

# Palliative Care Dentistry-A Boon for the Elderly

Vishwas Bhatia<sup>1\*</sup> and Garima Bhatia<sup>2</sup>

<sup>1</sup>Department of Prosthodontics and Crown and Bridge, Eklavya Dental College and Hospital, Kotputli, Rajasthan, India

<sup>2</sup>Department of Prosthodontics, Eklavya Dental College and Hospital, Kotputli, Rajasthan, India

## Abstract

Palliative care deals with patients in the end phase of their life. These patients should receive a treatment which focuses on the prevention and relief of suffering by means of early identification and assessment and treatment of pain and other problems, physical, psychosocial and spiritual. Now, a question may arise, what role could a dentist have in palliative care. Well, it has to be brought to everyone's notice that a dental treatment may not always consist of straining curative treatment approaches, but also focuses on the improvement of the quality of life. The aim of this paper is to give a view of general dental problems in geriatrics/old age people and their treatments that might not only relieve them of their disease but have a positive impact on their psychology, as during this phase of life our only aim should be to put back a smile on their face.

**Keywords:** Palliative; Geriatrics; Dental treatment; Psychology

## 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; the focus of care is quality of life [1]. Dentists can play a significant role in the care of geriatric patients by providing total comfort and care of the oral cavity. The function of the oral cavity is essential to the patient's ability to thrive. Many orofacial pain conditions occur in the elderly [2]. Therefore, alleviation of pain and prevention of infection in the oral cavity should be a priority in providing total, active comfort for the patient. Through routine assessments and interventions by a dentist on the palliative care team, comfort and care for the patient may be improved by the maintenance of oral hygiene and procedures to hydrate the oral mucosa. In addition, routine dental assessments may identify dental disease and facilitate dental interventions for caries, periodontal disease, oral mucosal problems or prosthetic needs. This multidisciplinary approach to palliative care, including a dentist, may reduce the oral debilities that influence the patient's ability to speak, eat or swallow. Changing demographics and improved medical management of disease are placing increasing demands on dental providers for increased knowledge of oral manifestations of systemic disease and their dental management [3].

The prevention of infections, treatment of problems like dry mouth or xerostomia, mucositis and candidiasis as well as the removal of sore spots are some of the important aspects of palliative oral treatment. They can have an immediate positive impact on the patient's personality and boost them with self confidence bringing back their lost smile.

## Age Changes in Mouth

Ageing not only causes changes in the body but it does so in the mouth as well. These changes can lead to oral disease, discomfort and poor appearance making older people susceptible to a wide array of discomfort and psychological trauma.

'Oral Cavity' is a mirror of one's health. The different structures in the mouth show degenerative changes as individuals get older. Some of these changes may be related to one or more diseases that a person has acquired over a life time or to drugs given to treat these diseases. However, some changes are physiological and result simply as a consequence of increasing age. Age-related oral changes are seen in the oral hard and soft tissues as well as in bone and the oral mucosa [4].

The different structures in the mouth, which are the teeth, mucosa and bone, go through changes as given below:

## Teeth

In a normal healthy tooth, the absorption of certain elements from saliva keeps it strong, healthy and able to resist disease. With age, enamel undergoes attrition, and in addition its mechanical characteristics alter, owing probably to changes in diffusion conditions leading to lesser absorption by the tooth [5]. This results in weaker and brittle teeth that are more likely to fracture and decay. Moreover as age progresses, wearing away of the surfaces of teeth caused by attrition and erosion leads to sensitivity to hot and cold. The age-induced changes occurring in dentine are much more obvious, the biological properties of this hard substance being fundamentally altered. The dentine of older people is characterized by the continuous narrowing of the lumen of the dentinal tubule, increasing calcification, reduction in the amount of peritubular fluid and reduced sensitivity [5]. This is more aggravated by the fact that lowering blood supply and increasing collagen content weaken the response of the tooth tissue to any kind of injury and its ability to repair or heal itself. Because of these changes, hard foods that did not cause any problems before cause cracks in the teeth and bits to be scraped off. Gradual narrowing of the circumference of the pulp volume, decrease in pulp density and dystrophic or degenerating calcifications are also noted alongside compression of collagen fibres [6].

