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SURGICAL AND NON-SURGICAL TREATMENT OF CHRONIC PERIODONTAL DISEASE

[1] Shruthi Nambiar — [1] Post graduate student
[2] Vijay Kumar Chava — [2] Professor and Head
[3].Ramesh Reddy B.V — [3] Professor

[1,2,3] Department of Periodontology, Narayana Dental College and Hospital, Nellore, India

ABSTRACT The aim of this paper is to compare nonsurgical and surgical treatment for periodontitis by longitudinal trials. Treatment of periodontits can be broadly classified into either surgical or non-surgical approaches. Non-surgical therapy includes plaque control, supra- and subgingival scaling, root planing (SRP), and the adjunctive use of chemotherapeutic agents. Surgical therapy can be divided into either resective or regenerative procedures. The majority of articles reviewed agree that when adequate access for root debridement is achieved, non-surgical treatment of chronic periodontal diseases seems to be as effective as surgical treatment in the long-term maintenance of clinical attachment levels (CAL). SRP is limited by the presence of furcation involvements, deep pocket depths, and root anatomy. Conclusion: Decision-making in periodontal therapy requires a thorough understanding of the long-term outcomes of all available treatment modalities. Studies have consistently shown that SRP can provide similar improvements of clinical attachment levels when compared to surgical treatment. However, several factors need to be considered when deciding on which treatment approach to select for the treatment of chronic periodontal disease

KEYWORDS: Probing depth, Clinical Attachment level, Root Planing.

INTRODUCTION

Periodontitis is initiated by microbial plaque, which accumulates on the tooth surface at the gingival margin and induces an inflammatory reaction. The inflammatory response in patients with chronic periodontitis results in destruction of the periodontal tissues [1]. With a constant bacterial challenge, the periodontal tissues are continuously exposed to specific bacterial components that have the ability to alter many local cell functions.

Socransky et al. in 1998[2] described the subgingival microflora plaque formation as a series of successive waves of colonization by increasing periodopathogenic clusters of bacteria. The microflora shifts from Gram positive to Gram negative microbes and rods. The most pathogenic microbial cluster is the red complex which consists of the P. gingivalis, T. Forsythia and T denticola species. The microbial- inflammatory response interface plays a major role in the occurrence of the disease. According to data from the World Health Organization (WHO), advanced disease with deep periodontal pockets (≥ 6 mm) affects approximately the 10 to 15% of the adult population worldwide [3]

The primary goal of periodontal therapy is to arrest the inflammatory disease process. Periodontal therapy is directed at disease prevention, slowing or arresting disease progression, regenerating lost periodontium, and maintaining achieved therapeutic objectives. Non-surgical and surgical therapies have been performed to reduce the microorganisms

Patient discomfort and apprehension, susceptibility to periodontal disease, root exposure, systemic health, root sensitivity, age, recurrent caries and esthetic considerations must also be given careful attention, in selecting a treatment method.

Nonsurgical periodontal therapy consists of patient motivation and oral hygiene instructions as well as mechanical removal of supra and subgingival plaque and calculus deposits, correction of plaque-retentive factors (eg. overhangs) and risk factor modification (eg. smoking cessation). Many terms have been used to describe this process such as nonsurgical periodontal therapy, initial periodontal therapy, hygiene phase therapy, mechanic therapy and cause-related periodontal therapy. Many adjunctive treatment modalities have been clinically used and investigated for their efficacy [1]

Non surgical therapy for the control of periodontitis normally consists of subgingival debridement combined with oral hygiene instruction. Subgingival debridement in the absence of adequate oral hygiene measure results in a limited healing response [4]

Surgery has been defined as the act and art of treating diseases or injuries by manual operation. If this broad definition is used, nearly all periodontal treatment, from hard or soft tissue curettage through osseous surgical procedures, falls under the heading of "periodontal surgery". In common usage the term "periodontal surgery" is applied only to specific surgical manipulations of periodontal soft tissues and bone and not to the accompanying debridement and root planing.[5]

The main goal of periodontal surgery was to gain access to the root surface for adequate debridement and to establish gingival contours that are optimal for the patients self-performed plaque control.

