

Clinical report or Tips from Readers

Preventive Considerations for Prosthodontic Longevity: Clinical Observations

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Longevity: Clinical Observations

Abstract

Dentinal wear, gingival recession and the inability to maintain prosthodontic appliances and the dentition are an increasing problem in both the aging and general dental population. Preventive strategies are discussed that may help in managing this at the clinical level to help practitioners consider alternative procedures. Efficacy of geriatric hygiene, toothbrush abrasion and the ongoing effects of dentinal wear and the loss of soft tissue contours are discussed with respect to prosthodontic outcomes clinically.

Conclusions: The use of non-abrasive hygiene measures are recommended to avoid the loss of structural and aesthetic integrity of dental prostheses. Inclusion of peroxides in tooth paste substitutes improves overall efficacy of oral hygiene outcomes.

Key Words: Dentinal abrasion, peroxide mouthwashes, prosthodontic longevity, non-carious cervical lesions, tooth brush abrasion.

Disclaimer: This clinician has had no financial support or incentives from the manufacturer of the recommended mouthwash; Listerine Whitening, Johnson & Johnson, USA.

INTRODUCTION

This article addresses preventive strategies which influence the clinical longevity of prosthodontic appliances including geriatric changes, loss of supporting oral structures, tooth brush - dentifrice abrasion and some effects of bruxism.

After many years of treating and maintaining comprehensive restorative patients, numerous problems emerge. The more frustrating outcomes are those of gingival recession resulting in the margin exposure of crowns, loss of cervical tooth structure and exposure of root surfaces. This may result in root sensitivity, increased risk of root caries and aesthetic failure. These changes can be observed across a wide age range of the patient population. Figs. 1, 2.



Fig.1 Gingival recession, tooth brush abrasion, margin exposure and cervical caries



Fig.2 The lower arch of patient in Fig 1.

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Observations:

The non-carious cervical lesion is well researched in the literature and is often described as multifactorial¹⁻⁷. As shown in the above photos, the effects can be destructive both structurally and aesthetically. This article arose from observations involving the aging population where manual dexterity and poor oral hygiene was a problem leading to the loss of dental prostheses and their supporting teeth.

Prosthodontic management of the aging prosthesis poses a distinct group of challenges. Problems with diet, flossing, interproximal cleaning and regular brushing all seem to suffer with aging, decreasing dexterity and attitude. In attempting to look after these patients, a number of specific clinical patterns were seen.

There was a distinct relationship between excessive tooth brushing and tooth wear, bruxism and chronic neck and back pains. This type of patient appears more prone to brushing aggressively with increased root sensitivity following a number of observed clinical events:

1. Increased stress and time constraints in their lives. These patients brush faster and harder as they are always in a rush. If this pattern is assessed, the greatest cervical wear and tissue loss was associated with the first point of impact with the commencement of tooth brushing.
2. Increased body pain levels may lead to increased bruxism and increased forces during tooth brushing. The most commonly observed pain of this type was noticed in cervical trauma (whiplash injury) patients with increased TMJ and

bruxing events. These patients do not seem to be aware that they are brushing harder at all.

3. Repetitive Strain Injury patients with chronic spinal pain and poor posture were also noted to be more prone to excessive tooth brushing forces. Bruxism and TMJ events were also noted to have increased and again, this type of patient was unaware that they brushed harder or even that they bruxed.
4. Another observation in chronic pain / bruxism patients was that the more the patient bruxed, the harder it was for them to floss well without the floss shredding and being cut. This was due to the teeth being compressed in the sockets; compressing the contact points. Invariably this type of patient was noted to brush harder and have increased cervical tooth root sensitivity. This problem was quite often a main reason why they would not floss.

Once gingival recession occurs and roots are exposed, aging with poor cleaning may result in a greater risk to root caries; additionally if they develop a poor diet.

Ongoing abrasion of the dentine of the root causes problems with cleaning, undercutting crown margins, root caries, weakening of the root structure (coronal flexure and fracture) and dentinal sensitivity. Abrasion can be influenced by the brush type, force of brushing and abrasiveness of dentifrices. Awareness of this in dentistry is not new¹⁴⁻²¹.

Fig.3, 4.



Fig.3 Undercut crown margins and soft tissue contours caused by abrasion



Fig.4 Undercut crown margins and the tooth brushing effect

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Over time, a number of patients in these groups presented without the severe structural tooth damage. This group of my patients do not to use any dentifrices primarily due to taste or naturopathic reasons. Surprisingly, these patients, for their age, do not show the same level of dentinal abrasion and gingival recession as those using toothpaste and they rarely complain of dentinal sensitivity. There is no doubt that the type of toothbrush and the force of brushing influence dentinal wear, but what is the effect of dentifrices on dentine abrasion and the problems cited previously?.

