Review Article

Causes and Treatment of Complete Denture Staining: A Review

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Abstract

Complete dentures are constructed for elderly patients commonly and are specific for patients who are young but have deformed teeth congenitally. Loss of teeth may occur due to trauma, dental diseases, or pathology. The denture hygiene can be improved by polishing of denture's tissue surface, but this polishing should not affect the prosthesis retentions. If the dentures are not washed regularly, they will have a tendency to accumulate plaque and stains. In this review article, we explan about causes of staining of complete denture and some of methods that are used to clean the denture. The purpose of this article was to review various methods and the materials used for cleaning dentures for geriatric denture wearers.

Keywords: Causes, complete denture, staining, treatment

Introduction

Complete dentures are constructed for elderly patients commonly and are specific for patients who are young but have deformed teeth congenitally. Loss of teeth, which may be due to trauma, dental diseases, or pathology, not only alters the psychological thought of the patients but also affects the appearance, speech, and occlusion.[1,2]

Micro-pits and micro-porosities are found on acrylic resin dentures' tissue surface and these porosities or pits show microorganisms that are so difficult to get rid of it;[3] however, these micro-pits of dentures are relatively superficial.[4]

The denture hygiene can be improved by polishing of denture's tissue surface, but this polishing should not affect the prosthesis retentions. If the dentures are not washed regularly, they will have a tendency to accumulate plaque and stains. Many studies combining the light and electron microscopy provided details on the denture sections: it has shown that there is a similarity in the basic structure of the microbial plaque on the intaglio surface of the denture section and the plaque on the natural teeth,[4,5] and also there is a similarity in the difficulties in the removal of the plaque in other studies.[6] One of the pathogenesis of denture stomatitis is the microorganisms that are found in the tissue surface of the denture plaques, so the dentures should be clean and relatively free from microorganisms.[3,7] and This condition was usually seen in elderly denture wearers. In such case, antifungal agent was useful as a conventional treatment, purifying the occlusion and providing a healthy denture.[5,8,9]

It is of not abundant use to remove the related microorganisms from the mouth, if the contaminated denture is inoculated recurrently oral tissues.[10] A program for denture cleaning should be organized to eliminate and avoid building up of microbial plaque and furthermore to eliminate exogenous stains, mucin, calculus, and food debris.[11] The most common method of routine denture cleansing that has been reported as an effective method when used accurately in removing artificial stain and plaque from acrylic resin dentures was brushing with soap or toothpaste .[8,9,11-13]

There is no experimental evidence that brushing with a toothpaste or polishing paste is more effective than brushing with soap. The first line of oral cleaning method should be tooth brushing unless not possible in the case

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of compromised ability in an elderly person because of the rapid cleaning advantages. However, the disadvantage of loss of polish, inability of the elderly patient to reach into remote areas of denture, and the bigger probability of falling or destruction of the denture during denture scrubbing may by overshadowed by the advantages of the rapid cleaning. The acrylic resin, which is the most commonly used denture base material, has been shown to be comparatively wear resistant to continued brushing, given that a suitable brush and no severe abrasives particles are used.[11,12,14] On the contrary, it has been found that the wear on dentures will increase with increasing length of the bristles of brush, and aggressive brushing with toothpaste can produce scratches on the denture surface and this will stimulate bacteria accumulation [Figure 1].[15]

One of the most common solutions that is used as a cleanser for daily overnight immersion is alkaline peroxidase, which releases oxygen bubbles that apply a mechanical cleansing result, and the surface of acrylic resin will not be affected by prolonged immersion in peroxide cleansers as shown by electron microscopic studies, but bleaching of acrylic resin may result [Figure 2].

Solutions that can remove stains, dissolve mucin and organic elements, and are bactericidal and fungicidal was alkaline hypochlorites. These solutions do not melt calculus but might prevent formation of calculus on the dentures. Their use is effective with overnight immersion of the denture but they should be used intermittently (e.g., once a week) to avoid bleaching of the denture; otherwise, they can be used only in acid detergents with bases of dilute acids that are effective against calculus and stains on dentures.[12] The overnight immersion of the denture the diluted acids such as acetic acid can be used to dissolve calculus, and this immersion should be used only once a week or twice a week intervals, and care should be taken in their use as they have a harmful effect on eyes and skin.

