PERIODONTAL DEBRIDEMENT: STILL THE TREATMENT OF CHOICE

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ABSTRACT

Periodontal debridement (PD) remains a gold standard for the treatment of inflammatory periodontitis.

Background/Purpose

The evidence base regarding the causal relationship between oral biofilm and the host inflammatory response to the etiology of periodontal disease has substantially increased over the years. What has not changed significantly during that time is the conservative manner in which the disease can be treated with periodontal debridement (PD). Since dental hygienists, in particular, specialize in providing these procedures it is important to evaluate the evidence that supports periodontal debridement as a primary and fundamental treatment modality.

Method

An extensive narrative literature review that included systematic reviews, examined traditional PD, the use of adjuncts to enhance PD and newer PD procedures to determine what are the best practices for achieving optimal clinical outcomes.

Conclusion

Compared to surgical therapy, PD results in maintenance of attachment levels over time, but is not as effective in the initial reduction of probing depths in deep pockets. Sustained release local drug delivery agents have some modest adjunctive effects when used with PD, as do systemic antibiotics in aggressive periodontitis cases. Reported analyses of the long term effects of chemotherapeutic agents usually do not extend beyond a few months to a year. While laser therapy is still under investigation it remains as a potential PD therapy. New instruments being refined to better visualize the root surface either non-surgically or with mini papilla reflection flaps, hold promise for the future when they become more affordable and accessible. Despite the development of new technology, it still appears that periodontal debridement (PD) remains the gold standard for the treatment of inflammatory periodontitis.

Key words: Periodontal debridement, periodontal therapy, non-surgical therapy, scaling, root planing, outcomes

INTRODUCTION

Periodontal debridement (scaling and root planing) is the thorough mechanical removal of biofilm and calculus from periodontally diseased root surfaces. It is the basis for the treatment of all inflammatory periodontal diseases and remains the requisite gold standard for initial therapy in non-surgical and surgical treatment. It does not seem to matter whether the root is treated with hand or power-driven instrumentation or a combination; both are successful in the hands of skilled clinicians. 1-5
Systematic reviews and meta-analysis support the efficacy of periodontal debridement for reversing or controlling inflammatory periodontal disease by reducing bleeding on probing, probing depths and increasing attachment levels. Therefore, PD is the first line treatment choice in all pocket depths (Figure 1). Periodontal debridement, or scaling and root planing, is shown to reduce probing depths about 1–2 mm in moderate and deep pockets and increase attachment levels about 0.5–2 mm in moderate to deep pockets (Table 1). Scaling does cause some attachment loss in shallow pockets so clinicians are cautioned not to over-instrument shallow pockets.

### Surgery Versus Non-surgery

Many meta-analyses and systematic reviews have addressed the question of whether to treat periodontitis with surgery or non-surgery. In reality, most practitioners use a combination of therapies for each patient. For moderate to advanced periodontitis cases some areas of the mouth are likely to be surgically treated while non-surgical therapies are more appropriate for other areas. Non-surgical periodontal debridement compared to surgical therapy holds up very well over time, particularly in shallow and moderately deep pockets. Deeper pockets may initially respond better to surgical therapy with increased probing depth reduction and attachment gain. However, longitudinal studies have shown that long term, periodontal debridement combined with regular maintenance is a viable and predictable treatment for maintaining attachment levels in most diseased sites regardless of initial probing depths. Pocket depths are maintained with non-surgical therapy at a similar level to surgical treatment over time but generally are maintained with equal or less recession and attachment loss than surgically treated sites, particularly in shallow and moderate depths.

### Adjunctive Therapies

It is noteworthy that the refinement of periodontal instrument designs and methodologies, the introduction of power-driven scalers and slimmer ultrasonic tips, and perhaps more recently the use of lasers for root detoxification has only marginally enhanced the clinician’s ability to effectively decontaminate the pocket and to remove microbial deposits from the root surfaces. As seen in Figure 1 periodontal debridement with hand and ultrasonic devices is the minimal therapy required in most, if not all, treatment protocols for inflammatory periodontal disease.