An in-vitro study⁵ of the effects of toothpaste versus non-toothpaste brushing provided current, interesting and surprising results. The amount of tooth and soft tissue damage caused by the use of dentifrices can no longer be ignored. Clinical awareness of abrasion lesions is not new and dates back for hundreds of years. The first non-clinical abrasion lesions were researched by Miller in 1907¹.

In a clinical attempt to reduce this damage to the prostheses and supporting teeth, I employed the use of a non-abrasive dentifrice protocol. Patients however, usually prefer the refreshing benefits of a dentifrice, the so called “minty fresh taste” over the use of plain water. I have also employed the use of mouthwashes as a toothpaste substitute to also provide this effect when needed, of which the most effective clinically were those containing peroxides.

The initial use of this type of product was an attempt to resolve poor oral hygiene in my geriatric patient population (most commonly due to poor dexterity). The twice daily use of this mouth wash improved their level of oral hygiene significantly to the point where

both they and their relatives were significantly happier, especially with the reduction in halitosis. The non-peroxide containing mouthwashes appeared less effective, especially those that created a burning sensation in this type of patient. These were described as unpleasant by many patients.

In those patients severely compromised physically who cannot brush well or floss at all, their complex bridge work was poorly cleaned at the daily level and their tooth roots showed signs of dentinal decalcification and decay. Having their teeth cleaned daily is often difficult to arrange in aged care facilities or by family members and the use of this mouth wash program was aimed at improving their outcomes. Swishing teeth with a peroxide mouthwash is a lot easier for these patients and this ability doesn't appear to be as reduced with aging as is routine oral cleaning.

In as little as a week, significant improvements were observed in those using the mouthwash daily, more so if used twice daily. Halitosis was reduced, chronic gingivitis receded and a decrease in root sensitivity to cold and brushing was observed. The results were more effective when following a routine prophylaxis.

Clinical problems that responded well to this protocol include:

1. Early periodontitis and some types of gingivitis which do not respond to regular periodontal care and oral hygiene measures.
2. Chronic mouth breathing with associated enamel decalcification.
3. Halitosis
4. Hairy tongue
5. Root caries and hygiene under fixed and removable prostheses.

6. Chronic papillary hyperplasia of the palate, under prostheses when worn continually.
7. Root sensitivity
8. Reduction, even cessation of attachment loss in cases with minimal attachment remaining.
9. Reduction in dentinal loss with brushing at the crown / root margin
10. In some patients, an increase of about 1 mm occurred in the labial gingival margin height around both crowns and implants.

Based on these clinical observations and outcomes, I initially restricted the use of abrasive dentifrices with my practice for bruxers, highly-stressed individuals, chronic pain patients, patients with severe loss of gingival attachment and highly aggressive tooth brushing individuals. After six years of observations, it was clinically apparent that this protocol improved their general oral hygiene outcomes and reduced their susceptibility to tooth and supporting tooth structure damage. This was measured clinically relative to past clinical models held in storage

The patient's brushing patterns were not altered; I only substituted toothpaste with a liquid, non-abrasive, peroxide containing mouthwash. Clinical experience had already shown that patients could achieve a good level of oral care using water alone¹⁹.

A provisional clinical protocol was developed after varying manufacturer recommended instructions to obtain suitable outcomes.

Clinical protocol advised:

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1. Use mouthwash twice daily only, using only a third to a half of a teaspoon of liquid. Excessive amounts of mouthwash use may cause sensitivity primarily in soft tissues and the tongue.
2. Rinse (swish) thoroughly with the mouthwash for 20 seconds moving the tongue to access areas under it. Use the mouthwash morning and evening only, with mid-day using water instead.
3. Spit out the excess mouthwash, but do not rinse with water.
4. Carefully brush using the modified Bass technique with the remaining mouthwash left in the mouth as the toothpaste, rinse out with water and then floss. Do not use toothpaste on the brush.
5. This technique was the same for manual and electric toothbrushes. Electric brushes do froth the solution more and may require spitting this excess froth out during brushing.

The mouthwash used was Listerine Whitening (containing peroxide and 8% alcohol) manufactured by Johnson & Johnson, USA. This product has been modified to include fluorides.

Some of the patient's reasons for not using the mouthwash:

1. They didn't like the taste of the peroxide.
2. It was too intense a taste and / or burning sensation. This occurred more often when the patient did not follow instructions and used the mouthwash three or more times daily or in too high a volume.