It has been reported that disinfecting agents, such as ethanol, isopropyl alcohol, chloroform, formalin, and acetic acid, may be used for infrequent decontamination of dentures and to prevent infection from dentist to technician and vice versa.[6] Some solutions can cause staining of the denture so it is unsuitable for daily immersion of the denture like chlorhexidine gluconate, and the 1%–2% solution of chlorhexidine gluconate can be recommended for immersion of denture as an adjunct to specific drug in the treatment of denture stomatitis caused by candidiasis. A 0.1% solution of sodium salicylate may have a similar beneficial effect without causing staining. However, immersion of the denture for a few minutes daily in a dilute solution of chlorhexidine causes stains. Gluconate or salicylate caused a significant reduction in amount of denture calculus and brought about an improvement in the mucosa-bearing denture in patients with denture stomatitis.[16-19] But these materials have many disadvantages that made them unsuitable for daily use like bad odor and taste and it will cause bleaching and crazing of the denture and also it is unknown if they are biologically unsafe. Among elderly complete denture wearers, effective chemical denture cleansers may be a significant alternative to mechanical cleaning.

The commercial denture cleaners seem to be not harmful to denture plastics. A laboratory study carried out by Anthony and Gibbon[8] found that commercial chemical cleansers are effective only in removal of stains. However, the tested commercial denture cleansers were found to be completely satisfactory in removing deposits.[10] A similar result was obtained from the study of Theilade.[4] However, he supported that and a hard soap and a properly designed denture brush would accurately clean a well-polished denture. Placing the denture in a microwave at 850 watts for 1 min demonstrated its effectiveness.[20] But in the case of repaired or relined dentures and in the presence of ceramic teeth, this method cannot be used. It may be considered as an effective method of inoculating dentures of elderly persons who are at particular risk for pneumonia.[21] Another method, which is effective in removing plaque, smoking and coffee stains, is the sonic cleaners that use vibratory energy to clean the dentures, and their action is combined effect with chemical cleansers.[21]

The denture was similar to the natural dentition that tends to accumulate plaque, stain, and calculus. The localized denture stomatitis incidence was increased in person who failed to correctly clean the collected biofilm on his

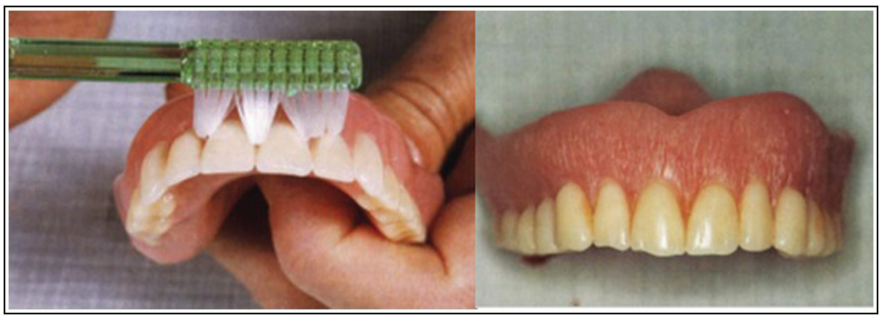

Figure 1: Aggressive brushing with tooth paste can produce scratch on the denture surface (complete prosthodontics problem, diagnosis and management, Alan A Grant)[22]

Figure 2: Prolonged immersion in peroxide cleansers (complete prosthodontics problem, diagnosis and management, Alan A Grant)

denture[22-24] as well as the more serious systemic diseases noted above also will increase.

Abelson's[25] take all studies during the period between "1936 and 1983", and it described the role of denture plaque in oral disease and its nature, the denture cleansers development, and the effectiveness of the cleansers and the mechanism of cleansing. I also suggest the best way to clean the denture was the use of abrasive pastes, that highly effective solutions was hypochlorite but possibly harmful to prostheses, and that the denture cleansers should be evaluated by new standards.

