

REVIEW

Material and Methods for cleaning the Dentures

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ABSTRACT:

Microbial plaque on the tissue surface of the denture is the most significant factor in the pathogenesis of denture stomatitis. Many organisms are involved in causing infection in the oral cavity. Proper oral hygiene care is very much essential in maintaining the health of the oral cavity and also the general health. Denture cleanliness is often poor due to improper mechanical cleaning and relatively inefficiency of most of the commercially available cleaning agents. The dentist has to motivate and instruct the patients regarding means and methods of denture cleaning. Still research should be done in developing denture cleaners which can maintain plaque-free dentures and they should not affect the colour and surface of the denture

Key words: *Plaque, oral hygiene, Dentures, Denture Cleaners*

After a synthetic material such as a polymethylmethacrylate denture is placed in the mouth, a coating of glycoprotein quickly develops. This thin pellicle becomes contaminated with oral debris and a range of microorganisms very similar to those in the plaque which forms on natural teeth. Calcification can occur and the mass can be stained by tobacco smoke and medicines especially those containing iron. An unpleasant taste and odour can develop and if candida organisms become involved, mucosal irritation will often occur.¹ For reasons of personal hygiene, dental prosthetists and other dental care providers advise denture wearers to regularly clean their dentures with a soft tooth brush

and nonabrasive toothpaste or specifically designed denture cleaning paste.

Denture plaque as the cause of denture stomatitis has been discussed in a number of publications. Plaque removal is probably the most important part of the treatment of denture stomatitis. Methods of plaque control are mechanical cleaning through brushing, soaking in chemicals, or soaking in enzymes. Most people clean their dentures by brushing with some kind of detergent, soap, toothpaste, or salt. The problem is that elderly patients have difficulty with their vision and manual dexterity, which leads to less efficient cleaning. The ideal solution for an elderly person would be some kind of efficient soak that would remove the denture plaque without harming the material of the denture

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or the oral tissue². Furthermore, the soak should be inexpensive.

There are various methods and materials that evolved over a period so has to provide effective plaque control. These can be broadly divided into

- Mechanical
- Chemical
- Recent methods

Mechanical methods

Brush:

Most common method and used in conjunction with soap, tooth powder, tooth paste. Brushing subjects the denture to wear and the wear is directly proportional to diameter of bristle and inversely related to the length of the bristles.³

Pastes and powders:

Pastes and powders increase the amount of wear of denture acrylics. Especially products containing insoluble calcium carbonate. Newer incorporations like acrylic abrasives (boor's toothpaste) and special pastes containing (ZrSiO₄-ZrO₂ system) cause very little abrasion⁴. No direct relationship between cleansing and polishing potential and abrasive effect of toothpaste on denture acrylic.⁵ Pastes containing chloroform cause increased wear due to chemical solubility of acrylic resin.⁶

Ultrasonics:

This method removes denture plaque but does not effectively reduce the number of microorganisms. Ultrasonic treatment of dentures in disinfectant solutions increases the efficiency of the disinfectant.

Chemical denture cleansers:

These are immersion type denture cleansers. Widely used in Europe and U. K. They can be broadly divided based on chemical composition.

Alkaline peroxides:

Peroxide cleansers are most commonly used. They are supplied in the form of tablets and powders

Chemical reaction:

Tablet or powder + water



Mode of action:

Alkali (chemical reagents)

→ decrease surface tension

2H₂O₂ (hydrogen peroxide)



Nascent oxygen released has a mechanical effect on cleansing.

Alkaline peroxides are effective stain removers but not more than brushing with soap. They are effective only when dentures are soaked for several hours or overnight and are not effective when soaked for 15-30 minutes. Routine usage may cause bleaching of acrylic resin and may have a harmful effect on soft resilient denture liners.

Alkaline hypochlorides:

These chemical have bactericidal and fungicidal properties. Additionally they are effective stain removers, dissolve mucin and inhibit calculus formation by dissolving the plaque organic matrix. They are corrosive towards metals but this can be overcome by adding sodium hexametaphosphate or excess of alkali. They also tend to bleach acrylic resins.

Acids:

Hydrochloric acids and phosphoric acids are the acids used. These compounds are used as bases of dilute acids. They cause corrosion of metal components and are rarely used for cleaning of dentures.