### Local Delivery

If there is significant edema and exudate, then consideration of adjunctive use of antimicrobials in the ultrasonic lavage during initial debridement, such as 0.5% povidone iodine, can be utilized. Povidone iodine is a potent antiseptic, bactericidal and anti-fungal, and exhibits some substantivity. Although the data to support this ultrasonic bactericidal debridement technique is mixed, it has been part of the author’s protocol for thirty years and is justified as an effective way to reduce aerosol contamination produced by the power-driven instrumentation. It has also been shown to result in a modest reduction in probing depths when used as a rinse in conjunction with periodontal debridement.

The adjunctive use of chlorhexidine (CHX) rinses, irrigation and subgingival gels along with full mouth debridement compared to regular quadrant scaling alone, has been explored and found to be of some adjunctive benefit to PD. However, the magnitude of additional benefit is small in comparison to that realized by PD alone.

### Sustained Release Delivery

Unfortunately none of the sustained release locally delivered chemotherapeutic agents available to date fulfill the wish for the magic potion, or “periodontal pixie dust.” Antimicrobial/antiseptic agents have been shown in meta-analyses and systematic reviews to serve as adjuncts to PD. However their effect is minimal, adding only tenths of a millimeter additional attachment gain and probing depth reduction.
None of these chemotherapeutic agents surpass periodontal debridement as a monotherapy. There is also still some uncertainty about the cost to benefit ratio for the patient and the lack of well-defined protocols for their use.

Using locally delivered antimicrobials in addition to thorough periodontal debridement will likely result in an additional 0.3–0.5 mm of probing depth reduction and an additional 0.5–1 mm of attachment level gain. While not a profound improvement in clinical parameters, if Phase 1 of periodontal debridement is not completely successful, then use of locally delivered sustained release antimicrobials should be considered at re-evaluation. This is especially recommended for isolated sites that are greater than 4 mm and continue to bleed upon probing (Figure 2). When there is generalized bleeding upon probing and many pockets deeper than 4 mm, the use of systemic antibiotics and/or host modulation therapies may be indicated (see Figure 2).

Systemic Antibiotics

The patient seen in Figure 3 who was diagnosed with generalized aggressive periodontitis complicated by poor glycemic control and an abnormally high fasting glucose of >400 dl/per ml fell in this category of severe aggressive periodontitis. In this case, full mouth ultrasonic bactericidal debridement was performed using 0.5% povidone iodine lavage in an ultrasonic device in one appointment. Evidence supports the use of systemic antibiotics (discussed in more detail below), particularly with aggressive periodontitis patients such as this 34 year old African American diabetic female. Three hundred fifty mg each of amoxicillin and metronidazole were prescribed 3 times a day for 8 days. Substantial reductions in inflammation and probing depths were seen at 2 weeks post debridement. Interestingly, the patient transferred to another periodontist after initial therapy because she did not like the resultant recession and spaces between her teeth due to the reduction of the inflammation.

Post-debridement Recession

Recession is a reality in nearly all sites following debridement (Table 1) so patients must be forewarned of the likelihood of some recession, particularly when the tissues are highly inflamed and edematous as seen in the 56 year old male treated by full mouth debridement and reevaluated at 4 weeks (Figure 4). He experienced significant post-debridement recession and hypersensitivity and was very wary of continuing treatment. Since he had multiple residual probing depths well over 5 mm that bled on probing, surgical treatment of his posterior quadrants was planned and performed. After treating the right upper and lower posterior quadrants with osseous surgery, the patient refused surgical therapy on the left side of his mouth because of increasingly significant hypersensitivity. Fortunately, at 1 year post-surgery, there were no residual pockets remaining on the non-surgical side (L), therefore further surgery was not required. This case is a good reminder that in some situations, patience is warranted, especially when the post-operative hypersensitivity is fairly profound. Putting the patient on regular maintenance
including high concentration NaFl dentifrice use for hypersensitivity was a valuable way to evaluate his healing potential following periodontal debridement.

