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Full-Mouth Disinfection versus Quadrant Scaling & Root Planing - A Review

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ABSTRACT

In this paper, the author has reviewed the microbial & clinical impacts of the one-stage full-mouth disinfection and quadrant scaling root planing in Periodontics. Periodontal diseases are one of the most common in the oral cavity and have an infectious nature triggered by pathogenic microorganisms that first lead to gingivitis and may develop to periodontitis and, if not treated, to tooth loss. Periodontitis is characterized by loss of attachment in the conjunctive tissues followed by alveolar bone destruction and consequent formation of periodontal pockets. To overcome a bacterial transmission, 'one-stage full-mouth disinfection' was introduced for the treatment of periodontal infections. This treatment strategy resulted in significant clinical and microbiological improvements when compared with the standard sequential treatment.

Keywords: periodontics, full mouth disinfection, quadrant scaling root planing, microbial.

INTRODUCTION

Periodontal disease is a mixed contamination by periodontal microbes. The activity of the disease is dependent on the susceptibility of the host, an increase in the number of pathogenic microbes and a decrease in the number of advantageous microbes. These diseases defines a broad group of diseases affecting the periodontal tissue, the most common are inflammatory processes of the gingiva and tissues attaching to the tooth. These diseases are usually associated with microbial infection due to accumulation of a plaque biofilm and calculus. Periodontitis refers to a group of more advanced and related diseases within the broad heading of periodontal disease.

Periodontal tissue destruction occurs when the balance of the host's local and systemic immunologic defense system is broken by pathogenic microbes. Those microbes may inhabit not only the oral mucosa, periodontal pocket, tongue, saliva but also the oropharynx and paranasal sinuses. Changing the host's susceptibility is difficult because it is a genetic factor. Therefore, successful periodontal treatment should aim to decrease the number of pathogenic microbes in intra-oral ecological niches and plaque and re-establish an oral environment suitable for normal flora. Scaling and root planing (SRP), is a frequently suggested treatment for periodontal contamination. Most periodontal diseases respond well to nonsurgical treatment but the clinical results are dependent on patient's cooperation, the composition of plaque, and genetic or environmental factors. After mechanical instrumentation, the number of subgingival microbes decreases considerably. However, in the case of conventional SRP (cSRP), which is performed by quadrants or sextants, pathogenic microbes from untreated areas such as the periodontal pocket, tongue, mucosa, pharynx or saliva can re-cluster into the treated pocket

within a week leading to a recurrence of the disease. The elimination or reduction of periodontopathogens is the foremost in the prevention and treatment of periodontal diseases that is traditionally performed by the conventional quadrant wise scaling and root planing (Q-SRP). Unfortunately, treatment failure and disease recurrence may occur. Among different causes, cross contamination through the intra oral bacterial translocation has been suspected. Numerous studies show that periodontal pathogens, recolonize due to previous inadequate treatment resulting in poor treatment results [1-3].

QUADRANT SCALING & ROOT PLANING

Scaling and root planing are performed routinely in the treatment of periodontal disease. The procedure is usually carried out over several visits where full-mouth root treatment is required—one quadrant at a time, or a sextant, or selected teeth at each appointment. Root planing aims at the successful removal and reduction in the number of periodontal pathogens. Removal of plaque, toxins, calculus, other foreign materials, dead and diseased tissue from the roots of the teeth, periodontal pockets, and adjacent soft tissue are all components of the procedures. Nonsurgical root planing procedures are challenging for the clinician, require a high degree of skill, and are carried out "blind." They may involve the use of both hand instruments and ultrasonics, or only hand instruments. They can also be challenging for patients, requiring extended chair-side time and repeat visits, and range from uncomfortable to very painful on the pain scale [4].