With increasing age, people become less able to practice proper dental care because of disabilities, which can contribute to further problems like pulpal pathology and caries.

The above mentioned changes in the aged tooth add on to the effects of cancer therapy in a geriatric cancer patient. Patients undergoing head and neck radiotherapy are at life-long risk of developing osteoradionecrosis; subsequently, dental management protocols prior to radiation often entail aggressive approaches such as extractions [7].

**\*Corresponding author:** Dr. Vishwas Bhatia, B.D.S, M.D.S Prosthodontics, Department of Prosthodontics and Crown and Bridge, Eklavya Dental College and Hospital, Kotputli, Jaipur-303108, Rajasthan, India, Tel: 8800452322; E-mail: [vishwas211@yahoo.co.in](mailto:vishwas211@yahoo.co.in)

**Received** July 13, 2012; **Accepted** August 07, 2012; **Published** August 09, 2012

**Citation:** Bhatia V, Bhatia G (2012) Palliative Care Dentistry-A Boon for the Elderly. J Palliative Care Med 2:126. doi:10.4172/2165-7386.1000126

**Copyright:** © 2012 Bhatia V, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Also, many older people have more plaque build up on their teeth. This is not because of their age. It's related to other physical changes that can make it more difficult to brush and floss every day. For example, people with arthritis or neurological problems may not be able to clean their teeth as well, or they may forget to do it.

### Oral mucosa

Like all tissues in the human body, those within the buccal cavity undergo changes with ageing, which are observable in clinical practice [8]. Oral mucosa loses its elasticity and becomes more inflexible with age. Changes occur in arteries of the oral mucosa. However, gradual loss in substance of tissue in the insides of the mouth and jaw bone with age can cause increasing difficulty in the form of denture instability for denture wearers.

### Mucositis

Mucositis is the painful inflammation and ulceration of the mucous membranes lining the digestive tract, usually as an adverse effect of chemotherapy and radiotherapy treatment for cancer [9]. In older age, because of some oral or paraoral diseases, patient might receive chemo or radio therapy which along with unhealthy nutrition can lead to mucositis and stomatitis causing generalised soreness of oral mucosa and changes in sense of taste and smell. Oral mucositis is a common and often debilitating complication of cancer treatment [10].

Chemotherapy acts on tissues that have a high rate of mitosis, and the oral cavity is frequently affected. Oral mucositis affects almost all patients undergoing high-dose chemotherapy and Hematopoietic Stem cell Transplantation (HSCT), 80% of patients with malignancies of the head and neck receiving radiotherapy, and a wide range of patients receiving chemotherapy [11]. Reducing mitosis causes atrophy of tissues leading to ulceration, which may be further complicated by microbial invasion [12]. Mucositis occurs within 5–7 days of chemotherapy with drugs such as 5-fluorouracil and methotrexate, which are potent mucositis agents. With 5-fluorouracil (5-FU), up to 40% cancer patients get mucositis [11]. Radiotherapy to the head and neck is associated with Grade 3 and Grade 4 oral mucositis in which the patient is unable to eat solid food and unable to consume liquids respectively [11]. The above mentioned changes in the oral cavity combined with several factors like medications and denture wearing in geriatric cancer patient further results in a loss of appetite.

### Candidiasis

The incidence of candidiasis in palliative care patients has been estimated to be 70% to 85% [1]. Predisposing factors for fungal infections include poor oral hygiene, xerostomia, immunosuppression, use of corticosteroids or broad-spectrum antibiotics, poor nutritional status, diabetes and the wearing of dentures. *Candida albicans* is the most common infectious organism encountered in candidiasis. It is a natural inhabitant of the oral cavity whose overgrowth is normally suppressed by other nonpathologic microorganisms and natural host defense mechanisms. The mere presence of a positive culture without clinical symptoms is not indicative of *Candida* infection [13]. In palliative care patients, candidiasis is primarily a result of xerostomia. Results of a previous study done to determine the epidemiology, aetiology, clinical features and microbiological aspects of oral candidosis in a cohort of cancer patients receiving specialist palliative care showed 66% of the patients had microbiological evidence of oral yeast carriage, whilst 30% of the patients had combined clinical and microbiological evidence of oral candidosis [14]. Oral candidosis is relatively common in community-based patients with advanced cancer. Hence, such patients

should be screened for oral candidosis and should also be screened for reversible factors that predispose to oral candidosis, such as poor dental hygiene and salivary gland dysfunction [15].