In the 1970s and 1980s, from some important clinical trials, it is noted that nonsurgical periodontal therapy is effective in eliminating inflammation in deep pockets and in improving clinical attachment levels. However, despite the best efforts at meticulous nonsurgical instrumentation, residual plaque and calculus may still be found. It was accepted that in situations where signs of inflammation persist, surgical therapy may be indicated. A variety of different treatment techniques have been used including subgingival curettage, gingivectomy, modified widman flap, and full- or split-thickness flap procedures with or without osseous recontouring. The best surgical approach remains controversial.[6]

Nonsurgical and surgical periodontal therapies have, for several decades, been and remain the basis of periodontal treatment concepts. However, one must be aware that the way we treat patients now is indeed different from how we treated them 30 years ago. We now have a greater understanding of the etiologic factors associated with periodontitis, the mechanisms involved in periodontal wound healing and the inter-relationship between patient factors (such as smoking and diabetes) and treatment outcomes. Hence in the present library dissertation an attempt was made to review surgical vs. nonsurgical periodontal therapy.

Discussion

The aim of periodontal therapy is to preserve the natural dentition; to maintain and improve periodontal health, comfort, aesthetics and function; and to replace functional missing teeth, if any (by dental implants). Several treatment modalities to achieve these goals have been developed in periodontics, which may be broadly classified as surgical and non-surgical therapies. Non-surgical periodontal therapy includes plaque control, supra- and sub gingival scaling, root planing, and the adjunctive use of chemotherapeutic agents. Surgical therapy includes resective and regenerative procedures. The measurements often recorded to assess the success of any therapy and for comparison among different therapeutic procedures include gain in attachment level, pocket depth reduction, reduction in degree of gingival inflammation, efficacy, and clinical applicability.

Attachment level

Knowles et al 1980 [7] evaluated three modalities of periodontal therapy such as subgingival curettage, modified Widman flap surgery, and pocket elimination and observed none of the treatment was consistently superior to any of the other two with regards to sustained reduction of pocket depth and gain of clinical attachment.

Comparing the efficacy of scaling and root planning with that of modified Widman flap surgery on multi-rooted teeth, Philstrom et al. 1981 [8] observed that both procedures were effective in treating moderate to advanced periodontitis, and that additional flap procedure tended to result in greater attachment gain in deeper pockets. Later, after a long-term follow-up of the subjects in the above study they also reported a sustained gain in attachment when pockets more than 7 mm deep were treated by either procedure.

On the contrary, Hill et al. 1981 [9] in a similar two year follow-up study observed that the flap procedure offered no advantage over scaling and root planing alone, irrespective of the pocket depth.

However, Lindhe et al. 1982 [10] observed that in shallow pocket depths, non-surgical therapy resulted in gain in attachment at 6 and 12 months that dropped to baseline values when measured at 24 months; whereas, surgical therapy resulted in slight loss of attachment. Based on their observations, Lindhe et al. 1982 [11] determined the critical probing depths for scaling and root planing (2.9±0.4 mm) and modified Widman flap surgery (4.2±0.2 mm), suggesting that in patients with a large number of shallow probing depths, non-surgical approach is preferable, while in patients with a large number of pockets > 4.2 mm, surgical treatment may result in more gain of attachment. Furthermore, they emphasised that the level of oral hygiene established during healing and maintenance is more critical rather than the mode of treatment used.

Similarly, Ramfjord et al. 1982 [12] in an 8 year long-term study that included treatment by occlusal adjustment followed by surgical therapy and regular recall prophylaxis every 3 months throughout the study, observed that poor oral hygiene leads to a greater loss of attachment than better oral hygiene.

Isidor et al. 1984 [13] compared three treatment modalities, namely scaling and root planning versus modified Widman flap surgery versus reverse bevel flap on single-rooted teeth using a split-mouth study design. All the treatment modalities resulted in clinical gain of attachment; however, Scaling and root planning resulted in

slightly more gain of attachment than the two surgical procedures.

Becker et al. 1988 [14] compared scaling and root planing, modified Widman flap, or osseous surgery, and concluded that all techniques resulted in a similar outcome in relation to clinical attachment levels and gingival recession. They further observed that none of the surgical modalities of treatment had any better effect than scaling and root planing alone in maintenance of periodontal support at any pocket depth, indicating that a thorough debridement of root surfaces exposed in periodontal pockets is more important than various manipulations of the surrounding tissues.

Bonito et al 2004 [15]compared scaling and root planing accompanied by a local adjunctive therapeutic agent over time compared to SRP alone and observed reductions in probing depth and gains in clinical attachment level in combination procedure due to pharmacological benefits.

