



REAL TIME PCR IDENTIFICATION FOR TARGET ADJUNCTIVE ANTIBIOTIC THERAPY OF SEVERE CHRONIC PERIODONTITIS. PART I - CLINICAL RESULTS

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ABSTRACT:

INTRODUCTION: The periodontal pathology is of great social importance due to the vast distribution in the human population. The adjunctive antibiotic administration could improve the healing in such cases but the latest data of the continually growing antibiotic resistance requires more precise approaches of antibiotic selection. The contemporary molecular diagnostic methods could offer the required precision for the microbiological identification in order to achieve better control of the periodontitis.

OBJECTIVE: The aim of this study is to compare the microbiological effectiveness of adjunctive antibiotic administration with the mechanical periodontal therapy.

METHODS: 30 patients with severe chronic periodontitis were enrolled in this study and were divided in 3 groups:

Control group – with mechanical debridement only.

Test group 1 – with combined adjunctive antibiotic administration using Amoxicillin+ Metronidazole.

Test group 2 – with target antibiotic administration according to the results from the Real Time PCR identification.

RESULTS: A considerable improvement of the periodontal status was reported in all treatment groups. The most positive results were in the group with target antibiotic administration were all tested clinical parameters showed the best improvement with statistically significant changes in sites with PD<3mm, PD 5-7mm, PD>7mm and CAL>5mm.

CONCLUSION: The adjunctive antibiotic administration demonstrates better clinical effectiveness concerning the reduction of the severely affected sites in cases with severe generalized chronic periodontitis compared to the mechanical therapy alone. From all examined groups the target approach has statistically significant better results. These results suggest that this approach is recommended in cases with high prevalence of deep pockets.

Key words: severe chronic periodontitis, adjunctive antibiotic therapy, periodontal pockets reduction, clinical attachment gain.

INTRODUCTION:

The periodontal pathology is of great social importance due to the vast distribution in the human population. In recent years different anti-infective approaches were suggested to control the periodontal infection. The mechanical debridement is the consensus therapy of the periodontitis [1], but in the severe cases with deep periodontal pockets and furcation involvement this approach doesn't have the needed efficacy. [2, 3]

The adjunctive antibiotic administration could improve the healing in such cases and the data in the literature demonstrates a good effectiveness of the broad-spectrum combination Amoxicillin+Metronidazole. [4, 5]

The latest data of the continually growing antibiotic resistance of the microbiota in the human population requires a more precise approaches of antibiotic selection. The contemporary molecular diagnostic methods with Real Time PCR could offer the required precision for the microbiological identification of the periodontal pathogens in order to achieve better control of the periodontitis.[6]

OBJECTIVE:

The aim of this study is to compare the clinical effectiveness of adjunctive antibiotic administration with the mechanical periodontal therapy. Two protocols of antibiotic administration were tested – combined antibiotic treatment with Amoxicillin + Metronidazole and target antibiotic administration according to the result of the Real Time PCR test – PET Test plus.

METHODS:

1. Patient selection

70 patients were diagnosed and 30 patients were enrolled in this study

Inclusion criteria:

- Age – 18-75 years
- > 20 natural teeth in situ
- clinical and radiographic signs of severe chronic periodontitis(CAL-loss of 5 mm or more at least at 20 sites)
- at least 6 pockets with PPD of 5 mm
- at least 4 pockets with PPD ≥7mm
- no professional periodontal therapy during the 6 months preceding the baseline clinical evaluation

Exclusion criteria:

- have known systemic diseases that may influence the periodontal conditions, in particular Down's syndrome, known AIDS/HIV or diabetes type I or II as determined by assessment of erythrocyte HbA1c levels (more than 6.5%);

- regularly take drugs that may affect the periodontal conditions, e.g. phenytoine, nifedipine, and/or anti-inflammatory drugs;

- require antibiotic treatment for dental appointments;

- are undergoing or require extensive dental or orthodontic treatment;

- are pregnant or breastfeeding;

- have any oral or extra oral piercing in or around the oral cavity with ornaments or accessory jewelry;

- have participated in a clinical dental trial in the six months preceding the study.

- have known allergies against the antibiotics to prescribe.

- take antibiotics in the three months preceding the study.

The patients enrolled in this study were divided in three groups:

- **Control group** - with mechanical debridement only.

- **Test group 1** - with combined adjunctive antibiotic administration using Amoxicillin 500mg + Metronidazole 250mg tid - 7 days

- **Test group 2** - with target antibiotic administration according to the results from the Real Time PCR identification.

