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Original Article

Clinical and Metabolic Effects of two Periodontal Therapeutic Modalities in Diabetic Patients with Residual Pockets

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Abstract

Objective: To evaluate the metabolic control and compare the clinical effects between non-surgical and surgical therapies on periodontal treatment of residual pockets of type 2 diabetic patients. **Material and Methods:** 352 periodontal sites in 16 type 2 diabetic subjects with residual pockets of similar depths were randomly selected, whose contralateral quadrants were divided into G1 and G2 undergoing surgical and non-surgical therapy, respectively, and evaluated 3 and 6 months after the first intervention. The data were analyzed by Statistical Package of Social Science (SPSS) version 20.0, using descriptive and inferential statistical methods. Fisher's exact test was used to verify differences between means obtained in the clinical parameters between G1 and G2. The significance level adopted was 5%. **Results:** The mean Hb1Ac values of patients were significantly reduced and the mean PD and CIL values were reduced in G1 with no significant difference when compared to G2. **Conclusion:** Periodontal treatment was effective in metabolic control of type 2 diabetic patients and that both therapies, surgical and non-surgical, behaved similarly when compared.

Keywords: Type 2 Diabetes Mellitus; Periodontal Diseases; Dental Scaling; Root Planing.

Introduction

Diabetes mellitus is a quite prevalent disease in the world population, presenting periodontitis as main oral complication [1,2], where epidemiological studies have demonstrated a positive correlation between periodontal disease and poor glycemic control in type 2 diabetic patients [3,4].

Evidence suggests that there is a cyclic and bidirectional association between periodontal disease and diabetes mellitus where the presence of one of these conditions may influence the aggravation of the other [1,2,5-9]. The mechanism by which this event occurs is not yet fully understood in literature, but it is suggested that the presence of a chronic infection, such as periodontitis, induces an increase in inflammatory mediators that may alter insulin activity causing resistance to its action in the body with consequent losses to glycemic control [8-10].

To prevent the recurrence and progression of periodontal disease and improve metabolic control after therapy, periodontal support therapy should be performed at regular intervals [11] consisting, as in the initial therapy, of the removal of microbial deposits from the dental surface and contaminated cement. Thus, there is a decrease in the production of inflammatory mediators, promoting a reduction of bleeding to periodontal probing and of the depth measurements to probing inside the pocket, and a gain in the clinical levels of periodontal insertion [12-15].

Non-surgical periodontal therapy is able to reduce the amount of viable periodontopathogens by restoring the local microbiota compatible with periodontal health in diabetic and non-diabetic patients [16-19].

Since the 1960s, studies have been conducted with the aim of demonstrating the possible benefits of periodontal therapy in the glycemic control of diabetic patients [20], where surgical and non-surgical periodontal therapies may be able to reduce the systemic inflammatory gradient, thus favoring glycemic control although this fact is not yet a consensus in literature due to the lack of more homogenous and well delineated studies [5,7,12,21-23].

Some trials have evaluated the clinical success of periodontal therapy in diabetic patients in a single session (full-mouth disinfection) or in distinct sessions with or without the use of antibiotic therapy [12,13]. However, few studies have emphasized periodontal surgical therapy as an alternative for the treatment of residual pockets in these patients.

The aim of this prospective study was to compare periodontal clinical effects between non-surgical and surgical therapies in the treatment of residual pockets in type 2 diabetic patients, also evaluating the effect of these therapies on the metabolic control of these patients.

Material and Methods

A period of 6 months (0-3-6) in the periodontal response of type 2 diabetic patients was determined for the evaluation of the metabolic effect and comparison of the clinical efficacy of periodontal surgery and conventional scaling in the same individual.

Sample and Inclusion and Exclusion Criteria

In an initial phase, 16 subjects, who completed conventional periodontal treatment (dental scaling and root planning - SRP) among 39 initially selected in a randomized, double-blind, controlled clinical trial, participated in the present study undergoing periodontal surgical treatment in one quadrant and conventional (non-surgical) treatment in the contralateral quadrant.

To be included in the study, participants should be diagnosed with type 2 diabetes mellitus [1], have clinically and radiographically diagnosed chronic periodontitis. In addition, they had to be ≥ 35 years old, have at least 15 teeth present; glycosylated hemoglobin (Hb1Ac) ≥ 6.5%, have participated in the previous study (periodontal treatment), present contralateral residual pockets and agreed to participate in the study. Participants were excluded if they had received periodontal treatment, except for the previous study; as well as those in use of antibiotics in the last 6 months, pregnant or lactating women, those who have made chronic use of anti-inflammatory drugs, presented a systemic condition that could interfere with the course of periodontal disease (diseases associated with the immune response) and smokers.

Treatment Phases

Initial Phase

All volunteers participated in an initial interview to verify the inclusion and exclusion criteria adopted. The included participants were periodontally evaluated by a previously trained and calibrated examiner, where the clinical parameters evaluated were measured and recorded using a periodontal probe from the University of North Carolina (UNC, Hu-Friedy, Chicago, IL, USA). Probing depth (PD), bleeding on probing (BoP), gingival recession (GR), clinical insertion level (CIL) and visible plaque index (PI) data were recorded [25]. Data on glycemic control (fasting glycemia and Hb1Ac) of patients whose tests were performed at the Laboratory of the General Hospital of UFPE were also recorded.