Christodoulides et al 2008 [16] evaluate the clinical and microbiologic effects of the adjunctive use of photodynamic therapy to non-surgical periodontal treatment and it failed to result in an improvement in terms of pocket reduction and attachment gain , but it resulted in a significantly higher reduction in bleeding scores. It is due to light from a helium/neon (He/Ne) laser or a gallium-aluminum arsenide laser, in combination with appropriate photosensitizers, resulted in a significant reduction in the viability of aerobic and anaerobic bacteria.

Badran Z.et al 2012 [17] conducted a study by nonsurgical periodontal treatment with the short-term effects of Er: YAG laser debridement (ERL) and manual scaling and root planing and showed significant reductions in their pocket depth and attachment level. Laser-induced new attachment through regeneration of cementum, periodontal ligament, and supporting alveolar bone, and significant decreases in subgingival pathogenic bacteria.

Papadopoulos CA et al 2015 [18] stated that the open flap debridement used alone, with an approach employing the additional use of a diode laser for the treatment of peri-implantitis leads to improved clinical attachment level because surgical therapy helps to gain access for effective surface decontamination. None of the "surgical" modalities of treatment had any better effect than scaling and root planing alone in maintenance of periodontal support at any pocket depth, indicating that a thorough cleaning of root surfaces exposed in periodontal pockets is more important than various manipulations of the surrounding tissues.

Pocket Depth

Cercek et al. 1983 [19] after a 2-year study comparing supragingival and subgingival plaque control to scaling and root planning, reported that minimal effect was derived by supra or subgingival plaque control and that greater pocket depth reduction is achieved by scaling and root planing.

Badersten et al. 1984 [20] also observed a considerable reduction in pocket depth following nonsurgical periodontal therapy involving root instrumentation with hand or ultrasonic instruments under local anaesthesia. However, they further reported that the reduction in depth for deeper pockets (>7 mm) was initially greater with a flap procedure than with scaling and root planning alone until 2 years following completion of treatment.

Rabbani et al. 1981 [21] also recommended pocket elimination for >6mm deep pockets by surgical method and recorded decreased pocket depths. Similarly, Becker et al. 1988 [14] reported greater pocket depth reduction by osseous and modified Widman flap surgery procedures than scaling and root planing alone. These results were in accordance with studies by Kaldahl et al. 1988 [22] **,** Kerry et al. 1990 [23] who all reported significantly greater pocket depth reductions by osseous and modified Widman flap surgical procedures than scaling and root planing alone in 6-7 mm deep pockets. However, on the contrary, Hill et al. 1981 [9] reported no significant difference in the reduction of pocket depths in deep pockets after scaling and root planing alone and the modified Widman flap procedure at either 1 or 2 years following therapy.

Mean decrease in pocket depth and changes in attachment loss following nonsurgical treatment of moderate to severe periodontitis was noted by Copulos et al 1993 [24] and Drisko et al 1995 [25] which was also supported by Haffajee et al 1997 [26] Preshaw et al 1999 [27] and Stelzel et al 2000 [28] . Tunkel et al 2002 [29] noted clinical attachment loss and gain in pocket depth by non-surgical periodontal therapy**.**

Aljateeli et al 2014 [30] compared the outcomes of surgical periodontal therapy with and without initial scaling and root planing. Combined scaling and root planing and surgery yielded greater probing depth reduction as compared to periodontal surgery without initial scaling and root planning, and it benefits more by proper maintaince of oral hygiene.

Gingival Inflammation

Philstrom et al. 1981[8] and Lindhe et al. 1982 [10] reported no significant difference between treatment procedures with respect to reduction in gingival inflammation and that both scaling and root planing alone or in combination with modified Widman flap result in significant reduction in gingivitis scores measured by an index. Lovdal et al 1961 [31] further emphasised that a combination of regular dental prophylaxis and good oral hygiene are critical for reduction in gingivitis rather than the therapeutic procedure.

Efficacy of Non-surgical therapy in deep pockets

Waerhaug 1978 [32] evaluated the response to subgingival plaque removal after subgingival instrumentation and recommended pocket elimination for >3 mm deep pockets. Caffesse et al. 1986 [33] evaluated the efficacy of scaling and root planing with and without surgical access. They concluded that surgical access improved calculus removal in deeper pockets Bleeding that obscures the surgical field, and the fact that the plaque front and the tooth are of the same colour were attributed as reasons for the failure of complete calculus removal by Waerhaug 1978.