2. Anti-infective mechanical therapy - after oral hygiene instructions and achievement of the proper oral hygiene standard all patients received the same amount of full mouth mechanical debridement.

3. Microbiological testing - a Real Time PCR test – PET Test (MIP Pharma) was used in all patients. A pool sample with five sterile paper points from the pockets with PPD ≥ 7 mm were taken on the baseline and on the 8 week reevaluation.

This test provides information for:

A. Total Counts –MO

- Identified periodontal microorganisms –

Ident

- Non-identifies microorganisms – No Ident

B. Quantity and prevalence of red complex:

- Porphyromonas gingivalis (Pg)

- Treponema denticola (Td)

- Tanerella forsythia (Tf)

C. Quantity and prevalence of some pathogens from orange complex:

- Prevotella intermedia (P.i.)

- Peptostreptococcus (Micromonas) micros (Pm)

- Fusobacterium nucleatum (Fn)

D. Quantity and prevalence of some pathogens from orange associated complex:

- Eubacterium nodatum (En)

E. Quantity and prevalence of some pathogens from green complex:

- Capnocytophaga gingivalis (Cg).

F. Quantity and prevalence of Aggregatibacter actinomycetemcomitans (Aa).

The data analysis contained:

1. Initial levels

2. Microbial levels at reevaluation

3. Mean reduction of the microbial levels

4. Relative reduction – represents the relative share of the changes in the microbial levels as a percentage from the initial levels, thus allowing more accurate comparison between the different approaches.

4. Statistical analysis

The acquired data was analyzed with **IBM SPSS Statistics 19.0**. The chosen level of significance was **p<0,05**.

The following methods were applied:

