis of underlying pathology for hyposalivation which includes sialometry, sialochemistry, salivary gland imaging, etc. [28]. Based on investigative procedures and accurate diagnosis, treatment plan should be done accordingly.

Candidiasis

The incidence of candidiasis in palliative care has been estimated to be 70-85% [1]. *Candida albicans* is the most common infectious organism encountered in candidiasis. Predisposing factors are embraced with poor oral hygiene, poor nutrition, smoking, denture wearers, immuno suppression, use of broad spectrum antibiotics and corticosteroids [1,2].

Types of primary candidiasis include pseudomembranous, erythematous, atrophic candidiasis and *candida* associated infections (angular cheilitis, median rhomboid glossitis, and denture stomatitis) [28]. The most common type in terminal end stage immuno compromised patients is pseudomembranous type which presents as loosely attached membranes comprised of fungal elements and debris, upon on scraping it leaves erythematous area. Hyperplastic candidiasis is usually non scrapable. Erythematous candidiasis appears as red lesions, frequently on hard palate and tongue. Angular cheilitis appears as red and white fissures



[Table/Fig-3]: Thick ropey saliva



[Table/Fig-4]: Angular cheilitis

Drug	Form	Dosage
Amphotericin B	1. Lozenge 10mg 2. Oral suspension 100mg/ml	Dissolve in mouth slowly 3-4 per day or 2 weeks
Nystatin	1. Cream 2. Oral suspension 100,000 U	1. Apply to affected areas 3-4 times per day 2. Apply after meals 4 times per day for 7 days
Clotrimazole	1. Cream 2. Solution	1. Apply to affected areas 2-3 times daily for 3-4 weeks 2. 2.5ml 3-4 times daily for 2 weeks.
Ketoconazole	Tablets	200-400mg tablets twice daily with food for 2 weeks.
Fluconazole	Capsules	50-100mg once daily for 2-3 weeks.
Itraconazole	Capsules	100mg capsules daily taken immediately after meals for 2 weeks
Miconazole	1. Oral gel 2. Cream	1. Apply to the affected area 3-4 times daily 2. Apply twice per day and continue for 10 to 14 days after the lesion heals.

[Table/Fig-5]: Treatment of candidiasis [16]

emanating from the corners of mouth which consists bacterial and fungal components [Table/Fig-4]. In palliative patients candidiasis is mostly because of xerostomia [29].

Treatment of candidiasis includes topical and systemic antifungal drugs grouped into polyenes and azoles [Table/Fig-5] [19,30].

Many trial interventions have been done regarding the administration of antifungals and its absorption in GIT. According to Finlay, Flynn, Oude and Bensadoun fluconazole is the best absorbed drug, this presumes that absorption of drugs plays an important role in hospice receiving radio and chemotherapy [31,32]. Despite the number of commercial products available, research has shown that rinsing with water, cleansing with a soft tooth brush and regular soaking of dentures in a weak non-toxic solution are the most effective oral cleansing agents. Dentures should be stored in vessels in solution of water, mouth wash 0.12% chlorohexidine or 100,000 IU of nystatin suspension. The suspension of agent like nystatin has high sugar content and must therefore be administered cautiously in xerostomic dentate patients [33].

Nutrition and Taste disorders

Nutrition is the most important aspect of health and well being. Nutrition is required for physical and alert active mental status. However it is most commonly compromised in people suffering from end stage disease and patients undergoing treatment for the same. Development of malnutrition and its consequence is usually a slow process, and is most often neglected aspect in management of palliative patients. Compromised nutritional status can lead to severe neural, muscular, bony, hematological and mental disorders affecting the general health and rarely proved to be fatal [28]. The most common causes of malnutrition in palliative patients are xerostomia, Taste and olfactory dysfunction stomatitis and compromised dental status.

The risk factors for diminished taste and smell are typically due to nervous system disorders, chronic renal and liver diseases, endocrine disorders, medication and multitude of disorders affecting nasal and oropharyngeal region [4].

The role of dental professional is to assess nutritional status, oral implications causes of complaints provide guidelines and refer to appropriate provider [34].

Our capacity to taste and smell allows us to distinguish the flavour and aroma of food or drink, whether pleasant or unpleasant. Indeed alterations in these senses significantly impact our quality of life [35]. Nutrition risk may be minimized or avoided with early intervention, proper diet instructions and referral to appropriate health professional.

Dental caries and Periodontitis

Patients with terminal end stage are usually prone to caries and periodontitis, with most common reasons being radiation therapy which in turn causes changes in salivary flow, decreased pH, reduced buffering capacity, increased viscosity, reduced cleansing



[Table/Fig-6]: Radiation caries

action and debris accumulation leading to increased rate of caries and periodontitis [Table/Fig-6] The best method of reducing caries is by combination of restorative dental procedures, proper oral hygiene and topical application of sodium fluoride. Avoidance of dietary sucrose further reduces concentration of streptococcal mutants and *lactobacillus* [36]. Teeth which are grossly decayed and severely periodontally compromised should be extracted based on patients health status, as it improves patients comfort for intake of food. Rehabilitation of missing teeth should be done to improve masticatory efficiency.