Disinfectants:

Immersion of dentures for a few minutes daily in a dilute solution of chlorhexidine gluconate or

salicylate caused a significant reduction in the amount of dent. ure plaque and brought about an improvement in the denture-bearing mucosa in patients with denture stomatitis. Nightly immersion of dentures in a 0.2% solution of chlorhexidine gluconate prevented recurrence of the infection, although the yeasts were not eliminated from the oral cavity.⁶

All studies have reported a heavy discoloration of the dentures by chlorhexidine solutions which make this substance unsuitable for routine denture soaking. Brushing dentures with a 1% chlorhexidine gel (Hibitane gel)* caused less severe staining. There was no clinical evidence that the chlorhexidine had any effect, since the plaque accumulations were no less than those occurring in a group of denture wearers brushing with a placebo gel.

A 0.05% salicylate solution used for denture immersion was found to be slightly less effective than a 0.2% solution of chlorhexidine gluconate in the treatment of denture stomatitis. However, salicylate solution did not stain the dentures.

It has been reported that ethanol, isopropyl alcohol, chloroform, formalin, and acetic acid may be used for occasional disinfection of dentures and to avoid contamination from the operatory to the dental laboratory and vice versa. These substances are unsuitable for daily use because of their bad odor and taste and their bleaching and crazing effects and because it is not known whether they have harmful biologic side effects. Chloroform should never be used because it will dissolve acrylic resin.⁶

Recent methods

Enzymes:

Denture cleansers containing a chelating agent (ethylene diamine tetra acetic acid, EDTA) and a mixture of enzymes (papain, lipase, amylase, and trypsin) were found to be effective in removing sordes, mucin, and heavy deposits of calculus from

dentures. The cleansers were also bactericidal and fungicidal.⁶

In another series of clinical experiments, the efficacy of the enzymes dextranase, mutanase, and proteinase on denture plaque deposits was studied. The enzymes were dispensed as water-soluble tablets, both alone and in various combinations. A combination of proteinase and mutanase caused a significant reduction in the amount of denture plaque and reduced the formation of new plaque. Plaque was reduced to the extent that the palatal tissues in patients with denture stomatitis improved significantly. No unwanted or harmful side effects have been reported from the use of enzyme-containing denture cleansers.⁷

A study was done to test the effectiveness of an enzyme-containing denture cleanser. During a 3-week period, 13 patients used Enzydent only for soaking the denture: during another 3-week period, the patients were instructed first to soak and then to brush their denture. The effectiveness of the cleanser was measured by microbiologic procedures. The results showed that soaking the denture in the enzyme containing cleanser alone was as effective as the patients' previous regimen of denture hygiene, but that when soaking was used in combination with brushing, the denture became significantly cleaner.⁸

Australian oral care products manufacturer, Bidental Technologies has launched Puradent, a persulphate-free denture cleaner. Puradent removes plaque, tartar and other residues.¹

A study was done in which seven denture cleansers were evaluated for their mode of action of tea stain removal from Perspex acrylic resin material. Perspex acrylic resin specimens were stained using a combination of chlorhexidine and tea solution. The specimens were also treated with saliva to form an initial pellicle layer and facilitate the uptake of the stain. Water was used as a control in the two parts of the experiment. The products containing alkaline

hypochlorite had the highest ability for removing stain from the acrylic resin material together with a bleaching effect. The results varied when the same denture cleansers were used on the roughened Perspex surface, and this was attributed to the presence of irregularities and porosities on the blocks. Denture cleansing agents containing hypochlorite and Boots Denture Cleaning Powder (constituents not stated by the manufacturer) exhibited the ability to remove stain from the denture base materials most effectively.⁹ Irregularities and porosities present on the denture surface played a major role in reducing the activity of denture cleaning agents and hence increased stain and plaque retention.^{10, 11}

Summary:

Proper hygiene care of removable dentures is most important for maintaining the health of oral mucosa in denture wearers. All oral care providers must educate, motivate and instruct the patient regarding various means and methods of plaque control. Patient should maintain oral hygiene through daily home care routine. Now, many materials are available for cleaning dentures and further research is going on to develop solution cleansers that maintain plaque free dentures with minimal soaking

period and not affecting the colour and surface characteristics of denture base resins.

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