Fleischer et al 1989 [34] reported that multi-rooted teeth with surgical access had significantly more calculus-free root surfaces. Thus, accessibility to deep pockets for thorough scaling and root planing is one of the most critical considerations.

Efficacy in furcation areas

Wang et al. 1994 [35] reported that molar teeth with furcation involvement are more likely to lose clinical attachment loss than molar teeth without furcation involvement, regardless of scaling and root planing. Wylam et al. 1993 [36] reported that lack of proper access for instrumentation due to furcation anatomy and, therefore, persistence of pathogenic microbial flora could probably be the reasons for compromised results in furcation. So resective and/or regenerative surgical therapies have consequently been predominantly employed in treating furcation areas,

Skill level of the therapist

Badersten et al. 1985 [37] observed significantly a smaller difference in clinical results with respect to various experience levels. However, Brayer et al [38] and Fleischer et al. (1989) reported that experienced operators were more proficient in removing calculus in furcations and deeper pockets than those with less experience. The time required for scaling and root planing alone took 5-8 hours over a course of 3-8 appointments noted by Hill et al. 1981, Pihlstrom et al. (1981), and Lindhe et al. (1982) .

Although Hill et al 1981 noted that there appeared to be no advantage with respect to time for any procedure; Lindhe et al. 1982 reported that scaling and root planing alone took twice as much time to accomplish than did the combination of this therapy with a flap procedure. Clearly, it has been well documented that scaling and root planing when used as a treatment procedure alone does not offer any advantage in terms of time or skill required for treatment.

Table.1. AL-SHAMMARI et al 2002 – Decision making for surgical and non-surgical treatment of chronic periodontal disease

S.No.	Factors	SRP	Surgery
1.	**Age** >70 <40	 + -	 - +
2.	Hygiene-Poor	+	-
3.	**Smoking** 1/2-2packs >2 packs	 + +	 - - - - -
4.	Significant systemic disease	+	- -
5.	Pockets<6mm Pockets>7 mm	++ +	- - ++
6.	Inflamed edematous gingiva	++	- -
7.	Fibrous gingiva/deep pockets	-	+
8.	Hyperplastic gingival	-	+
9.	Furcations ≥ class II	+	++
10.	Restricted access root anatomy	+	++
11.	Failure of previous SRP	+	++
12.	Refractory disease	+	-
13.	**Calculus** Discrete/"chunky" Diffuse/embedded	 + +	 - ++
14.	Hypercementosis	-	++

Recommended**(+);** Strongly recommended**(++)**
Not Recommended**(-);** Strongly not recommended(-/-)

CONCLUSION

The nonsurgical periodontal treatment remains the gold standard for managing the periodontal patients. It can result in reduction of inflammation, pocket depth reduction and clinical attachment gain. There is no certain magnitude of initial probing pocket depth where nonsurgical periodontal therapy is no longer effective.

It needs to be emphasized that the root instrumentation is only indicated for sites with probing depth 4mm and above as instrumenting shallow sites will potentially develop loss of attachment. Yet, no other therapeutic modality can be routinely utilized for the nonsurgical periodontal treatment than the scaling and root debridement or planing or instrumentation.

Non-surgical intervention is not a substitute for surgery as surgery has definite indications in specific clinical settings such as furcational involved teeth, roots with ridges, grooves, concavities, etc, where thorough SRP by means of a closed approach is difficult.

It is suggested that all measures of non-surgical therapy first be advocated, results evaluated after an adequate revaluation interval and then a surgical option planned in case of non-responsive cases. The clinician while debating on a treatment option should hence follow an integrated approach of taking all the above-mentioned criteria into consideration and thereby providing each individual patient with the best possible option.

Therefore, the role of a high quality root debridement along with the implementation of a risk factor modification approach (oral hygiene habits, patient's motivation and education, smoking cessation, diabetes control, healthy lifestyle changes) in the management of periodontitis is paramount.

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Corresponding Author

Dr. **Vijay Kumar Chava**
Professor and Head,
Department of Periodontology,
Narayana Dental College and Hospital,
Chinthareddypalem, Nellore,
India 524001
E-mail: chava7@hotmail.com
Phone: 9441978737
Fax: +91861 2305092