



Comparison Of Full-Mouth Scaling and Quadrant-Wise Scaling in the Treatment of Adult Chronic Periodontitis

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In the search for the ideal treatment of periodontal disease various non-surgical techniques should be considered. The objective of this study was to evaluate the efficacy of full-mouth scaling (FMS) by clinical and microbiological parameters. 670 individuals were evaluated with 230 subjects meeting the selection criteria and were divided into two groups; 115 subjects treated with FMS and 115 treated with weekly sessions of scaling and root planning (SRP). The patient population had a mean age of 51.67 years, with moderate chronic periodontitis. Subjects were evaluated prior to treatment (T1) and 90 days after execution of therapy (T2), with regards to: probing depth (PD), clinical attachment level (CAL), plaque index (PI), gingival index (GI), and microbial detection for the presence of *Porphyromonas gingivalis* (*P.g.*) and *Prevotella intermedia* (*P.i.*) by culture method and confirmed by biochemical tests. Subjects treated in the FMS group also rinsed with 0.12% chlorhexidine mouthwash for seven days following treatment. The results were analyzed using statistical Student's t-test and chi-square test. No statistically significant differences were observed for PD and CAL between T1 and T2 in both groups. For GI and PI significant difference was observed between the groups. For the evaluated microbial parameters was observed reduction of *P.g.* and *P.i.*, but only for *P.g.* with a significant reduction in both groups. The full mouth scaling technique with the methodology used in this study provided improved clinical conditions and reduction of *P.g.* in subjects with moderate periodontitis, optimizing the time spent in the therapeutic execution.

Introduction

Periodontal disease is a multifactorial infection caused by specific anaerobic gram-negative microorganisms which can lead to destruction of the supporting tissues of the teeth. Two factors contribute decisively to the pathogenesis of the disease, the first is the presence of microorganisms which will cause damage to the periodontal tissues by producing toxic products. The second is the host response to pathogens, which typically results in the release of inflammatory mediators (cytokines, interleukins, metalloproteinase) involved in disease progression and tissue destruction. Conventional therapy for treating individuals with chronic periodontitis are based on mechanical removal of bacterial deposits, located supra and subgingivally, removal of retention factors and oral hygiene instruction (1,2).

Non-surgical periodontal treatment is routinely performed by quadrants in weekly sessions with prolonged use of 0.12% chlorhexidine mouthwash recommended for two months (1). An alternative to this technique is to perform full-mouth scaling (FMS) in one or two sessions within a 24-h period. The advantages of performing FMS over a more conventional staged approach is that it allows for the faster reduction and possible elimination

of pathogenic bacteria potentially reducing the risk of re-infection of previously treated sites. In addition, FMS requires fewer visits which supports patient compliance and ease of patient scheduling (3,4).

Regardless of whether ultrasonic or manual techniques are used to carry out the FMS and quadrant-wise scaling and root planning (SRP), both treatment modalities showed clinical improvement, with no significant difference between them (5-8). Several studies (9,10) comparing mouth disinfection with chlorhexidine following quadrant scaling, showed no significant differences in periodontal indices between groups.

Chlorhexidine is an effective oral antiseptic agent, that has proven antimicrobial effect and when used in a rational way can be an important tool in controlling periodontal disease (11). Prolonged use of chlorhexidine may cause numerous side effects, such as the presence of stains on tooth surfaces and change in taste (12), mucosal irritation, and burning sensations in the mucosa (13). The effect of spot natural teeth and restorations should be expected in a few days of use.

The purpose of this study was to evaluate whether the modified total disinfection therapy, followed by

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chlorhexidine base to 0.12% for a week, provides clinical and microbial benefits can thus be incorporated the clinical practice in cases where prolonged use of chlorhexidine cause undesirable effects to patients, and the results obtained in the FMS technique can be equal or superior to the conventional technique by quadrant (SRP), for the purpose of its application in the public health system, optimizing the time of treatment of individuals.