A Nikawa and colleagues' review[26] take all studies during the period "1979 and 1995", and it described more than 20 papers assessing the effectiveness of denture cleansers and insist that the results obtained were highly dependent on the methods used to assess the selected cleansing methods, and they like Abelson,[25] suggested that the standardized method for evaluation of denture cleansers should developed.

A Cochrane Review focused modern methods for cleaning dentures writing by Souza and colleagues.[27] In this review, a comparison was made between six clinical trials.[28-33] The authors recommended that "there was no evidence that any denture-cleaning method is more beneficial than others for the health of the denture-bearing tissues or has a higher level of patient satisfaction or preference than that of other methods."

Discussion

There are many studies and thesis about the staining of complete denture, but each method has advantages and disadvantages; the efficacy of denture paste in biofilm removal was evaluated in three *in vivo* studies. The first study recommended that brushing with the paste of the denture was inferior to use of the same cleaner or use of an effervescent cleaner followed by paste brushing.[28] The second study recommended that the biofilm mass can be reduced when brushing with two types of pastes (one antibacterial and the other with a fluoro-surfactant) when compared with brushing with water, although brushing with either paste had no influence on *Candida* spp. colonization.[29] The third study made a comparison between brushing the dentures with coconut soap followed by soaking for 10 min in sodium hypochlorite and brushing with soap and soaking in water.[30] This cross-sectional study showed that the level of denture stomatitis will decrease by both treatments program, but this treatment did not reduce the levels of *Candida* spp. cultured from the denture. Therefore, *Candida* spp. seem to be unaffected by mechanical debridement from the prosthesis base. Mechanical cleaning is considered as an effective and superior method for enhancing denture cleanliness and ensuring preservation of the healthy oral mucosa under removable denture.[6]

Conclusion

There are many studies and thesis about the staining of complete denture, but each method has advantages and disadvantages. Mechanical cleaning is considered as an effective and superior method for enhancing denture cleanliness and ensuring preservation of the healthy oral mucosa under removable denture.

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Conflicts of interest

There are no conflicts of interest.

References

1. Al-Jammali ZM. Comparison of the maximum bite force in patient with heat cure acrylic and flexible partial dentures (free end extension). Asian J Pharm Tech 2013;3:93-7.
2. Al-Jammali ZM, Al-Muthaffer A, Al-Yasiry A, Saad Z. The satisfaction of patient with removable partial denture therapy from point of the comfort and chewing efficiency. Ann Trop Public Health 2019;22:S296.
3. Budtz-Jörgensen E. The significance of *Candida albicans* in denture stomatitis. Scand J Dent Res 1974;82:151-90.
4. Theilade J, Budtz-Jorgensen E. Electron microscopic study of denture plaque. J Dent Res 1977;56:554-9.
5. Miner JF. The nature of a denture base: A key factor in denture sore mouth. J Prosthet Dent 1973;29:250-5.
6. Budtz-Jørgensen E. Materials and methods for cleaning dentures. J Prosthet Dent 1979;42:619-23.
7. Budtz-Jörgensen E. Clinical aspects of candida infection in denture wearers. J Am Dent Assoc 1978;96:474-9.
8. Anthony DH, Gibbons P. The nature and behavior of denture cleansers. J Prosthet Dent 1958;8:796-810.
9. Aljamali ZM. Instructions given during insertion of complete denture. Biochem Physiol 2014;4:1.
10. Olsen I. Denture stomatitis. Effects of chlorhexidine and amphotericin B on the mycotic flora. Acta Odontol Scand 1975;33:41-6.
11. Sexson JC, Phillips RW. Studies on the effects of abrasives on acrylic resins. J Prosthet Dent 1951;1:454-71.