Laser Therapies

The efficacy of laser therapy has been subject to mixed results in clinical trials and systematic reviews. It is for these reasons that laser therapy is depicted as questionable in the decision tree seen in Figures 1 and 2. Authors have yet to reach complete agreement that laser use substantially surpasses the clinical improvement seen with hand and power-driven instrumentation alone. However, lasers hold promise in the treatment of periodontal pockets, most likely as an adjunct to PD. It is too early to discount their potential use in non-surgical pocket therapy. Yet, despite the confusing evidence to support their use, lasers are becoming more and more a part of periodontal therapy; this is especially the case in parts of the country where their use by dental hygienists is legal (see Low and Mott, Laser Technology to Manage Periodontal Disease: A Valid Concept?, in this publication).

TREATMENT DECISION CHOICES

After examining the options, treatment decisions are based primarily on probing depth, loss of attachment and bleeding on probing (Figure 1). For the majority of periodontal patients, shallow pockets of 1–3 mm can be treated with self-administered plaque control following scaling and polishing. If pockets are greater than 4 mm and bleeding upon probing is present, then thorough periodontal debridement or more intense treatment regimens are in order. These might include the addition of ultrasonic bactericidal debridement followed by chlorhexidine rinses.

Some evidence indicates that combining local drug delivery and host modulation may provide added benefits to PD.

Locally delivered antimicrobials25,28,29 may also improve clinical outcomes following periodontal debridement3,4,8 however, as with host modulation therapy, the magnitude of their additive effect is small compared to that achieved with PD alone. If, however, at reevaluation 4 weeks later, there are residual probing depths greater than 4 mm that bleed upon probing, then adjunctive therapies may be considered such as locally delivered antimicrobials, systemic antibiotics, or drugs such as low dose doxycycline that modulate the host response (Figure 2).39,40
Figure 6. a) 56 year old female; pre periodontal debridement; b) Mandibular left mirror view of prototype periodontal endoscope used for visualization during periodontal debridement. c) 3 weeks post-full mouth debridement with hand instrumentation, ultrasonic scaler with 5% povidone iodine lavage and visualization with a prototype periodontal endoscope. d) Lingual mirror view at 3 weeks post-full mouth debridement with hand instrumentation, ultrasonic scaler with 5% povidone iodine lavage and visualization with a prototype periodontal endoscope. e) Radiograph of mandibular left cuspid, tooth #22 in 56 year old female; Pre periodontal debridement. f) One year Post-operative radiograph #22 showing radiographic bone fill.
A Newer Development

Early trials of the adjunctive use of periodontal endoscopes (videoscopes) for better visualization of the root surface may be an innovative way to treat residual pockets in the future. The patient shown in Figure 6 had advanced generalized chronic periodontitis with probing depths ranging from 5 to 15 mm. This 56 year old female was a dental fears patient who had received inferior care for 20 years. The treating dentist told her that he wouldn’t clean her teeth because it would damage the enamel. Given her dental fears, her unfortunate experience with her dentist, and her inability to pay for surgical therapy, non-surgical therapy was the only treatment at that time she would accept. Prior to PD, the mid lingual and mesial of tooth #22 measured 11 mm and had copious bleeding upon probing and an epulis from a new ill-fitting removable partial denture. After initial ultrasonic bactericidal debridement with 0.5% povidone iodine, a prototype of a periodontal endoscope was used to reassess residual pockets that bled on probing (Figure 6). Using the endoscope at re-evaluation allowed visualization and removal of subgingival deposits in a residual 6 mm bleeding pocket on the mid lingual and mesial of tooth #22. Within weeks, the pockets measured 3 mm with no bleeding upon probing. The periodontal healing potential and amount of radiographic bone fill is tremendous when thorough periodontal debridement results in pristine, clean roots. This periodontal endoscopic technology has been under further refinement for several years and will likely become the standard of care at sometime within the next ten years.41,42