Material and Methods

This longitudinal, randomized, parallel group study was approved by the Research Ethics Committee of the Universidade Metropolitana de Santos, and all subjects signed a free and informed consent agreeing to participate.

A total of 670 individuals previously examined with 230 individuals (92 men and 138 women, aged 41 to 60 years; mean age: 51 years) diagnosed with moderate chronic periodontitis (14) were included. The subjects examined were those who sought periodontal care in the Metropolitan University of Santos, Santos, SP, Brazil, between 2010 and 2014. Of the 230 subjects included all were systemically healthy, had not undergone dental treatment 12 months at baseline and denied use of antibiotic medication in the last six months preceding the start of the study. Smokers, pregnant women and those with orthodontic appliances were excluded. Participants underwent a complete periodontal examination during the screening phase to determine periodontal diagnosis, the baseline examination and 3 month follow-up examination after periodontal treatment. Periapical radiographs were taken in the first periodontal examination. In included individuals, clinical periodontal examinations were performed at six points per tooth, using manual periodontal probe, and observed the probing depth index (PD), clinical attachment level (CAL). For Plaque Index (PI) and gingival index (GI) (15), dichotomous evaluation was performed on the faces: buccal, mesial, distal and lingual/palatal. The periodontal sites with greater probing depths were selected to collect microbial samples. Sterile paper points were inserted into the gingival sulcus, in places with greater depth probing of each individual and maintained for 15 s. Soon after the paper points were transferred to micro tubes containing 2.0 mL of pre-reduced Ringer's solution and were immediately processed. The micro tubes with paper points were homogenized in a shaker for 60 s. The contents of each micro tube was serially diluted in PBS buffer (10 to 10 000 times) and 0.1 mL of each dilution was plated in duplicate onto Petri plates containing Brucella blood agar culture medium supplemented with menadione 1 µg/mL hemin and 5 µg/mL (BD, Franklin Lakes, NJ, USA); a culture medium for isolation and cultivation of strict anaerobes from clinical specimens. The plates

were incubated in jars containing 90% N₂ and 10% CO₂ for ten days at 37 °C. After this period, the colonies were characterized according to morphology, pigmentation and Gram stain. The colonies with the morphologic characteristics similar to colonies of *P. gingivalis* and *P. intermedia*, pigmented black and Gram negative bacteria were collected and evaluated by means of a kit consisting of biochemical tests for the identification of anaerobic species, commercial kit RAPID-32 (BioMérieux, Marcy-l'Étoile, France). The readings of the tests were carried out with the help of software Miniapi (BioMérieux). From the results of biochemical tests, it was possible to identify the microorganisms and confirm the presence or absence of *P. gingivalis* and *P. intermedia* samples in the gingival sulcus.

Subjects were then randomly divided into two groups, 115 individuals were treated with FMS technique, and the other 115 individuals treated in a total of 4 weekly sessions performed root coronal scraping (SRP). Those treated by FMS followed the two sessions protocol with an interval less than 24 h between the sessions. At the beginning of each session, oral hygiene instructions were given to each individual demonstrating to patients the correct way of brushing and flossing. Following infiltrative anesthesia, scaling was accomplished with cures type McCall 13/14, 17/18 McCall, Gracey 5/6 (16). Each subject received seven individual doses of 0.12% chlorhexidine mouthwash base, to be used in seven consecutive days after execution of the first session of the proposed therapy, being guided to use after the last evening brushing and abstaining from eating and drinking for 30 min to allow for maximum effectiveness of the chlorhexidine (17). Individuals treated by weekly sessions received oral hygiene instructions only at the initial consultation and in the last session. They were treated with the same techniques and materials described in FMS technique except that chlorhexidine was administered to this group. After two months new clinical data was collected and subgingival sampling were performed, as well as oral hygiene instruction.