Treatment Groups and Treatments Performed

After the plaque control phase, the periodontal treatment phase started according to each group:

• Test group (G1) - Periodontal surgeries were performed at residual sites in the upper right quadrant, chosen by simple draw at month 0. The surgery of choice was total thickness flap for root decontamination using saline solution as irrigating substance. For the performance of the surgical technique, the following were used: scalpel handle, 15c slide, Molt descaler (Trinity®), Gracey manual periodontal curettes 7-8,11-12,13-14 (Trinity®), needle holder and scissors. The operated area was sutured and protected with periodontal surgical cement (PerioBond). The contralateral quadrant received conventional periodontal treatment (SRP).

• Control group (G2) - Under local anesthesia, the residual sites of the quadrant contralateral to G1 received conventional periodontal treatment (SRP) with subgingival irrigation with saline

solution at month 0. For this treatment, Gracey manual periodontal curettes 7-8,11-12,13-14 (Trinity®) were used.

Secondary Phase

In the 3 and 6-month follow-up period, all patients received only guideline and oral hygiene kit and were reassessed by the same examiner for periodontal and glycemic parameters. Laboratory tests were requested in periods 0, 3 and 6 months and were performed at the Laboratory of the General Hospital of UFPE.

Statistical Analysis

The data obtained were analyzed by Statistical Package of Social Science (SPSS) version 20.0, using descriptive and inferential statistical methods. The normal distribution of data was tested to verify the adequacy of the statistical test (parametric or non-parametric) through the Shapiro-Wilk test. The mean values of intragroup differences (G1-G2) in the 0-3-6 periods of the clinical and metabolic parameters studied were verified using the Friedman test. Fisher's exact test was used to verify differences between means obtained in the clinical parameters between G1 and G2. The significance level adopted was 5%.

Ethical Aspects

This study was approved by the Research Ethics Committee (CEP) of the Center for Health Sciences, Federal University of Pernambuco, under protocol No. 057993/2012. All subjects were volunteers, and after explaining the research objectives, they signed the Free and Informed Consent Form, according to resolution 466/12 of the National Health Council.

Results

A total of 352 sites in 16 quadrants and 341 sites in 16 quadrants were evaluated, which underwent surgical and non-surgical therapy, respectively. Table 1 shows the results regarding the participants' metabolic indexes. The mean fasting glycemia and Hb1Ac values presented a reduction in times 0-3 and 0-6 with a statistically significant difference ($p < 0.05$).

Table 1. Glycemic and lipid exams of groups 1 and 2 according to the evaluation period (month 0, 3 and 6).

Variable	Evaluation Periods	G1 mean ± SD	p-value*
Fasting glycemia (mg/dl)	Month 0	164.0 ± 46.6*	0.04§
	Month 3	143.8± 36.2*	
	Month 6	145.3 ± 46.6*	
Hb1Ac (%)	Month 0	15.8 ± 3.4*	0.04§
	Month 3	6.6± 1.2*	
	Month 6	6.5 ± 1.0*	

*P value for intragroup analysis of months 0, 3 and 6 by Friedman's test. § statistically significant ($p < 0.05$).

As for the periodontal clinical parameters, there was a trend towards a reduction of PI% in the three times studied in both groups, but without statistical significance (p> 0.05) when groups were evaluated alone or when compared to each other (Table 2). When analyzed separately, PD and CIL presented reductions in times (0-3) and (0-6) with statistically significant results (p <0.05) in both groups without, however, significant differences when compared to the evaluated therapies (Table 2). Regarding BoP, there was a greater tendency to reduce this clinical index in the surgical group at times (0-3) and (0-6) without statistically significant difference (p> 0.05). However, a significant reduction (p <0.05) was observed between groups when only the sixth month was evaluated (Table 2).

Table 2. Means and percentages of clinical and metabolic parameters in periodontally treated quadrants.

Glycated Hemoglobin (N=16)			
T_0= 15.800[a]	T_3=6.694[a]	T_6=6.516[a]	
Clinical data of treated quadrants (n=16)			
Surgical Therapy (G1)		**Conventional Therapy (SRP) (G2)**	
$PI\%_0$	90.56	$PI\%_0$	87.31
$PI\%_3$	75.50	$PI\%_3$	71.10
$PI\%_6$	69.44	$PI\%_6$	68.94
PD_0	3.704 [a]	PD_0	2.568
PD_3	2.896 [a]	PD_3	2.500
PD_6	2.995 [a]	PD_6	2.443
CIL_0	3.842 [a]	CIL_0	2.692
CIL_3	3.397 [a]	CIL_3	3.564
CIL_6	3.346 [a]	CIL_6	2.631
BoP_0	50.00	BoP_0	75.00
BoP_03	33.3	BoP_03	31.3
BoP_6	28.6 [b]	BoP_6	**71.4** [b]

Different overwritten letters mean statistically significant values (p ≤ 0.05). a: Friedman Test; b: Fisher's Exact Test.