### Xerostomia

Dry mouth is very common in older people. It is usually a side effect of medicines. Hundreds of medicines can cause dry mouth. Salivary flow is decreased in old people causing a condition known as Xerostomia. Also radiotherapy to treat cancers of the head and neck results in xerostomia due to destruction of the salivary tissues within the treatment zone. The decrease in lubrication and the protective agents in saliva render the tissues more susceptible to trauma and invasion by pathogens. The tissues become ulcerated and erythemic [1].

Because of the ageing population, and the concomitant increase in medicated individuals, dentists can expect to be presented with xerostomia in an increasing number of patients in the coming years and therefore should be familiar with its diagnosis and treatment [16]. Oral soft tissues become thinner, are less hydrated and elastic, are more susceptible to infection, and require a longer time to heal as age progresses.

### Bone

Loss in bone mass can result with age, which can cause osteoporosis (reduced bone formation). Loss of alveolar bone (part of the jaw that contains teeth) causes loss of facial height which makes a person look older than he/she is. The loss of bone also makes the lips fall in causing wrinkles to appear around the lips, making smile lines deeper and making the face sag. This appearance is more pronounced in people who have lost all of their teeth or a great number of them.

Dental practitioners need to be able to identify what is considered to be within the normal physiological limits of the ageing oral tissue and hence what is abnormal and requires further investigation to facilitate appropriate referral. Osteonecrosis of the jaw has been described in geriatric patients taking bisphosphonates after oral surgery procedures, including the placement of dental implants [17]. Long term administration of bisphosphonates, especially intravenous preparations results in a condition called Bisphosphonate-Related Osteonecrosis of the Jaws (BRONJ) [18].

### Psychological Changes

One should keep in mind that any kind of pain or discomfort has a huge negative impact on the patient's psychology. Along with treatment of pain, what is required in such patients is a psychosocial counselling as in such phase of life; even the slightest of discomfort can make one think of big problems. It is also important for the dentist to counsel the patient before and after the treatment and educate them about the care to be taken from their side. Nowadays, novel approaches to hospital palliative care are formulated that suggest an expanded role for counsellors. It is unique in that the approach has a strong counselling base in providing the palliative service, rather than major reliance on advance practice nurses or palliative physicians. The counsellors spend the hours needed to assist families in making difficult end-of-life decisions.

### Medications and Oral Side Effects

Older adults are likely to take medications that can impact oral health and affect dental treatment. Hundreds of common medications - including antihistamines, diuretics, pain killers, high blood pressure medications and antidepressants - can cause side effects

such as dry mouth, soft tissue changes, taste changes, and gingival overgrowth. A chief medicine that leads to xerostomia is, to mention a few, Antihypertensive, diuretics, antidepressants, antihistaminic and radiation therapy too. Unfortunately these drugs are prescribed to adults very often and hence xerostomia is considered as a disease of geriatric patients.

### Concerns for Older Women

Women who are menopausal or post-menopausal may experience changes in their mouths. Recent studies suggest that estrogens' deficiency could place post-menopausal women at higher risk for severe periodontal disease and result in tooth loss. In addition, hormonal changes in older women may result in discomfort in the mouth, including dry mouth, pain and burning sensations in the gum tissue and altered taste, especially salty, peppery or sour. Women considering Hormone Replacement Therapy (HRT) to help fight osteoporosis should note that this may help protect their teeth as well as other parts of the body.

### Syndromes Affecting in Old Age

#### Eagles syndrome

Eagles syndrome is a medical condition in which the styloid process is abnormally long, extending over 1.18 in (30mm), and the stylohyoid ligament has undergone calcification. Eagle syndrome has been linked with aging and trauma and is more common in females than males. The condition may present symptoms of chronic dull pain, or sharp pains when swallowing, stretching the tongue, or turning the head.