1. Descriptive analysis

2. Analysis of variations

3. Graphical analysis

4. Test c2 Shapiro-Wilk test

5. ANOVA test

6. Kruskal-Wallis test

7. Student T –test

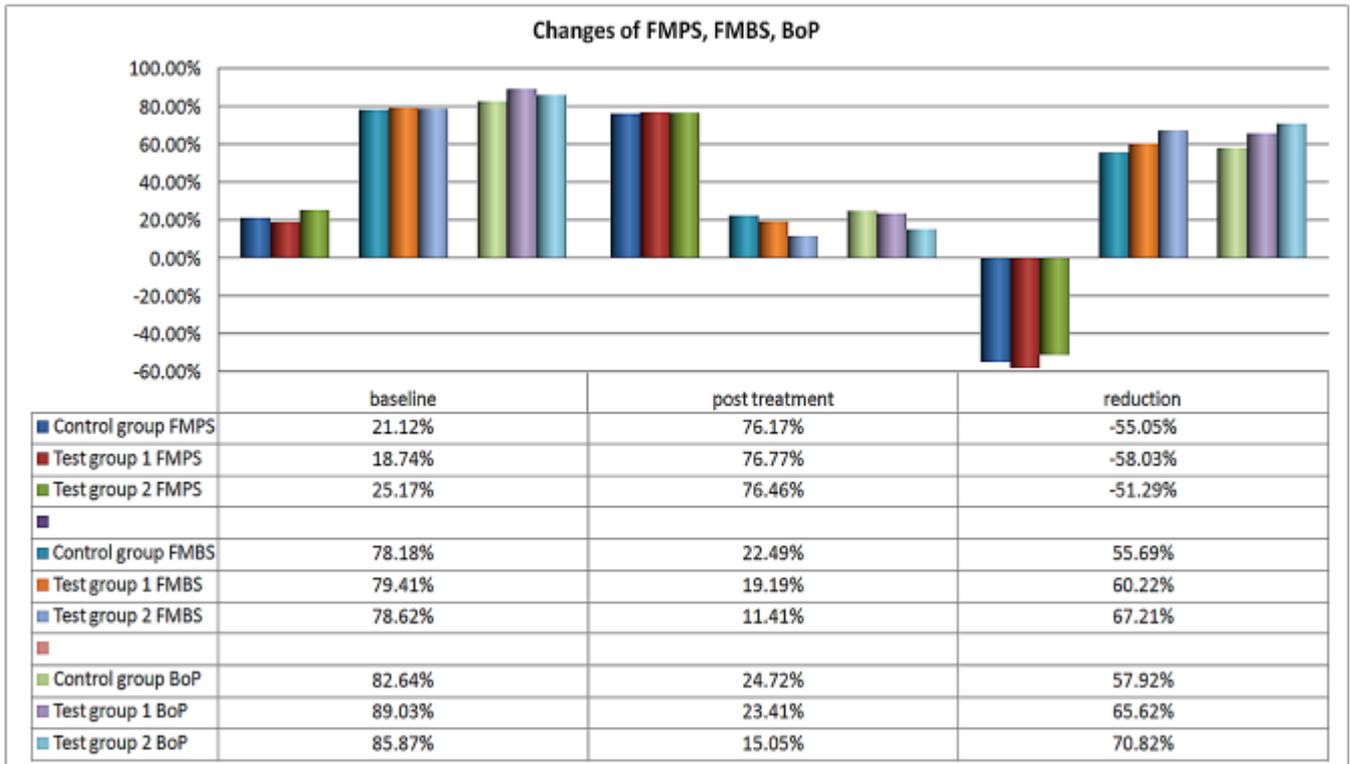
8. Mann-Whitney test

9. Wilcoxon test

RESULTS:

The data concerning FMPS, FMBS and BoP demonstrates a significant reduction of these parameters after the three tested approaches, thus confirming the effectiveness of the anti-infective periodontal therapy. No statistical significance was recorded between groups. These results suggest that the resolving of the gingival inflammation depends primary on the oral hygiene effectiveness of the patient and the meticulous mechanical therapy than the adjunctive antibiotic administration (Fig.1).

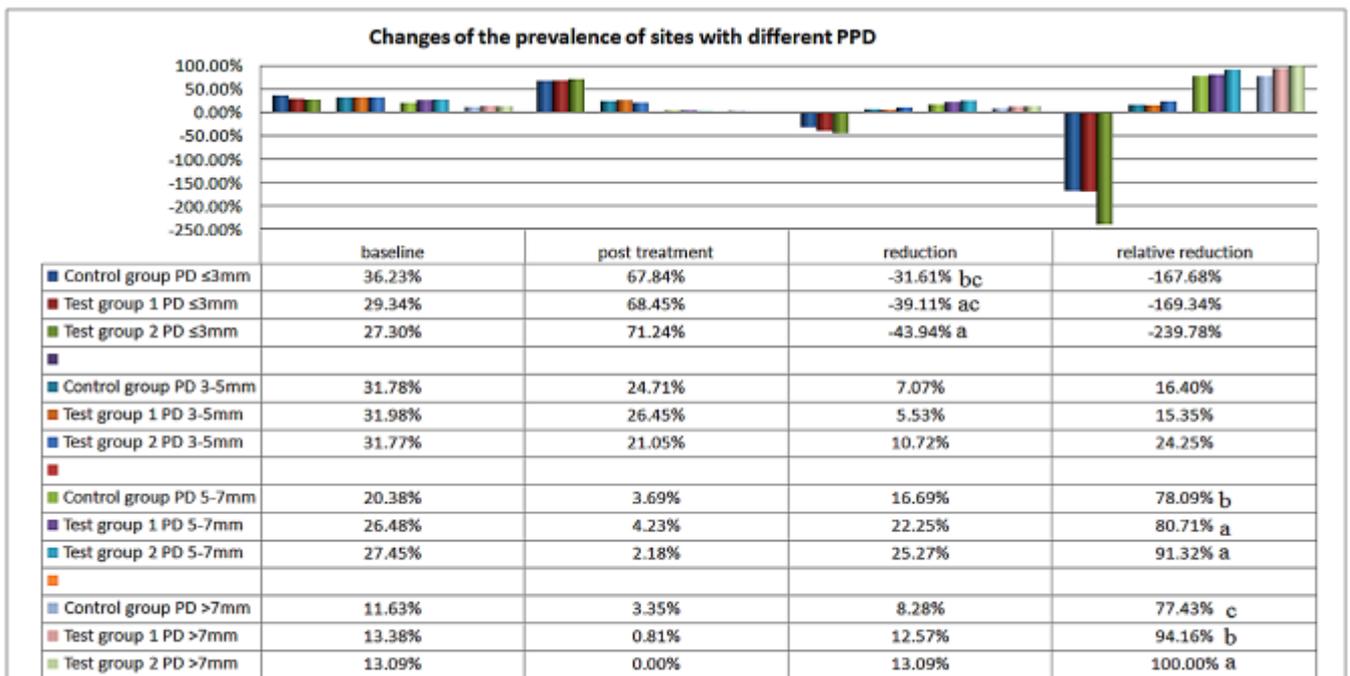
Fig. 1. Changes of the oral hygiene, gingival inflammation and the bleeding on probing.