Typically, the dental hygienist is responsible for scaling and root planing procedures. Seventy-five percent of general dentists were estimated to employ dental hygienists in 2003. Despite the fact that root planing and scaling are nonsurgical procedures that effectively help to restore oral health, a significant number of patients either do not attend for initial therapy or do not return for treatment after the first root planing appointment. Evidence from the literature shows that for patients, there are many factors that contribute to either a lack of case acceptance or noncompletion of treatment. Overcoming these barriers to treatment represents an opportunity to improve both the patient's health and the clinician's practice [5].

Local and topical anesthetics provide pain relief during scaling and root planing procedures. The choice depends upon preference, degree of anesthesia required and duration of, state regulations, the affected area, and the patient's medical status. In the maxillary arch, infiltration is given in the sulcal region buccally or labially to produce anesthesia. For scaling and root planing, it may be necessary to supplement this with palatal anesthesia. Other than a feeling of numbness, few side effects will be noticed by patients with maxillary infiltration anesthesia. In the mandibular arch, inferior dental blocks for lower quadrant root scaling are given. Side effects include numbness, a thick feeling of the tongue and lip area, and a lopsided smile until the anesthesia starts to wear off [6].

ONE STAGE FULL MOUTH DISINFECTION

Traditionally, periodontal debridement procedures are made in quadrants or sextants with regular intervals of one or two weeks. It is known that the clinical success of this type of treatment happens mainly because of the reduction of periodontal pathogens generally accompanied by the increase of beneficial bacteria and the subsequent establishment of a healthy microbiota. However, these microbial changes could be impaired in individuals with more severe periodontal disease, since they are more susceptible to intra-oral cross contamination involving the variety of aerobic and anaerobic bacteria which can translocate from not treated sites to those recently treated. In this context, the concept of one-stage full mouth disinfection emerges and aims mainly at minimizing transmission of pathogenic microorganisms from the periodontal pockets still not treated to those already treated.

Chlorhexidine is an antimicrobial agent widely used in Dentistry. Although in this protocol CHX had demonstrated good results, authors felt like it was necessary to check the degree of benefit brought by the product. In a posterior study, however, the same group reported controversial results after observing that the prolonged use of CHX brought beneficial effects to the protocol. During explanation of potential risks and benefits of this study, subjects were informed about possible side effects related to CHX [7].

The one stage full mouth disinfection concept consists of a combination of such efforts:

- A full mouth scaling and root planning (the entire definition in two visits within 24 hours (i.e. two consecutive days) to reduce the number of subgingival pathogenic organisms.
- An additional subgingival irrigation (three times repeated within 10 minutes) of all packets with a 1 % chlorhexidine gel in order to suppress the remaining bacteria.
- Tongue brushing with a 1 % chlorhexidine gel for one minute to suppress the bacteria in this niche.
- Mouth rinsing with a 0.2 % chlorhexidine solution for two minutes to reduce the bacteria in the saliva and in the pharynx, including the tonsils.
- Optimal oral hygiene supported during the first two months by a 0.2 % chlorhexidine mouth rinse to retard the recolonisation of the packets.

LITERATURE REVIEW

A large number of clinical studies have been carried out on the subject, with contradictory results, making it difficult to make a sound judgment. Some studies have not reported any differences between the conventional quadrant-wise scaling and root planing procedure and the new technique. Some others have reported that the new technique is superior to the conventional procedure. The one-stage full-mouth disinfection technique was introduced by the Belgian Lowen research group. The aim of this technique is the rapid elimination or at least suppression of all periodontal pathogens from the oropharyngeal areas (periodontal pockets, saliva, oral mucosa and tonsils). In this technique, bacterial re-colonization through cross-contamination or intra-oral transportation is delayed until the appropriate healing of the periodontal pockets. The technique is rather new and there is a lot of controversy over its efficacy, rationale, patient and operator comfort, systemic effects and finally its cost-effectiveness. [8-10].

The majority of studies have clinically and microbiologically evaluated the new technique and only one study has evaluated the immunologic effect of the technique, reporting a significant decrease in pro-inflammatory mediators and an increase in anti-inflammatory mediators [11].