#### Burning mouth syndrome

Oral mucosal conditions are more prevalent in older patients and many orofacial pain disorders, such as burning mouth syndrome are more common in patients over the age of 50 years [19]. This is a painful, burning sensation localized in the tongue affecting other areas of the oral mucosa. The description of the symptoms varies from patient to patient, which may be pain, burning, tingling, or numbness. Burning Mouth Syndrome or Glossodynia may occur as an isolated symptom or as one of a group of oral symptoms, such as taste abnormality and various oral dysesthesias, including dull, deep, continuous pain of the atypical facial pain variety. It can be seen in different dental as well as medical conditions and can be seen in any age group but is more common in females that too middle aged or old aged females. It can be related with menopause or some kind of allergy, dry mouth or some nutritional deficiencies.

#### Trigeminal neuralgia

Trigeminal Neuralgia is also known as tic douloureux. It is a pain syndrome recognizable by the patient's history; it is a painful neurological condition that occurs as a result of damage to or pressure on the fifth cranial nerve, also called the trigeminal nerve. It causes sudden, severe pain, usually on one side of the face. Contact with a stimulus (i.e., a touch) often can trigger a painful attack in patients who have tic douloureux. According to the National Institutes of Health (NIH), trigeminal neuralgia is more common in people over the age of 50, although the condition can occur at any age. Trigeminal neuralgia affects more women than men.

It is less well known that pain which seems to be due to idiopathic trigeminal neuralgia is occasionally due to dental causes. For this reason it is suggested that such cases should be given very careful dental and oral examination before the commencement of drug therapy or surgery. Such an examination must be meticulous and may be tedious

as well as time consuming. It should therefore be done by a dentist who is especially interested in pain and who is preferably associated with a centre for pain relief. A few cases may then have their pain relieved by such procedures as fillings, extractions or occlusal adjustment [20].

### Palliative Care Treatments

#### Burning mouth syndrome

Removal of local oral irritants, construction of plastic retainers to cover irregularities of the occlusion that magnify the side-effects of tongue habits, treatment of the muscular tension by correction of the malocclusion or by muscle relaxants such as diazepam, or treatment of the systemic disease, such as a connective tissue disease or diabetes mellitus are some of the treatment modalities. Some studies have also shown a greater percentage of patients taking clonazepam reporting either partial or complete relief of symptoms compared to diazepam [21].

Neurosurgical exploration of the lingual nerve for glossodynia of neuropathic origin may relieve some of the more distressing symptoms, especially if there is a nodule of scar tissue or neuroma formation at the site of damage to the lingual nerve. Some numbness may persist.

Some relief from symptoms of Burning Mouth Syndrome also is usually obtained from the use of topical analgesics such as 0.5% aqueous diphenhydramine alone or mixed with 0.5% dicyclonine or lidocaine or other analgesic ointments applied to the affected area.

Cancerphobia (an excessive fear of cancer) may be a prominent feature of patients with Burning Mouth Syndrome. So, psychological counselling should be given.

There are few self used home remedies to relieve the pain and the symptoms of Burning Mouth Syndrome.

- These are Avoid hot and spicy food.
- Do not use the mouth wash which contains alcohol. These can aggravate the symptoms of Burning Mouth Syndrome.
- Sip water frequently. One can chew ice chips when the symptoms of Burning Mouth Syndrome are acute.
- Sugarless gums can be chewed by the persons having Burning Mouth Syndrome.
- Avoid citrus fruits and juices as one should avoid the food which is acidic.

#### Mucositis and stomatitis

Treatments are primarily aimed at relieving pain. Xylocaine and dyclonine topical anesthetics provide comfort but must be used with caution as they will block the gag reflex and increase the risk of aspiration. Dyclonine has been shown to have anti-inflammatory activity in addition to its anesthetic qualities [22].

The use of diphenhydramine hydrochloride 5% as a rinse to relieve pain has been used for herpetic stomatitis. Benzylamine is a non steroidal analgesic with anti-inflammatory properties. It has been reported to relieve radiation induced stomatitis [23]. It should be prescribed in geriatric cancer patients only after consulting a physician.

Before any of the above measures is initiated, it is important to identify local traumatic factors such as fractured restorations or teeth, or an impinging removable prosthesis. Patients should also be advised to avoid spicy foods, smoking and alcohol [24].

