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Evidence-Based Guidelines for the Care and Maintenance of Complete Dentures.

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ABSTRACT

The aim of this review is to compile evidence based guidelines for care and maintainance of complete dentures. The current rates of edentulism have been estimated to be between 7% and 69% of the adult population internationally. In india the incidence of edentulism continues to increase with rapid population growth coupled with current economic conditions. Unfortunately, evidence-based guidelines for the care and maintenance of removable complete denture prostheses are not easily accessible to denture wearers across the world. This article will hence provide guidelines on care and maintainance of complete dentures that are easily understandable and applicable for the denture wearing population of India.

Keywords: Complete dentures, maintainance, care, health.

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INTRODUCTION

Guidelines for care of complete dentures:

Based on the best available clinically proven evidences, the following guidelines for the care and maintenance of dentures were developed.

1. The bacterial biofilm present in the oral cavity and on complete dentures can cause denture stomatitis and hence daily careful removal of this bacterial biofilm is of outmost importance to minimize denture stomatitis and to help contribute to good oral and general health.
2. The following steps can be undertaken by patients who wear dentures to reduce levels of biofilm and potentially harmful bacteria and fungi. These guidelines have been obtained from various clinically proven studies.
 - (a) Dentures should be cleaned daily by soaking and brushing with an effective, nonabrasive denture cleanser.
 - (b) Denture cleansers should only be used to clean dentures outside of the mouth.
 - (c) Dentures should always be thoroughly rinsed after soaking and brushing with denture-cleansing solutions prior to reinsertion into the oral cavity. Always follow the product usage instructions.
3. Dentures should be cleaned annually by a dentist or dental professional using ultrasonic cleansers to minimize biofilm accumulation over time.
4. Dentures should not be placed in boiling water.
5. Dentures should not be soaked in sodium hypochlorite bleach, or in products containing sodium hypochlorite, for periods that exceed 10 minutes as it can damage dentures.
6. Dentures should be stored immersed in water after cleaning, when not in use, to avoid warping.
7. Proper use of denture adhesives can improve the retention and stability of dentures and help seal out the accumulation of food particles beneath the dentures, even in well-fitting dentures.
8. In a quality-of-life study (1) patient ratings showed that denture adhesives can improve the denture wearer's perceptions in retention, stability, and quality of life.
9. The extended use of denture adhesives should not be considered without periodic assessment of denture quality and health of the supporting tissues by a dentist, prosthodontist, or dental professional due to the lack of evidence on the long term use of denture adhesives.
10. Zinc-containing denture adhesives should be avoided as their improper use may have adverse systemic effects.
11. Denture adhesive should be carefully used in sufficient quantities on each denture to provide sufficient retention and stability to the prostheses.
12. Denture adhesives should be completely removed from the prosthesis and the oral cavity on a regular basis.
13. It is not recommended that dentures should be worn continuously (24 hours per day) in an effort to reduce chances of denture stomatitis.
15. Patients who wear dentures should be checked on an annual basis by the dentist, prosthodontist, or dental professional for maintenance of proper denture fit and function, for evaluation for oral lesions and bone loss, and for assessment of oral health status.

Denture cleaning:

Because of the defined relationship of biofilm to stomatitis, dentists and denture care providers must carefully instruct the edentulous patient in the proper methods for cleaning and maintaining dentures. The characteristics of an ideal denture cleanser should include the following

- 1) It should demonstrate anti biofilm activity to remove biofilm and stains and should be antibacterial and antifungal to minimize the level of biofilm and potentially harmful pathogens in the biofilm below clinically relevant levels.
- 2) It should be nontoxic.
- 3) It should be compatible with denture materials and should not modify, roughen or degrade the surface of the acrylic resin denture base or prosthetic teeth.
- 4) It should be short acting (≤ 8 hours).
- 5) It should be easy to use for the patient or caregiver and it should have an acceptable (or no) taste.
- 6) It should be cost effective.