Apatzidou et al. evaluated the effect of FMD techniques on antibody titers and reported that both treatment modalities resulted in a decrease in antibody titers during a six-month period, with no significant differences between the two techniques consistent with the results of the present study. In other words, both treatment modalities induced a decrease in serum levels of IL-17 and IL-1β during a 4-month period in the present study. The research group that has introduced the technique believes modifications in the original technique are responsible for the discrepancies in the results of various studies [12].

Mongardini et al. [13] found no statistically significant differences between the FMD and control groups (MST) for teeth with moderate pockets, as the test group had better results (0.2 mm differences) for both single-root and multi-root teeth. Moreover, no significant differences were found for teeth with deep pockets, as the test group had better results with 0.8 mm for single-root teeth and 0.3 mm for multi-root teeth. Moreira and Feres-Filho [14] who did not perform separate analyses for single-root and multi-root teeth, found a 0.3 mm difference favoring the control group in moderate pockets and an 0.2 mm difference favoring the control group in deep pockets.

Goutoudi et al. revealed high levels of cytokine in patients with periodontitis and the relationship between its serum levels and disease severity. Some studies reported no significant differences between the two disinfection techniques and some others have emphasized the superiority of the new technique over the conventional treatment modality. The majority of studies have evaluated the clinical and microbiological aspects of the new technique and only one study has evaluated the immunologic effects of this technique, reporting a significant decrease in pro-inflammatory mediators and an increase in anti-inflammatory mediators [15].

In the evaluation of clinical attachment loss, Mongardini et al. [13] found statistically significant differences ($P<0.05$) of 0.9 mm and 0.6 mm in moderate pockets of single-root and multi-root teeth, respectively, favoring the FMD group

compared to MST group. In the deep pockets, the differences were 0.5 mm and 0.25 mm for single-root and multi-root teeth, respectively, also favoring the FMD group. Moreira and Feres-filhos [14] found a difference of 0.1 mm for teeth with moderate pockets favoring the FMD group and a difference of 0.4 mm for teeth with deep pockets favoring the control group, but these differences did not achieve statistical significance.

Quirynen et al. analyzed samples from the tongue, mucosa, saliva and the four deepest proximal sites of single-root and multi-root teeth using dark field microscopy and cultures in anerobiosis (colony-forming units/ ml), but did not find significant differences between the test and control groups [16].

De Soete et al. [17] analyzed four proximal sites of single-root and multi-root teeth using Checkerboard DNA-DNA hybridization and found a slightly greater reduction in microorganisms of the red and orange complexes, especially in single-root teeth, as well as lower frequencies of P. gingivalis, T. forsythia and A. actinomycetemcomitans in the test group.

Léo G. Soares et.al, 2014 performed halimeter testing at 30, 60, and 90 days showed a better result in patients receiving full-mouth treatment than in those receiving conventional treatment. No difference was seen on organoleptic testing. Another study from the same group, found a significant reduction in VSC and tongue coating among patients with moderate periodontitis who received full-mouth therapy, as was noted in the present study. He also showed that full-mouth treatment, with or without antiseptics, had no significant clinical benefit for patients with chronic periodontitis [18].

In their study, Léo Guimarães Soares et. al [18], the results of different treatments at the end of 90 days of treatment showed that there was no statistical difference between the groups of non-surgical periodontal therapy: full-mouth and conventional therapy. Thus, the clinical results obtained with the non-surgical treatment alone showed efficacy in reducing PPD and RAL, consistent with the results of some studies 7, 14 which confirmed the success of the therapy in periodontal disease control.

CONCLUSION

one-stage full mouth disinfection protocol can be a treatment option to chronic periodontitis subjects. In addition, it is demonstrated that the adjunctive daily use of an antimicrobial agent to mechanical plaque control could result in a retarded subgingival recolonization by periodontal pathogens in examined population.

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