Results

Of the 670 individuals evaluated, 440 were excluded due to the adopted inclusion criteria. 230 assessed subjects (92 men and 138 women) diagnosed with mild periodontitis showed clinical improvement in all evaluated periodontal parameters (PPD, CAL, PI, GI) in response to the two evaluate therapeutic modalities, FMS and SRP. However a statistically significant difference was discovered when evaluating GI and PI when compared over time by the Student's t-test and Mann-Whitney test for evidence (Tables 1 and 2). When the presence of *P. gingivalis* and *P. intermedia* were compared using the chi-square test

the FMS technique observed a prevalence of 36.8% for *P. gingivalis* and 26.3% for *P. intermedia* at time point T1. When re-evaluated after 90 days post therapy an observed reduction in the presence of *P. gingivalis* (15.8%) and *P. intermedia* (13.1%) was seen. Only the reduction of *P. gingivalis* resulted in a significant difference ($p < 0.05$) (Table 3). In the quadrant-wise SRP technique, we observed a non statistically significant reduction in the prevalence of *P. gingivalis* T1 was 35.2% and *P. intermedia* 23.5%, at T2 observed prevalence was 18.3% for *P. gingivalis* and 16.7% for *P. intermedia* (Table 4).

Discussion

The total mouth disinfection treatment (full mouth disinfection) was introduced to clinical periodontal practice in order to improve the results obtained by scaling and root planing in individuals with chronic periodontitis, enabling a reduction in probing depth values and a gain in clinical attachment values (3). Several studies were performed (2,5,18-21) in an attempt to assess the results of the application of this therapy, but the comparison between studies is difficult due to the variety of methodologies used in research, such as: homogeneity of the allocated groups, inclusion criteria and adopted exclusion, periodontal disease classification mode, changes in treatment, use and dosage of chlorhexidine. Examples of the diversity of research on the technique of full mouth disinfection.

The main objective of this study was to evaluate the efficacy of full mouth disinfection therapy in the treatment of patients with moderate chronic periodontitis (14) evaluating periodontal indices and the prevalence of two commonly associated microorganisms, *P. gingivalis* and *P. intermedia*. One hundred and fifteen individuals were

evaluated following FMD protocol for scaling and root planning performed on two consecutive days within 24 h, using seven days of mouthwash with chlorhexidine base 0.12%. Several were the methodologies regarding the use of rinses in every mouth disinfection therapy. Were evaluated individuals using rinses: chlorhexidine for two months (1,3,4), chlorhexidine for 2 weeks, mouthrinse with essential oils (2), without the use of any substance (19) and support antibiotics with associated (11,22). Because of the unique characteristics of chlorhexidine 0.12%, and respecting the limits on the use of the substance chose the use of protocol for seven days, and the results show similarities with other studies (1,4) when the use of chlorhexidine for two months.

When assessing the periodontal status of individuals, pretreatment evaluations revealed a 3.49 mm PD, after 90 days following the adopted therapy a non statistically significant (3.3 mm) was noted. In addition to CAL, these results are in similar to other studies (18,19,21), this absence of statistical difference could be due to the included study individuals being in the early stages of periodontal disease, with CAL and similar PD values in both groups. For GI and PI a statistical difference was observed this is attributed to successful oral hygiene instruction which reinforced and corrected previously taught techniques.

Microorganisms evaluated in this study have been shown to be present in chronic periodontal disease. The presence of *P. gingivalis* in subjects with severe disease is also high in individuals without periodontal disease, *P. intermedia* has also been observed in subjects with gingivitis (23) and can be regarded as the primary pathogen in the development

Table 1. Description of the population evaluated

	Sex	Age (media)	FMS	SRP
Female	138	48.12	63	75
Male	92	55.23	52	40
Total	230	51.67	115	115

FMS: Full-mouth scaling. SRP: scaling and root planning.

Table 3. Periodontal parameters in scaling and root planning (SRP)

	T1	T2	T1 - T2	p value
PD (mm)	3.54 ± 0.47	3.42 ± 0.48	0.12 ± 0.01	0.668
CAL (mm)	3.98 ± 0.59	3.85 ± 0.55	0.13 ± 0.04	0.708
GI (%)	29 ± 17	16 ± 13	13 ± 4	0.046*
PI (%)	27 ± 20	20 ± 17	7 ± 3	0.016*

*Statistically significant difference.