## Trigeminal neuralgia

In general, treatment will always be individualized, according to the origin and cause of disease or complaints. After ruling out all differential diagnosis (dental pain, migraine, sinusitis, etc.) treatment for trigeminal neuralgia will be initially treated with a course of anti-inflammatory drugs and pain-killers. In addition, analgesic gels and supplements like calcium, magnesium and essential fatty acids will be provided. Some doctors would give a try with steroidal or alcohol or phenol injections or Carbamazepine, short wave diathermy, electric current, radiation, etc., for managing pain. Here also, relief will be short-lived. The evidence suggests that carbamazepine is still the first line drug for medical management, but this should be changed to oxcarbazepine if there is poor efficacy and an unacceptable side effect profile [25]. As a last resort, Microvascular Decompression (MVD) of the nerve or Gamma Knife Surgery (GKS) will be opted for surgical dissection of nerve to root out all the pain. A study has shown that immediate pain relief with MVD treatment is higher than with GKS, but in the long term both treatments are comparable [26].

## Oral candidiasis

Candidiasis may be treated by a combination of topical and systemic applications. One topical agent is nystatin, which can be administered via different methods. The fungicidal activity of nystatin depends directly on contact time with the oral tissues. Nystatin suspension also has high sugar content and must, therefore, be administered cautiously in the xerostomic dentate patient. Nystatin may occasionally cause gastrointestinal effects such as nausea, vomiting and diarrhea [27]. Angular cheilitis can be treated with a cream made up of 0.5% triamcinolone and 2% ketoconazole. Clotrimazole troches may be dissolved slowly in the mouth; however, they contain sucrose, which can increase caries. Troches are more efficacious than suspensions due to their longer oral contact time [28]. Clotrimazole vaginal cream may be applied as a thin coat on the tissue side of the denture.

## Mouth dryness or Xerostomia

1. Sucking on sugar free lozenges or sugar free gum to stimulate saliva production
2. Keeping hydrated by sipping water frequently
3. Using a humidifier while patient sleeps
4. Avoiding caffeinated drinks
5. Avoiding chewing tobacco

Treatment is indicated in extreme cases like xerostomia caused by radiation treatment. Pilocarpin is the drug preferred and can be consumed for a long period.

## Denture care

Denture wearers need to avoid plaque build up that can irritate the tissues under the dentures. Thoroughly clean dentures daily and remove dentures at night to avoid bacteria growth. Higher salivary Candida levels are more frequently encountered in denture wearers than in dentate patients [29].

The use of commercial hydrogen peroxide releasing agents has been found to be ineffective in the disinfection of the denture [30,31]. Soaking the denture in bleach (15 ml) and water (250 ml) for 30 minutes will help rid the denture of odours. Partial dentures should not be soaked in bleach solution, as it will lead to metal fatigue. Dentures

can also be soaked in benzalkonium chloride (1: 750) for 30 minutes. Benzalkonium chloride should be formulated daily as Gram-negative bacteria can proliferate within 24 hours. Boiling the denture will cause denture base distortion [32]; however microwaving it in water at high power for 5 minutes can disinfect the denture base. Repeated microwaving can result in hardening of PermaSoft denture linings [33].

Dentures should be stored in well-identified vessels in solutions of water, mouthwash, 0.12% chlorhexidine, Listerine antiseptic or 100 000 IU of nystatin suspension [34].

Candidiasis may be treated by a combination because mouths continually change; dentures need to be checked for proper fit to avoid irritation, increased bone loss and infections.

## Ulcers

Aphthous ulcers are common and can be helped by topical corticosteroids or tetracycline mouthwash. Severe viral infection (herpes simplex or zoster) will need aciclovir 200 mg every 4 hours for 5 days. Malignant ulcers are often associated with anaerobic bacteria that produce a foul odour; this responds to metronidazole, either as 400-500 mg taken orally or rectally every 12 hours or as a topically applied gel.

## Infected mouth

Topical corticosteroids-Betamethasone 0.5 mg in 5 ml water as mouthwash or triamcinolone in carmellose paste

Tetracycline mouthwash, 250 mg every 8 hours (contents of one capsule dissolved in 5 ml water).

## Missing natural teeth

**Pain free or flexi dentures:** Many patients wearing conventional hard dentures experience pain because of the hard acrylic material of the denture or because of the sensitivity of mucosa with age. In all such cases, dentist can provide flexible dentures that as the name suggests are quite flexible because of the nylon base it is made off.