LONG-TERM EFFECTS OF ADJUNCTIVE ANTIBIOTIC THERAPY

As mentioned earlier, the use of locally delivered and systemic pharmacotherapeutics have been shown to result in minimal to modest additional reductions in bleeding on probing, probing depths and increased attachment levels compared to PD alone8,43–45. However, there is little long term data available beyond 3–12 month results following adjunctive use of systemic antibiotics or locally delivered antimicrobials. When the use of systemic metronidazole (S-MET) was subjected to a meta-analysis of 8 clinical trials, the results suggested that using S-Met in conjunction with PD in greater than 4 mm pockets may be more beneficial than PD; however, these positive effects disappeared after 13 weeks. This analysis is typical of the many individual clinical trials reporting the beneficial effects of systemic antibiotics in addition to PD so clinicians should be very discerning about using systemic antibiotics in the treatment of chronic periodontitis.46,47 Regardless of the type of antibiotics used, the clinical effect generally disappears over a period of 3–12 months. This is not to say one should not consider the selective use of adjunctive antimicrobials since it is well known that pathogens can penetrate into the cementum and dentin of the periodontally diseased root surfaces, into oral mucosa including the tongue and tonsil tissue, and the crevicular epithelium (Figures 7 and 8).18 Since viable bacteria have been seen within pocket epithelium, calculus, cementum and dentin, it is reasonable to target these tissue invading organisms with topical or systemic antimicrobials to more fully ‘sterilize’ the pocket and slow down the reinfection of the sites.43 However, periodontitis is a chronic infection, and often needs to be retreated. Clinicians should be diligent about thoroughly reassessing the patient on a yearly basis and institute any repeat therapy as needed (Figure 9). Depending on the severity of periodontitis, using systemic or locally delivered antimicrobials as part of the armamentarium is indeed justified when faced with getting control of the infection in an acute, severe, generalized chronic or aggressive periodontitis patient (Figures 3 and 6). It is critical that antibiotics not be used as stand-alone treatment and should always be accompanied by thorough PD.49
CONCLUSION

Periodontal debridement is a safe, effective treatment for inflammatory periodontitis. Locally delivered antimicrobials may have a modest adjunctive effect when combined with periodontal debridement in improving clinical parameters. However, trying to bypass periodontal debridement by using locally delivered sustained release chemotherapeutic agents as a monotherapy is analogous to trying to lose weight without diet and exercise. Just like fad dieting, placing a chemotherapeutic agent in the infected pockets in lieu of thorough root debridement may get temporary short term results, but will not be sustainable. Crash dieting does not usually result in long term positive weight control any more than deleting root debridement results in long term control of periodontal disease.

Minimally invasive therapy (microsurgery) is becoming popular in medicine and dentistry. Periodontal microsurgical flaps are gaining popularity because they are less traumatic for the patient. It is expected that periodontal endoscopes will be

![Figure 8.](image-url)
Figure 9. Scaling and root planing (‘periodontal debridement’) is the gold standard for initial therapy of inflammatory periodontitis. Sites that do not respond to periodontal debridement or remain above 6 mm in depths with bleeding upon probing, may need further treatment as indicated in the pyramid by the additional use of antimicrobial or host modulation therapy and/or surgery. At any time during maintenance there is additional loss of attachment or visible radiographic bone loss, the cycle of treatment shown above may need to be repeated in affected areas.

The treatment of choice for early to moderate chronic inflammatory periodontal disease, validated by decades of sound scientific evidence, is thorough periodontal debridement (PD). It is still the ‘gold standard’ for removing subgingival plaque (biofilm) and calculus in the treatment of inflammatory periodontal disease. Some small benefits may be derived from adjunctive systemic antimicrobials in cases of aggressive periodontitis, but scarce data is available to determine the long term effects of systemic antibiotic use with PD or surgery beyond 3–12 months. It is hard to trump a thorough periodontal debridement.

REFERENCES