Table 2. Periodontal parameters in full-mouth scaling (FMS)

	T1	T2	T1 - T2	p value
PD (mm)	3.49 ± 0.52	3.30 ± 0.49	0.19 ± 0.03	0.653
CAL (mm)	3.95 ± 0.67	3.90 ± 0.64	0.05 ± 0.03	0.897
GI (%)	32 ± 19	11 ± 9	21 ± 10	0.045*
PI (%)	25 ± 20	15 ± 13	10 ± 7	0.028*

*Statistically significant difference. PD: probing depth index; CAL: clinical attachment level; GI: gingival index; PI: plaque index.

Table 4. Presence of *P. gingivalis* and *P. intermedia* in full-mouth scaling (FMS) and scaling and root planning (SRP)

	T1	T2	p value
<i>P. gingivalis</i> FMS	36.8%	15.8%	0.037*
<i>P. intermedia</i> FMS	26.3%	13.1%	0.149
<i>P. gingivalis</i> SRP	35.8%	18.3%	0.715
<i>P. intermedia</i> SRP	23.5%	16.7%	0.695

*Statistically significant difference.

of periodontal disease (24). This study demonstrated a reduction of *P.i.* and *P.g.* following treatment between time periods T1 and T2, which is in agreement with previous findings (1,18,20,25). IG demonstrated no statistical reduction following treatment. The collection method used was the insert 4 to 6 paper cones sterilized in the gingival sulcus of the deepest sites, as in previous studies (4,20), providing results for the individual and not to periodontal sites which would be more appropriate, and allow more effective control, however much more expensive.

The main characteristics of individuals allocated for our study were the presence of periodontal disease early, and individuals who already were aware of oral hygiene, which facilitated the implementation of the full mouth disinfection therapy. Individuals treated expressed satisfaction with the rapid implementation of therapy and pain symptoms after treatment short or non-existent, without the use of painkillers providing appropriate and effective care in a short time. The FMD protocol for scaling and root planning and conventional treatment with weekly sessions of scaling and root planning applied in this study provided clinical improvement in conditions and reducing two major periodontal pathogens of individuals with moderate chronic periodontitis.

Resumo

Na busca do tratamento ideal da doença periodontal variadas são técnicas não-cirúrgicas que podem ser consideradas. O objetivo deste estudo foi avaliar a eficácia da técnica de desinfecção total de boca (FMD, na sigla em Inglês) por parâmetros clínicos e microbiológicos. Foram avaliados 670 indivíduos com 230 indivíduos atendendo aos critérios de seleção e divididos em dois grupos; 115 indivíduos tratados com FMD e 115 tratados com sessões semanais de raspagem e alisamento corono radicular (SRP, na sigla em Inglês). A população avaliada tinha idade média de 51,67 anos, com periodontite crônica moderada. Os sujeitos foram avaliados antes do tratamento (T1) e 90 dias após a execução da terapia (T2), quanto à profundidade de sondagem (PS), nível de inserção clínica (NIC), índice de placa (IP), índice gengival (IG) e detecção microbiana da presença de *Porphyromonas gingivalis* (*P.g.*) e *Prevotella intermedia* (*P.i.*) por método de cultura e confirmada por testes bioquímicos. Os indivíduos tratados no grupo FMD também realizaram bochechos com clorexidina 0,12% durante sete dias após o tratamento. Os resultados foram analisados utilizando o teste estatístico t de Student e o teste de qui-quadrado. Não foram observadas diferenças estatisticamente significativas para PS e NIC entre T1 e T2 em ambos os grupos. Para IG e IP observou-se diferença significativa entre os grupos. Para os parâmetros microbianos avaliados foi observada redução de *P.g.* e *P.i.*, mas apenas para *P.g.* com uma redução significativa em ambos os grupos. A técnica FMD com a metodologia utilizada neste estudo proporcionou condições clínicas melhoradas e redução da *P.g.* Em indivíduos com periodontite moderada, otimizando o tempo gasto na execução terapêutica.

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