A considerable improvement of the periodontal status was reported in all treatment groups. The most positive results were in the group with target antibiotic administration where all tested clinical parameters showed the best improvement with statistically significant changes in

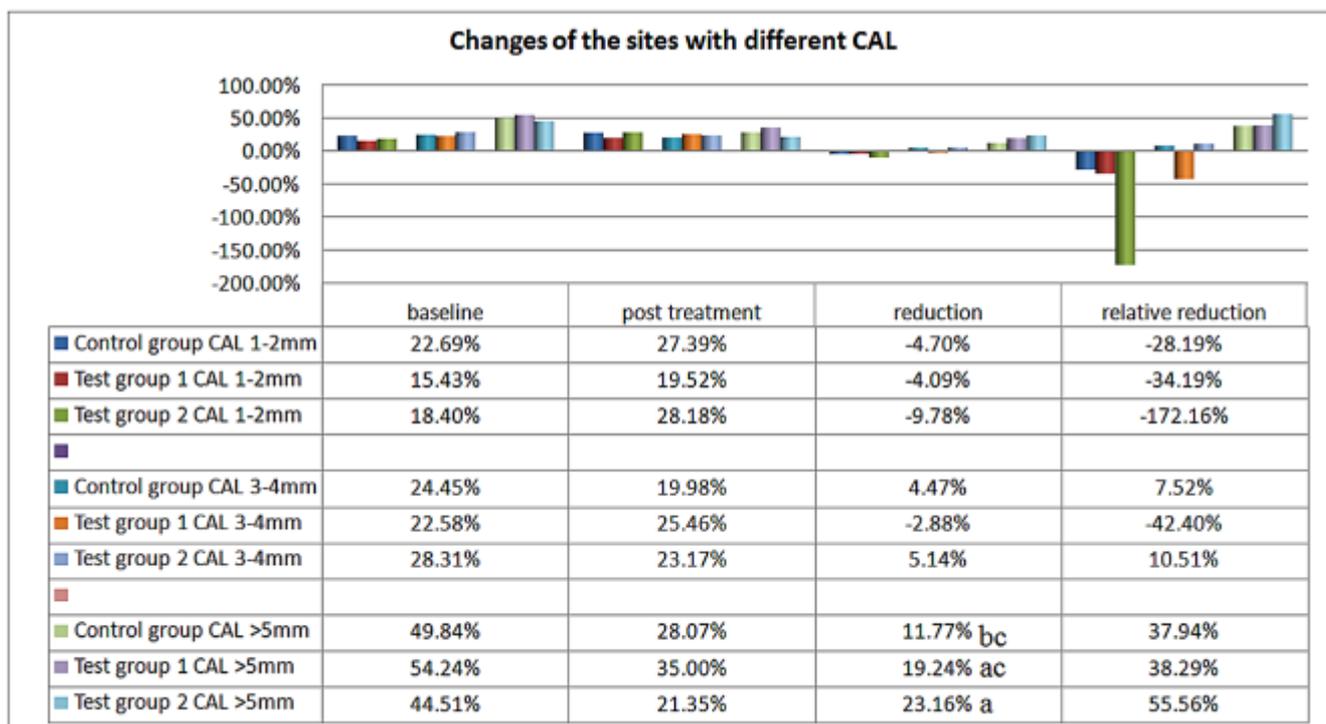
sites with PD<3mm, PD 5-7mm, PD>7mm and CAL>5mm. An elimination of the sites with PD>7mm and a significantly greater reduction of the sites with CAL>5mm were reported in these patients (Fig.2 and Fig.3.).

Fig. 2. Changes of the probing depth after therapy.



- different letters in the rows represent statistically significant difference (p<0,05)

Fig. 3. Changes of the clinical attachment level.



- different letters in the columns represent statistically significant difference (p<0,05)

CONCLUSION:

The adjunctive antibiotic administration as a part of the anti-infective periodontal therapy demonstrates better clinical effectiveness concerning the reduction of the severely affected sites (PD>7mm, CAL>5mm) in cases with severe generalized chronic periodontitis compared to the mechanical therapy alone. The target approach with selec-

tion of the antibiotic agent according to the results of the PCR identification has statistically significant better results in all examined groups. These results suggest that this approach is recommended in cases with high prevalence of deep pockets (PD>7mm) in order to limit the necessity of surgical procedures in these patients.

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