Discussion

Studies have shown the existence of a bidirectional association between periodontal disease and diabetes mellitus [1,2,6,7,9]. In this context, it is suggested that the reduction of periodontal inflammation, from the implementation of periodontal treatment programs, can lead to improvements in the metabolic control of diabetic patients [5,7,12].

Meta-analysis reviews and intervention studies [5,7,21,22,25,26] have shown a clinical and metabolic improvement in diabetic patients when evaluating the effects of conventional non-surgical periodontal therapy on the glycemic control of diabetic patients with periodontitis, although this fact is not yet a consensus in literature.

Although literature has shown that surgical intervention in periodontal sites with disease recurrence as a method of choice for reintervention at these sites, clinical studies with appropriate methodology evaluating surgical therapy in diabetic patients are still scarce. This fact may hinder the elaboration of an initial protocol for the treatment of these patients, and further studies with such objective should be conducted. Thus, the aim of this study was to evaluate the clinical and metabolic effect of surgical and non-surgical periodontal therapies in diabetic patients with periodontitis where metabolic and clinical improvements were demonstrated when periodontal therapy was performed.

Although another study [13] has reported significant clinical improvements without benefits in glycemic control in type 2 diabetics when performing periodontal therapy, our findings revealed significant clinical and metabolic improvements when using conventional and surgical periodontal therapies.

Evaluating Hb1Ac data in this study, a significant improvement was observed in this index, corroborating findings of the aforementioned authors [5,7,21,22,25,26]. Our results showed a mean reduction in Hb1Ac over time (0-3) and a tendency to decrease in the following quarter, similar to findings obtained from a systematic review [20], where similar results were demonstrated. Differently, other reports [13,27] found no metabolic benefits when using non-surgical periodontal therapy.

Some authors reported that surgical or conventional periodontal re-instrumentations are effective for the reduction of PD and CIL in non-diabetic patients [21,28]. In a randomized clinical trial [12], it was demonstrated that both therapies were effective in reducing these periodontal parameters in type 2 diabetic patients.

The process of periodontal repair involves the formation of a long junctional epithelium that can be obtained more quickly from open-field instrumentation (flap surgery for decontamination), favoring gains of periodontal clinical insertion as a consequence of the reduction of inflammatory mediators and microbial toxins. This repair process in diabetic patients is fundamental due to the reduced risk of systemic infection to which these patients are exposed. Thus, clinical trials with appropriate methodology and well-delimited samples are necessary in the elaboration of the therapeutic approach aimed at the diabetic patient in a clinical setting.

The present study evaluated and compared the efficacy of surgical and non-surgical periodontal therapies in the treatment of residual pockets in type 2 diabetic patients, demonstrating a favorable clinical response in the three studied times of surgical therapy in reducing periodontal clinical parameters. Considering the study limitations, our data are similar to other studies [12] performed with similar methodology, but with the use of a systemic antibiotic, where improvements in clinical parameters were observed in the group where periodontal surgery was performed at times (0- 3) and (0-6), although both therapies behaved similarly when compared to each other.

Such findings differ from the indication that periodontal surgical therapy could offer more satisfactory results in the reduction of PD and CIL when compared to non-surgical therapy [22,29,30]. It is noteworthy that in the results of the present study, both techniques were performed in the same patient in order to control possible individual effects such as glycemic status, diet, lifestyle changes, which could interfere in the final results. It should also be noted that better clinical gains are observed in sites with deep pockets. Thus, the most satisfactory results verified in the surgical group can be attributed to this fact.

PI and BoP were also evaluated in this study due to their clinical importance in the course of periodontal disease. BoP, associated with other clinical parameters, reflects the need for a new therapeutic intervention because it presents a greater probability of loss of periodontal insertion. The

results of this research are not in line with other findings [12], which demonstrated a significant improvement in BoP in months 3 and 6 when compared to surgical and non-surgical therapies, contrary to our results, where a significant clinical improvement between groups was observed only in month 6.

BoP presented a tendency to reduce in the group submitted to surgical therapy, and it may be suggested that surgical therapy is effective in reducing periodontal inflammation since this index reflects the presence of a disease activity. However, it is noteworthy that during the study period, all patients received oral hygiene guidance as well as devices for performing oral hygiene at home which may have contributed to the clinical improvement in the parameters related to gingival inflammation as observed in this study regarding PI, where test and control groups showed a tendency to reduce their values.

Conclusion

Periodontal therapy was effective in the metabolic control of type 2 diabetic patients and that both surgical and non-surgical therapies behaved in a similar way when compared with each other, but with a greater efficacy of surgical therapy in reducing the clinical parameters studied.

Acknowledgments

The authors declare that there is no conflict of interest in this research. The present research was contemplated by announcement MCT / CNPq No. 014/2010 - Universal.

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