12. Neill DJ. A study of materials and methods employed in cleaning dentures. Br Dent J 1968;124:107-11.
13. Budtz-Jörgensen E, Kelstrup J. Enzymes as denture cleansers. Scand J Dent Res 1977;85:209-15.
14. Pipko DJ, el-Sadeek M. An *in vitro* investigation of abrasion and staining of dental resins. J Dent Res 1972;51:689-705.
15. Sexson JC, Phillips RW. Oral hygiene devices and aids in oral health. In: Guide to Dental Materials and Devices. 8th ed. Chicago, IL: American Dental Association; 1976. p. 24.
16. Nicholson RJ, Stark MM, Scott HE Jr. Calculus and stain removal from acrylic resin dentures. J Prosthet Dent 1968;20:326-9.
17. Hutchins DW, Parker WA. A clinical evaluation of the ability of denture cleaning solutions to remove dental plaque from prosthetic devices. N Y State Dent J 1973;39:363-7.
18. Budtz-Jörgensen E, Löe H. Chlorhexidine as a denture disinfectant in the treatment of denture stomatitis. Scand J Dent Res 1972;80:457-64.
19. Olsen I. Denture stomatitis. The clinical effects of chlorhexidine and amphotericin B. Acta Odontol Scand 1975;33:47-52.
20. Banting DW, Hill SA. Microwave disinfection of dentures for the treatment of oral candidiasis. Spec Care Dentist 2001;21:4-8.
21. Macentee MI. Caring for elderly long-term care patients: Oral health-related concerns and issues. Dent Clin North Am 2005;49:429-43.
22. Zissis A, Yannikakis S, Harrison A. Comparison of denture stomatitis prevalence in 2 population groups. Int J Prosthodont 2006;19:621-5.
23. Ramage G, Tomsett K, Wickes BL, López-Ribot JL, Redding SW. Denture stomatitis: A role for *Candida biofilms*. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2004;98:53-9.
24. Coco BJ, Bagg J, Cross LJ, Jose A, Cross J, Ramage G. Mixed *Candida albicans* and *Candida glabrata* populations associated with the pathogenesis of denture stomatitis. Oral Microbiol Immunol 2008;23:377-83.
25. Abelson DC. Denture plaque and denture cleansers: Review of the literature. Gerodontics 1985;1:202-6.
26. Nikawa H, Hamada T, Yamashiro H, Kumagai H. A review of *in vitro* and *in vivo* methods to evaluate the efficacy of denture cleansers. Int J Prosthodont 1999;12:153-9.
27. de Souza, RF, de Freitas Oliveira Paranhos, H, Lovato da Silva, CH, Abu-Naba'a L, Federowicz, Z, Gurgan, CA. Interventions for cleaning dentures in adults. Cochrane Database Syst Rev 2009;13:237-42.
28. Dills SS, Olshan AM, Goldner S, Brogdon C. Comparison of the antimicrobial capability of an abrasive paste and chemical-soak denture cleaners. J Prosthet Dent 1988;60:467-70.
29. Panzeri H, Lara EH, Paranhos Hde F, Lovato da Silva CH, de Souza RF, de Souza Gugelmin MC, *et al*. *In vitro* and clinical evaluation of specific dentifrices for complete denture hygiene. Gerodontology 2009;26:26-33.
30. Barnabé W, de Mendonça Neto T, Pimenta FC, Pegoraro LF, Scolaro JM. Efficacy of sodium hypochlorite and coconut soap used as disinfecting agents in the reduction of denture stomatitis, *Streptococcus mutans* and *Candida albicans*. J Oral Rehabil 2004;31:453-9.
31. Gornitsky M, ParadisI I, Landaverde G, Malo AM, Velly AM. A clinical and microbiological evaluation of denture cleansers for geriatric patients in long-term care institutions. J Can Dent Assoc 2002;68:39-45.
32. Sheen SR, Harrison A. Assessment of plaque prevention on dentures using an experimental cleanser. J Prosthet Dent 2000;84: 594-601.
33. Mima EG, Pavarina AC, Neppelenbroek KH, Vergani CE, Spolidorio DM, Machado AL. Effect of different exposure times on microwave irradiation on the disinfection of a hard chairside reline resin. J Prosthodont 2008;17:312-7.