**Dental implants:** A dental implant is an artificial tooth root placed into your jaw to hold a replacement tooth or bridge in place. While high-tech in nature, dental implants are actually more tooth-saving than traditional bridgework, since implants do not rely on neighbouring teeth for support. When teeth are missing, the bone which previously supported these teeth begins to deteriorate. This can result in dramatic changes in ones appearance, such as increased wrinkles around the mouth and lips that cave in and lose their natural shape.

More and older people are selecting dental implants over dentures as a replacement option for lost teeth. Older adults have similar success rate with implants compared with younger people provided they are free of any systemic disease and cancer free. Currently, dental implants are contraindicated in patients being treated with intravenous bisphosphonates. All patients treated with bisphosphonates must have the risk of possible loss of implants and the risk of suffering a bony necrosis of the operated jaw explained to them, and give their informed consent prior to dental implant surgery [17].

## Patients with gum problems

Elder Patients suffering from periodontal problems are inclined towards total extraction and dentures. They must be explained all advanced periodontal treatments which may increase the life of their teeth. Preserving natural teeth by any means will help in preserving alveolar bone. There are quite a few geriatric cases where they have a few upper and few corresponding lower teeth and they don't find any

problem of chewing. They must be explained, of possible bone loss to an extent that, they cannot have in future, good prosthesis. All possible methods of replacements i.e. Crowns. Bridges or Implants are available to them.

## Conclusion

Factors that may make older people more susceptible include general health status, diminished immune status, medications, depression, worsening memory, diminished salivary flow, functional impairments and change in financial status. These are the factors that are not in the hands of the practitioner as among these are several factors that are bound to come with age. But what is there in our hands as practitioners is to relieve these geriatric patients of pain and discomfort and give them a treatment that improves their quality of life. A geriatric cancer patient with a maxillectomy or mandilectomy defect, apart from feeling psychologically depressed, goes through numerous problems like eating, swallowing and inability to regurgitate. In such an end phase of patient's life, we must try our best to deliver treatments that make their remaining life worth living. Treatments like dentures, implant prosthesis, obturators for closing defects, speech aid prosthesis etc along with proper counselling would be a boon for such patients.

Not only does maintenance of oral health have impact on the quality of life, which is already challenged by the disease, but it also aids in the ability of patients to thrive for whatever precious time is left to them.

