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Review Article

Pocket elimination therapy– The rhyme and reason

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ABSTRACT

Effective patient home care, coupled with regular professional maintenance, is the cornerstone of all successful therapy. A patient who is unwilling or unable to demonstrate the necessary level of plaque removal efficacy and commitment should never be considered a candidate for interdisciplinary therapy. Rather, all efforts must be made through instructional, motivational, technical, and chemical means to help the patient in question control plaque levels and thus provide a reasonable milieu for the acceptance of the necessary dentistry. Failure to demand such a level of plaque control results in therapeutic failure, and increased levels of frustration and anxiety for both the patient and the treating clinicians. While the patient has an obligation to make every effort to perform appropriate plaque control, it is imperative that the treating clinicians provide the patient with a milieu that is most conducive to effective plaque control, and that provides the greatest chance of a favorable long - term prognosis.

1. Introduction

Surgical therapies aimed at defect debridement and/or pocket reduction. As a patient who has undergone such surgical intervention is left with a milieu that is highly susceptible to further periodontal breakdown, the need for retreatment and the potential damage to the attachment apparatuses of adjacent teeth must be weighed. This treatment option offers minimal advantages over debridement, and no advantages when compared to osseous surgery. Various treatment options for periodontally involved teeth are tabulated below. [1]

2. Rationale for pocket - Elimination periodontal surgery

Pocket elimination, which has long been advanced as one of the primary endpoints of periodontal therapy, is most frequently accomplished through osseous resective surgery. The primary goal of pocket - elimination therapy is to deliver to the patient an environment that is conducive to predictable, long - term periodontal health, both clinically and histologically.

As such, the objectives are as follows:

1. Pocket elimination or reduction to such a level where thorough subgingival plaque control is predictable for both the patient and the practitioner.
2. A physiologic gingival contour that is conducive to plaque - control measures. Soft - tissue concavities, in the area of the interproximal col and elsewhere, soft - tissue clefts, and marked gingival margin discrepancies are eliminated.
3. The establishment of the most plaque - resistant attachment apparatus possible. This includes the elimination of long junctional epithelial relationships to the tooth surface where possible, and the minimization of areas of nonkeratinized marginal

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Table 1:

Options	Advantages	Disadvanatges
No treatment	Patient undergoes least amount of therapy.	Disease will continue to progress resulting in disease loss.
Subgingival debridement	Patient undergoes minimal amount of therapy. Ongoing disease process is slowed.	Disease process is not halted. Continued loss of attachment apparatus and eventual loss of teeth will occur.
Surgical debridement and/or pocket reduction	More thorough debridement than previous treatment options Reinstitution of disease process is common.	Attachment loss and eventual tooth loss
Resective periodontal therapy with elimination of furcations and no pocket depths greater than 3 mm	Delivers the most predictable attachment apparatus post therapy. Periodontal prognosis is optimized.	Patient must undergo various surgical therapies. Treatment is highly technique sensitive.
Regenerative therapy to rebuild lost attachment apparatus and alveolar bone	Lost tissues are regained. Prognosis is excellent when therapy is successful.	Poor understanding of prerequisites to delivery of therapy compromises results. Treatment is not as predictable as resective therapy.
Tooth removal with implant placement and regeneration if needed	Questionable teeth are eliminated. Therapy is predictable. Prognosis is excellent.	Highest cost of therapy. Teeth are lost.
Combination of above therapies	As listed above	Potential highest cost of therapy

epithelium, especially in the presence of restorative dentistry.

4. The elimination of all other physical relationships that compromise patient and professional plaque - control measures. These include furcation involvements and subgingival restorative margins.
5. A clinically maintainable milieu. This condition will evolve as a result of the previous four criteria having been met.

Pocket - elimination therapy helps maintain the plaque - host equilibrium in the host's favor, by closing the window of host vulnerability due to characteristics of the periodontium as much as possible.