Brushing with denture creams and pastes:

Three in vivo studies were conducted to study the efficacy of denture paste in biofilm removal. Dills et al(2) suggested that brushing with a denture paste was less effective when compared to the use of an effervescent cleaner or to the use of the same cleaner followed by paste brushing. Panzeri et al (3) demonstrated that brushing with two types of pastes (one antibacterial and one with a fluorosurfactant) reduced the biofilm mass when compared with brushing with water; however, brushing with either of the pastes had no impact on *Candida sp* colonization. Finally, Barnabé et al (4) compared brushing the dentures with coconut soap followed by soaking in sodium hypochlorite (NaOCl) (10 minutes) to brushing with soap and soaking in water. This cross-sectional study showed that both treatments reduced the levels of denture stomatitis, but also showed that neither treatment reduced the levels of *Candida sp* cultured from the prostheses. Thus, *Candida sp* was seen to be resistant to mechanical debridement from the denture base.

Soaking and brushing with commercially available denture cleansers (effervescent tablets): Commercially available denture cleansers use various active agents like hypochlorites, peroxides, enzymes, acids and oral mouth rinses to remove biofilm from dentures. Each of these immersion cleansers has a different mode of action and a different rate of efficacy for the purpose of removal of adherent denture biofilms. In vitro studies, however, have demonstrated that NaOCl was superior to all other types of commercially available denture cleansers (5-11). An in vitro investigation by Lee and colleagues (13) indicated that NaOCl was capable of killing MRSA, a major pathogen in the immunocompromised patient that increases mortality rates significantly.

Ultrasonic cleaning:

Ultrasonic cleaning of dentures are carried out in both the dental office and the dental laboratory. The mode of action of ultrasonic devices is unique. They produce ultrasonic sound waves (20 to 120 kHz), which create microscopic cavities or bubbles that grow and implode. This implosion creates voids which result in localized areas of suction. Materials adhering to the denture are loosened and removed by this mechanism. This action is known as "cavitation." Two types of solutions that are commercially available for use in the ultrasonic cleaner are BioSonic Enzymatic (Colte` ne/Whaledent, Cuyahoga Falls, OH), which contains nonionic detergents, protease enzymes and 400 parts per million isopropyl alcohol, and Ultra-Kleen (Sterilex, Hunt Valley, MD), which requires the mixing of two solutions that results in the formation of an alkaline-peroxide cleanser. While ultrasonic cleaning demonstrated remarkably improved kill rates of bacteria, neither of these two solutions tested were completely bactericidal.(13,14)

Precautions associated with use of denture cleansers:

In 2008 the U.S. Food and Drug Administration (15) (FDA) issued a requirement for manufacturers of denture cleansers to revise their labeling regarding contents, and to consider alternatives to the types of ingredients present in this class of products as it caused severe allergic reactions. One such ingredient is

persulfates which are used in denture cleansers as part of the cleaning and bleaching process. Symptoms of the reaction to persulfates include

1. Irritation of the tissues and tissue damage
2. Rash
3. Hives
4. Gum tenderness
5. Breathing problems and low blood pressure.

The requirement involved labeling revisions to ensure that denture wearers understand that these products are for use only when the dentures are outside the mouth.

Symptoms related to misuse of the denture cleansers may include:

1. damage to the oesophagus
2. abdominal pain
3. burns
4. breathing problems
5. low blood pressure
6. seizures
7. bleaching of tissues
8. internal bleeding
9. vomiting

Alternative denture cleansing methods:

The following are few techniques that sterilize complete dentures following intraoral use. Microwave irradiation of dentures immersed in sterile water at 650 Watts for three minutes sterilizes dentures and does not cause surface degradation of the prosthesis. However, the long-term effects of this technique is not known. (16-19) Boiling of a denture base has been shown to deform the base making it unusable. There are many other forms of denture cleansing which appear to reduce the bacterial and fungal biofilm, but disinfect the prosthesis only. NaOCl is an immersion product which may be the most effective product available, but only when used properly (10-minute soaking). Soaking dentures for long periods of time like overnight, in NaOCl may degrade the acrylic resin components, causing color changes (lightening), and hence should be avoided. Additionally, once cleaned, dentures should remain immersed in water to prevent over drying of the base and warping of the prosthesis.

Use of denture adhesives:

Complete dentures are retained in the oral cavity through a complex interaction of multiple factors which include close adaptation of the intaglio surface of the prosthesis to the underlying tissues, appropriate peripheral extension of the denture borders, the presence of a thin film of saliva of acceptable viscosity between the prosthesis and the tissues, and atmospheric pressure. Following tooth removal and denture placement, significant resorption of the residual ridges occurs between the first 3 to 12 months. This resorption usually continues at a lower level throughout the life of the patient.(20,21)

As bone resorption occurs, the adaptation of the denture to the denture bearing tissues is compromised, resulting in ill-fitting dentures with compromised retention which decreases the wearer's chewing ability. Denture wearers may have conditions that affect retention and stability of their oral prostheses to a significant extent. With hard and soft tissue changes over time, these patients often experience problems with diminished neuromuscular control, reduced bite force, and alterations in the quantity and quality of saliva due to age or medications. There are several methods that have been developed to enhance both fit and retention of aging prostheses like use of denture adhesives, prosthesis relining, rebasing and the use of endosseous dental implants. Denture adhesives are widely available in formulations of creams, powders, strips, or liquids.