Osteoradionecrosis of the jaw

Osteoradionecrosis is best defined as a slow healing radiation induced ischemic necrosis of bone with associated soft tissue necrosis of variable extent occurring in the absence of local primary tumour necrosis, recurrence or metastatic disease [37]. Its incidence is three times higher in dentate patients than in edentulous principally due to injury from extractions and infection from periodontal disease [38].

Radiation dose < 3000 cGy	Mucositis, Candidiasis, Xerostomia & Dysgeusia begins
Radiation dose > 3000 cGy	Xerostomia (permanent) and Dysgeusia, saliva is thick, more acidic, altered flora
Radiation dose > 5000 cGy	Trismus, Concerns for Osteo radionecrosis
Radiation dose > 6000-6500 cGy	Significant concerns for Osteoradionecrosis

[Table/Fig-7]: Effects of radiation pertaining to dosage

Most common cause for osteoradionecrosis preclude radiation dose higher than 65-75 Gy [Table/Fig-7] [39]. Trauma can be a pathophysiology in theory of infection and radiation. Unrepairable teeth due to caries, periodontal disease or root lesions can cause infection to bone and progress to osteoradionecrosis. Abuse of alcohol and tobacco are identified as risk factor for the same.

The classification for Osteo radionecrosis was given by Clayman based on the overlying mucosa being intact or not.

Type 1- for the cases in which lysis of bone occurs under intact gingiva.

Type 2- more aggressive type called as "Radiation osteomyelitis" when there is soft tissue break down, exposing the bone to saliva with secondary contamination [40].

The concept of "three H" (hypoxic, hypovascular, hypocellular) of Marx is well accepted [41]. Marx and Johnson found physical diagnostic signs to correlate with increased degrees of radiation tissue injury which are described as follows: 1) induration of tissue 2) mucosal radiation telangiectasias 3) loss of facial hair growth 4) cutaneous atrophy 5) cutaneous flaking and keratinization 6) profoundness of xerostomia 7) profoundness of taste loss [42]. Radiological investigations may include Orthopantomography (OPG), Computed tomography, magnetic resonance imaging, positron emission tomography and radionuclide bone scanning with ^{99m}Tc-MDP and Near infrared spectroscopy.

Precautions to be followed in averting complications of radiotherapy at hospice of head & neck cancer patients [43,44]:

Precautions to be followed prior to Radiotherapy

- Oral prophylaxis.
- Extract teeth with more than 4-6 mm pockets, grade-II mobility and furcation involvement.
- Remove partially erupted third molars and carious teeth with periapical lesions.
- Weekly dental checkups during radiation therapy and three month dental checkups, possibly lifelong.
- Restore all dental caries.
- Antibiotics may be necessary for surgical procedures.
- Avoid removable or fixed prosthesis for six months before or after radiotherapy.
- Precautions to be pursued after Radiation Therapy.
- First three month dental checkups, possibly lifelong.
- Restore all dental caries.
- Endodontic treatments can be done.
- Antibiotics may be necessary for surgical procedures.
- Avoid removable prosthetics for six months.
- Crown and bridge can be given after six months of radiotherapy.

Ruggiero et al., concluded combination of antibacterials, antifungals and antivirals as the combined pharmacological therapy for osteoradionecrosis [45].

Psychological changes in palliative patients

Psychological distress is the term applied predominantly to anxiety, phobic and depressive symptoms [45]. The most common psychological problems for elderly requiring a palliative approach are depression, confusion and anxiety, with depression being one of the most prevalent psychiatric problems among older persons in general [46].

Therefore, the interactive effects of psychological and physical well being need to be carefully considered. By the time the patients reach palliative care stage, they have typically gone through the process of investigation, diagnosis and treatment with varying degrees of pain and trauma, dependency and disfigurement, following the diagnosis of life threatening illness, many patients experience shock punctuated by periods of dysphoria, anxiety, fatalism and grief [47]. Palliative care psychiatry often focuses on emotional and social issues that arise in someone who is receiving hospice or palliative care. Depressed patients are prescribed antidepressants which are used for pain palliation and many of these medications cause xerostomia. Dentist should guide the physician in choosing a saliva sparing antidepressant like amitriptyline which is more xerogenic [48,49]. Because of lack of

proper oral hygiene depressed patients often present with increased rate of dental caries, periodontitis and halitosis. Faced with these conditions, even the near and dear ones will refrain them which in turn imposes severe negative impact. Therefore, it is imperative for a dentist to promote good oral hygiene.

Role of dentist in palliative team from inception till date

Palliative dental care is a novel emerging branch, which provides symptomatic relief to the terminal end stage patients. The key role of dentist in palliative team was enlightened only since 2006 and accordingly in the present article, literature search was made from inception till date.