## References

- Wiseman MA (2000) Palliative care dentistry. *Gerodontology* 17: 49-51.
- Clark GT, Minakuchi H, Lotaif AC (2005) Orofacial pain and sensory disorders in the elderly. *Dent Clin North Am* 49: 343-362.
- De Rossi SS, Slaughter YA (2007) Oral changes in older patients: a clinician's guide. *Quintessence Int* 38: 773-780.
- McKenna G, Burke FM (2010) Age-related oral changes. *Dent Update* 37: 519-523.
- Ketterl W (1983) Age-induced changes in the teeth and their attachment apparatus. *Int Dent J* 33: 262-271.
- Murray PE, Stanley HR, Matthews JB, Sloan AJ, Smith AJ (2002) Age-related odontometric changes of human teeth. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 93: 474-482.
- Hong CH, Napenas JJ, Hodgson BD, Stokman MA, Mathers-Stauffer V, et al. (2010) A systematic review of dental disease in patients undergoing cancer therapy. *Support Care Cancer* 18: 1007-1021.
- Pinzon Tofino ME, Gaitan Cepeda LA (1989) [Aging and the oral cavity]. *Pract Odontol* 10: 33-36.
- Pazdur R, Wagman LD, Camphausen KA, Hoskins WJ (2008) *Cancer Management: A Multidisciplinary Approach* (11th edn), publishers of the journal ONCOLOGY, USA.
- Sonis ST (2004) Oral mucositis in cancer therapy. *J Support Oncol* 2: 3-8.
- Rubenstein EB, Peterson DE, Schubert M, Keefe D, McGuire D, et al. (2004) Clinical practice guidelines for the prevention and treatment of cancer therapy-induced oral and gastrointestinal mucositis. *Cancer* 100: 2026-2046.
- deVita VT, Hellman S, Rosenberg SA (1989) *Cancer: principles and practice of oncology*. (3rd edn). Philadelphia: JB Lippincott Co., USA.
- Arendorf TM, Walker DM (1979) Oral candidal populations in health and disease. *Br Dent J* 147: 267-272.
- Davies AN, Brailsford SR, Beighton D (2006) Oral candidosis in patients with advanced cancer. *Oral Oncol* 42: 698-702.
- Davies AN, Brailsford SR, Beighton D, Shorthose K, Stevens VC (2008) Oral candidosis in community-based patients with advanced cancer. *J P ain Symptom Manage* 35: 508-514.
- Cassolato SF, Turnbull RS (2003) Xerostomia: clinical aspects and treatment. *Gerodontology* 20: 64-77.
- Flichy-Fernandez AJ, Balaguer-Martinez J, Penarrocha-Diago M, Bagan JV (2009) Bisphosphonates and dental implants: current problems. *Med Oral Patol Oral Cir Bucal* 14: E355-360.
- Nicolatou-Galitis O, Papadopoulou E, Sarri T, Boziari P, Karayianni A, et al. (2011) Osteonecrosis of the jaw in oncology patients treated with bisphosphonates: prospective experience of a dental oncology referral center. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 112: 195-202.
- McCreary C, Ni Riordain R (2011) Oral medicine and the elderly. *Dent Update* 38: 30-36.
- Mumford JM (1978) Role of the dentist in trigeminal neuralgia. *Pain* 5: 83-92.
- Barker KE, Batstone MD, Savage NW (2009) Comparison of treatment modalities in burning mouth syndrome. *Aust Dent J* 54: 300-305.
- Epstein JB, Silverman S, Jr., Paggiarino DA, Crockett S, Schubert MM, et al. (2001) Benzylidamine HCl for prophylaxis of radiation-induced oral mucositis: results from a multicenter, randomized, double-blind, placebo-controlled clinical trial. *Cancer* 92: 875-885.
- Scully C, Epstein J, Sonis S (2003) Oral mucositis: a challenging complication of radiotherapy, chemotherapy, and radiochemotherapy: part 1, pathogenesis and prophylaxis of mucositis. *Head Neck* 25: 1057-1070.
- Cerchietti LC, Navigante AH, Korte MW, Cohen AM, Quiroga PN, et al. (2003) Potential utility of the peripheral analgesic properties of morphine in stomatitis-related pain: a pilot study. *Pain* 105: 265-273.
- Jorns TP, Zakrzewska JM (2007) Evidence-based approach to the medical management of trigeminal neuralgia. *Br J Neurosurg* 21: 253-261.
- Tang X, Wang Y, Shu Z, Hou Y (2012) Efficacy and prognosis of trigeminal neuralgia treated with surgical excision or gamma knife surgery. *Zhong Nan Da Xue Xue Bao Yi Xue Ban* 37: 616-620.
- Epstein JB (1990) Antifungal therapy in oropharyngeal mycotic infections. *Oral Surg Oral Med Oral Pathol* 69: 32-41.
- Alboug HA, Naidoo S (2002) A systematic review of the management of oral candidiasis associated with HIV/AIDS. *SADJ* 57: 457-466.
- Scully C, el-Kabir M, Samaranyake LP (1994) Candida and oral candidosis: a review. *Crit Rev Oral Biol Med* 5: 125-157.
- Glass RT (1992) The infected toothbrush, the infected denture, and transmission of disease: a review. *Compendium* 13: 592, 594, 596-598.
- Drake D, Wells J, Ettinger R (1992) Efficacy of denture cleansing agents in an in vitro bacteria-yeast colonization model. *Int J Prosthodont* 5: 214-220.
- Woelfel JB, Paffenbarger GC (1959) Method of evaluating the clinical effect of warping a denture: report of a case. *J Am Dent Assoc* 59: 250-260.
- Dixon DL, Breeding LC, Faler TA (1999) Microwave disinfection of denture base materials colonized with *Candida albicans*. *J Prosthet Dent* 81: 207-214.
- Meiller TF, Kelley JI, Jabra-Rizk MA, Depaola LG, Baqui AA, et al. (2001) *In vitro* studies of the efficacy of antimicrobials against fungi. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 91: 663-670.