3. Rationale for pocketing - Elimination procedures using osseous resective techniques

Periodontal pockets are recognized as complicating factors in thorough patient and professional plaque control. Waerhaug has shown that flossing and brushing are only effective to a depth of about 2.5 mm subgingivally.[2] Beyond this depth, significant amounts of plaque remain attached to the root surface following a patient's oral hygiene procedures. Professional prophylaxis results are also compromised in the presence of deeper pockets. The failure of root planing to completely remove subgingival plaque and calculus in deeper pockets is well documented in the literature.[3–7] Through the examination of extracted teeth, which had been root planed until they were judged plaque free by all available clinical parameters, Waerhaug[2] demonstrated that instrumentation of pockets measuring 3 mm or less was successful, with regard to total plaque removal, in 83% of the cases. In pockets of 3 – 5 mm in depth, 61% of the teeth exhibited retained plaque after thorough root planing. When pocket depths were 5 mm or more, failure to completely remove adherent plaque was the finding 89% of the time. Tabita et al.[8] noted that no tooth demonstrated a plaque - free surface 14 days after thorough root planing when the pretreatment pocket depths were 4 – 6 mm, even in the presence of excellent supragingival plaque control. Such reinfection of a treated site occurs along three pathways:[2,8]

1. Plaque that remains in root lacunae, grooves, etc., multiplies and repopulates the root surface following therapy.
2. Plaque that is adherent to the epithelial lining of the pocket repopulates the root surface after healing. Complete removal of the epithelial lining of the pocket is not a common finding following curettage.[9–11]
3. Supragingival plaque extends subgingivally, beyond the reach of the patient, and adheres to the root surface. Waerhaug[2] has stated, "If the pocket depth is more than 5 mm, the chances of failure are so great that there is an obvious indication for surgical pocket elimination".

Poor soft - tissue morphologies contribute to increased plaque accumulation. Deep, sharp clefts and marked soft - tissue marginal discrepancies in adjacent areas are contributing factors to inadequate patient plaque control.[12] The morphology of the interproximal soft - tissue col must also be considered. When the buccal and/or lingual peaks of tissue are coronal to the contact point, the gingiva must "dip "under the contact point to reach the other side, resulting in a concave col form.[13–15] Because the col tissue touches the contact point, its epithelium does not keratinize.[16,17] Lack of keratinization is not an inherent property of either col or sulcular epithelium, as this tissue will keratinize when it is no longer in contact with the tooth, either as a result

of periodontal therapy or eversion.[17–19] Nonkeratinized epithelium is less resistant to disruption and penetration by bacterial plaque than its keratinized counterpart.[20,21] When a concave, nonkeratinized col form is present, the patient must try to control an area that is conducive to plaque accumulation and more easily breached by the plaque and its byproducts.

4. Does pocket - E limination therapy work?

Smith et al.[22] and Olsen et al.[23] evaluated the relative efficacies of appropriately executed osseous resection with apically positioned flaps, and apically positioned flaps with root planing alone. Data were pooled by pocket depth and subdivided into tooth surfaces within a given pocket depth, to help elucidate the strengths and differences of the postsurgical attachment apparati. Mesial and distal probing depths were recorded with the probe placed as far interproximally as possible, and angulated to follow the long axis of the tooth. Only lesions that were amenable to resective therapy, and could therefore properly evaluate its applicability, were so treated. Surgical photographs were published, which demonstrated the techniques employed. Five years postoperatively, statistically significant interproximal pocket depth differences were noted between the sites treated with and without osseous resective therapy. Pocket depths in the flap curettage areas were approaching preoperative values, while the pocket elimination attained in other sites with osseous therapy was maintained. On the buccal and lingual surfaces, pocket elimination was maintained with both treatment approaches, underscoring both the fragility of a junctional epithelial adhesion and the danger of collapsing data. Radicularly, where patient plaque removal was easier and the junctional epithelium was shorter, pocket elimination was maintained following both types of therapies. However, in interproximal areas where plaque removal was more difficult and there was a longer junctional epithelial relationship to the root surface following root planing, curettage, and apically positioned flap therapy due to the presence of osseous craters, repocketing occurred in sites treated with open - flap curettage.