Advantages of denture adhesives:

Several studies yielded results indicating that denture adhesives improved retention and stability of both ill-fitting and well-fitting dentures despite its limitations.(22-32) Some studies measured the improvement in retention and stability after the use of denture adhesives (32-35) and showed more improvement in old or ill- fitting dentures than in new prostheses. However, Grasso and colleagues (30,36) reported no difference in improvement between well-fitting and poorly fitting prostheses.

Regarding mastication, the use of denture adhesives has been reported to improve the bite force a denture patient is able to exert compared with using no adhesives to a significant extent.(33,36-39) Rendell and colleagues (40) further evaluated chewing rates in denture wearers using a multichannel magnetometer tracking device and found that the mean chewing rates increased after the application of denture adhesive.(24)

Functional changes associated with the application of denture adhesive is time dependent. Rendell et al (39,40) found that chewing improved immediately after applying the adhesive and continued increasing after two and four hours. While many studies indicate that adhesives are effective for up to eight hours, one trial by Kapur et al (30) indicated that the mandibular denture, after showing initial improvements in retention, underwent significant loss of retention following chewing of test foods and imbibing of taste solutions. Hence the duration of effectiveness of adhesive retention is variable and often product dependent.

The correct application of denture adhesives is important in the maintainance of dentures.

The following clinical technique has been advocated by several manufacturers for proper application of denture adhesives to the denture base:

- 1) Clean and dry the intaglio (tissue side) surface of the dentures.
- 2) For the maxillary denture, apply three or four pea-sized increments of denture creams to the anterior ridge, midline of the palate, and posterior border.
- 3) For the mandibular denture, apply three pea-sized increments of denture cream to several areas of the edentulous ridge.
- 4) If using powder adhesive (instead of cream as noted above), wet the base with water, apply a thin film of powder to the entire tissue-contacting surface and shake off any excess.
- 5) If using pad adhesives, place the correct size onto the denture and cut off any excess that extends beyond the denture border with sharp scissors.
- 6) Seat the dentures independently; hold each firmly in place for 5 to 10 seconds.
- 7) Bite firmly to spread the adhesive and remove any additional excess that expresses into the cheek or tongue spaces.

Relines, rebase of dentures and denture recall interval:

The Glossary of Prosthodontic Terms, eighth edition,(41) defines reline as “the procedures used to resurface the tissue side of a denture with new base material, thus producing an accurate adaptation to the denture foundation area.” The term “rebase” is defined as “the laboratory process of replacing the entire denture base material on an existing prosthesis.” The reline procedure is most often used when factors other than loss of bone or soft-tissue support has changed for the patient (i.e., the vertical dimension, occlusion, phonetics and functionality of the dentures are acceptable), and these changes are compensated for by the addition of new acrylic resin to the intaglio surface of the denture. In those instances in which other factors have apparently been compromised, the rebase procedure is used. This procedure can cause marked changes in denture architecture that influence vertical dimension, phonetics and associated function. The reorientation of teeth to the denture-bearing surface by means of the rebase procedure provides these potential benefits and a pristine intaglio surface opposing the mucosa.

CONCLUSION

Due to limited evidences, further research needs to be carried out regarding the use and acre and maintainance of dentures.

1. Further exploration of effective cleaning methods will improve the quality of denture use, like microwave cleaning. This includes clinical evaluation on a long term basis and improvement of specific denture-cleaning components for safety, efficacy and ease of use.
2. The impact of denture hygiene on oral and general health calls for additional investigation.
3. Proper identification of the inflammatory process in denture stomatitis could enable clinicians to prescribe appropriate treatments for this condition.
4. The long-term effects of the use of denture adhesive on oral tissue health need to be determined.
5. Methods for enhancing the removal of adhesives from the tissue-contacting surface of dentures and oral soft tissues should be developed.

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