The role of dentist in the management of oral complications either due to progressive far advanced disease or by its treatment can be managed through various modalities. Comprehensive clinical examination of the extra and intra oral soft tissues, periodontium and dentition is essential. High patient awareness and motivation are essential to minimize potentially devastating dental complications. Oral care protocols should strive to maintain the integrity of oral mucosa and lips, prevent caries and periodontal disease, alleviate oral pain and discomfort and prevent or treat infectious complications [50,51].

Oral mucositis is a prime complication which surpasses through various degrees of severity and accordingly the treatment focuses on palliation with administration of systemic opiate analgesics for moderate to severe mucositis pain, topical anesthetics and mucosal coating agents such as lidocaine, benzocaine, dyclonine, diphenhydramine, doxepin and benzydamine for moderate pain, and bland rinses for mild pain [52]. Other agents also has been investigated with variable responses like oral capsaicin, oral sulfasalazine and growth factor mouth washes. The novel clinical trials have been carried on Olive leaf extracts and sedative hypnotics like ketamine in the form of mouth washes with its pronounced analgesic and anesthetic properties [53,54]. Similarly xerostomia a debilitating condition for terminally ill individuals was treated conventionally by stimulating agents like sugar free chewing gums, later secretagogues like cevimeline, pilocarpine and oral moisturizers, lubricants, artificial saliva and bedside humidifiers were employed [55]. Novel approaches like acupuncture and trans cutaneous electric nerve stimulation (TENS) which increases the amount of calcitonin gene related peptide (CGRP) which in turn increases the salivary flow [56], Gene transfer(Recombinant technology) and GTR (guided tissue regeneration) two novel areas of exploration which could repair the damaged salivary parenchyma [57]. Artificial type of salivary glands with use of irradiated NIH 3T3 fibroblasts which serve as feeding layer are also in process. Short span edentulous areas should be restored by fixed partial dentures with supragingival margins as it reduces mucosal contact and further irritation [55]. Removable partial dentures should be designed with minimal tissue coverage with modified de van clasp at the end of flange which would be more suitable. Zinc oxide Eugenol and impression plaster should be avoided rather as they adhere to dry mucosa which cause burning sensation and severe irritation, it should be replaced by silicone impression materials as they are well tolerated [58].

The treatment of candidiasis was formerly treated with polyenes and azoles however new emerging technologies in dentistry have been replaced with echinocandins which are large lipopeptide molecules that inhibit synthesis of 1, 3-d-glucan which is essential component of many fungi [59]. Presently Caspofungin, micafungin and anidulafungin are echinocandins which have been used extensively. A once daily dosing regimen can be given through IV Loading dose of caspofungin 75mg day 1 followed by 50mg/ day and anidulafungin 200mg loading dose on day 1 followed by 100 mg/day [60]. Higher salivary *candidal* levels are encountered in denture wearers than in dentate patients. Soaking the denture in bleach (15ml), water (250ml) and benzalkonium chloride for 30min

help rid the denture of odours. Dentures should be stored in vessels in solution of water, mouth wash 0.12% chlorohexidine or 100, 000 IU of nystatin suspension [58].

Diet modification forecasts an important role in palliative care. Reduction of sugar intake, replacement of refined carbohydrates with substances such as sorbitol, xylitol, aspartame and saccharine further reduces incidence of dental caries. Dry spicy and acidic foods, alcohol, alcohol containing mouth washes and tobacco products should be avoided [61].

Dental care should be accomplished with maintenance of proper oral hygiene, home fluoride treatments using 0.4% stannous fluoride, 1.1% NAF and 1.23% of acidulated phosphate fluoride using brushon technique in customized trays. There is no universal treatment as such for treatment of radiation caries however importance of fluoride should be well recognized. The overall sequel of complications like caries, periodontitis and osteoradionecrosis can be avoided with maintenance of meticulous oral hygiene [62].

Detection of dental pathology including infected root stumps, bony spicules or sharp edges and hopeless teeth. Any preradiation extractions performed with alveolectomy should ensure a smooth ridge and primary closure, restoration of decayed teeth, consideration for continued maintenance and future prosthetic rehabilitation. With these careful preventive measures the complications of osteoradionecrosis can be prevented and aim should be focused more on revascularization of irradiated tissue [63].

Finally the dental practitioner should spotlight the patient suffering and navigate the minefield of potentially devastating legacies of pain caused due to various conditions.

CONCLUSION

Palliative care medicine is the evolving branch and gaining immense importance in this advancing world. This can be contributed to the fact of modernization and present living style, which, as side effects, has much psychological and physical morbidity.

Patients in end stage diseases need special care and treatment which necessitate a group of specialists to render it, and oral physicians are a definitive inclusion in this team. As a usual protocol of management, much importance is given to the disease per se and its treatment and in this scenario oral cavity is often neglected. Numerous side effects of such diseases and their treatments often effects oral cavity, causing a lot of discomfort and disturbance in the routine diet effecting the nutrition and general well-being. Along with the physical disabilities and chronic pain these patients suffer from many psychological effects like depression and social stigma. Oral cavity is the most common site of abuse of all such direct and indirect effects. Definitive diagnosis and management of such oral conditions in these patients is proficiently done by oral medicine specialists, which calls for the inclusion of them in the palliative care team.

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