3. Sensitivity with ulcers or geographic tongue can cause a burning tenderness.
This can be overcome using the mouthwash as a tooth paste on the brush head, instead of vigorous swishing.
4. Unable to get over not using toothpaste and the conditioning to do so.
5. Sheet-like de-epithelialisation of the cheek mucosa in rare occasions.
6. Occasional patients noted an increase in supra-gingival calculus around the lower anterior teeth. No plaque was observed with this build-up.
7. Since it is recommended to only use the mouthwash twice daily, midday brushing was advised to be done using a toothbrush and water only. Some patients were not happy with this as they preferred the “minty taste”.
8. Occasional sensitivity in the throat area was noted. Gargling with this product was not advised.
9. Mild tooth staining may increase on the incisors due to lack of dentifrice abrasiveness, but this is easily removed with routine cleanings.

The mouthwash was not a substitute for flossing, but it did significantly influence certain patient types who did not floss at all. Flossing is mandatory where food packing occurs, as the mouthwash protocol has no effect on this.

Although the mouthwash tested was introduced as a whitening agent, I consider this a secondary benefit. Whitening does occur, but slowly over some weeks. Daily stain control was observed to be effective, especially with this mouthwash (as the toothpaste substitute) used two times per day. Other types of Listerine mouthwash were not as effective clinically, as they did not contain the peroxide. Colgate’s Peroxyl also has a similar positive effect.

Dzakovich and Oslak's⁸ research provided the in-vitro verification for many of my own long term in-vivo observations and the stimulus to continue recommending a non-abrasive oral hygiene regime. They concluded that teeth brushed in water had no visible loss of tooth structure whereas the use of toothpaste regardless of the degree of abrasiveness or toothbrush bristle firmness, demonstrated wear at the level of the CEJ.

Precautions:

The obvious concerns about all mouthwash products continue to be long term effects of their constituents. The use of peroxides, fluorides, sodium lauryl sulphates and the use of an alcohol containing base are continually being discussed and reviewed⁹⁻¹². I have used 5-8% peroxide without alcohol as a mouthwash, but its taste caused complaints.

The use of non-abrasive toothpaste substitutes in my patient's clinical routine has improved the longevity of prostheses in both new and long-term patients. The inclusion of the peroxides has improved soft tissue outcomes and reduced plaque retention around complex prostheses. The reduced plaque levels around crown margins and prosthesis attachments make the preventive fluoride strategies more effective for the management of root caries.

Many toothpaste products do not list the percentages of active ingredients and many types of toothpaste do not make it easy to determine if they contain abrasives. Many desensitizing toothpastes contain abrasives also which should make us question; why? In patient groups with severe brushing forces, the desensitizing effect masks the ongoing loss of cervical dentine. In most patients of this type, the use of non-abrasive products

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can lead to decreased cervical sensitivity and restricted use of the desensitizing agent.

Tooth Mousse (GC, Japan) is an effective non-abrasive product for this need.

Loss of gingival attachment due to tooth brush abrasion is a significant factor in clinical failure of teeth and prostheses²², but if the cause is not removed, then what is the longevity of any gingival graft procedure?

Implants and Halitosis

Most implant patients complain from time to time about bad breath with full mouth or partial implant prostheses. Yellow leathery plaque may develop as a result of their inability to access all areas of these devices and halitosis becomes a distinct problem for them and their partners. The marginal gap around most implants can also create an unmistakable anaerobic odour. These problems are significantly reduced using the peroxide containing mouthwash.

It has been observed that use of a 10% hydrogen peroxide treatment can improve osseointegration on implant surfaces which have previously been coated with bacterial biofilms orally¹³.

A similar halitosis problem develops under partial and complete dentures, especially when they are not left out at night time. This is exaggerated when they are not cleaned well. In both the fixed and removable cases, the use of the peroxide containing mouthwash has resulted in a lessening of this problem and secondarily to a whitening effect and a reduction in staining, both in the prosthesis and the natural teeth. The tooth

whitening occurs over a number of months. This may also improve the colour of the prostheses and the interfaces with the prosthetic teeth, the frameworks and the acrylic base.

The tissue conditions of both papillary hyperplasia of the palate and hairy tongue were both observed to respond well to the effects of the peroxide in conjunction with regular corrective procedures of prostheses.

The use of peroxides is not recommended as a cleaning agent for chrome dentures, but compared to the clinical problems associated with poor oral hygiene and the lower oxygen tension conditions under dentures; the use appears beneficial for the teeth and soft tissues. Partial dentures are not soaked in the mouthwash solution, but merely brushed with and placed into a mouth cleaned by the mouthwash.

It must be stressed, that the use of the non-abrasive mouthwash technique is an adjunct to routine oral hygiene techniques and where effective brushing cannot be accomplished by the patient, the use of a peroxide containing mouthwash may improve the clinical outcomes.

While I appreciate this paper reports on my long-term clinical observations, in light of the in-vitro research I hope this may generate further discussion and in-vivo research into these poorly identified and unmanaged problems.

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