Flap curettage sites that initially probed 4 mm underwent repocketing at 5 years three times more often than sites treated via osseous resection. If initial probing depths were 5 mm, flap - curettage sites repocketed 3.6 times as often as those treated with osseous resection. With initial probings of 6 – 8 mm, repocketing was six times as likely to occur with open - flap curettage. Bleeding upon probing was encountered 2.3 times more often in sites treated with open - flap curettage than those treated with osseous resection, 5 years postoperatively. As expected, there was a 91% correlation between the presence of subgingival plaque and bleeding upon probing. Lindhe and Nyman[24] reported the 14 - year results of pocket - elimination therapy in 61 patients with advanced periodontal disease preoperatively, who had remained on regular maintenance schedules. Only 0.49 teeth were lost per patient over 14 times slower than in Swedes with untreated periodontal disease.[25] Nabers et al.[26] reported upon the results of 1,435 patients treated via pocket - elimination therapy. Patients lost an average of 0.29 teeth per patient over a mean postoperative time of 12.9 years.

Retrospective studies that assess treatment modalities other than pocket - elimination therapy carried out in patients with active periodontal disease demonstrated markedly different results than those reported upon following use of pocket - elimination therapy. McFall[27] reported an average tooth loss of 2.6 teeth per patient 19 years post - therapy; a nine fold greater tooth loss than that reported by Nabers et al.[26] Similarly, Goldman et al.[28] documented a tooth mortality rate of 3.6 teeth per patient 22.2 years post - active periodontal therapy. Such mortality represented an incidence of tooth loss approximately 13 times greater than that reported by Nabers et al.

Breakdown of sites during maintenance care of up to 7 years was greater in areas treated with modified Widman surgery and scaling and root planing than in areas treated with osseous resective therapy. These differences became more dramatic as initial pocket depth increased, underscoring the superiority of osseous resective therapy as a clinical modality for eliminating pockets and rendering areas maintainable over time by patients. Shallower pocket depths, coupled with the biologically stronger attachment apparatus of a short connective tissue attachment and a short junctional epithelium attained after osseous resection, proved more resistant to periodontal breakdown during maintenance than the attachment apparatus of a short connective tissue attachment and a long junctional epithelial adhesion obtained following root planing or modified Widman surgery. Differences in tooth retention can be traced to the ability of the patient and the clinician to successfully and predictably effect thorough plaque removal. Properly performed pocket - elimination therapy provides an environment of minimal probing depth, which is conducive to plaque removal.

Patient plaque removal is only effective to a subgingival depth of 2.5 mm.[2] The clinician must not be misled by the supragingival scenario. Lindhe et al.[29] have demonstrated that there is no relationship between supragingival plaque control and changes in probing depths or attachment levels, or between supragingival plaque control and bleeding upon probing. Waerhaug spoke of the existence of subclinical infl ammation.[3] In such a situation, the tissues appear healthy, but periodontal destruction is occurring subgingivally. Badersten et al.[30,31] and Waite[32] noted that bleeding upon probing was directly related to pocket depth, with deeper areas bleeding more often. Therefore, the same limitations

that apply to subgingival root planing in the face of pocket depths must be considered in the maintenance phase of therapy. The deeper the residual probing depths, the more difficult debridement and maintenance become for both the patient and the dental professional.[33–40] Sites with probing depths of greater than or equal to 6 mm are at significantly higher risk for future deterioration and additional attachment loss as a result of disease activity, if left untreated.

5. Post therapeutic pocketing

The scenario for continued loss of attachment in the face of post - therapeutic pocketing is as follows:

1. The patient presents with pocket depths in excess of 3 mm.
2. Patient plaque control removes plaque up to 2.5 mm subgingivally.
3. The attachment apparatus which results from curettage, modified Widman surgery, or fl ap curettage, has a long junctional epithelial component.
4. This epithelial adhesion exhibits greater permeability to plaque than a connective tissue fiber insertion.
5. Junctional epithelium is easily detached from the root in the presence of inflammation.
6. Subgingival scaling is increasingly less effective in areas probing greater than 3 mm.
7. Plaque left behind subgingivally following root planing begins to grow and repopulate the root surface within 14 days.
8. As the plaque front proceeds farther subgingivally, its removal is less effective.
9. As the pocket deepens, the problems with plaque removal are exacerbated.
10. The presence of furcation involvements and/or subgingival restorations makes plaque removal even more difficult.
11. The result is continued periodontal breakdown.

Employed in conjunction with selective extractions, root resective therapy, and prosthetic reconstruction, pocket - elimination techniques afford a high degree of predictability.[41]

6. Conflicts of Interest

All contributing authors declare no conflicts of interest.

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None.

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