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**STRATEGIES FOR MAINTAINING SEVERE
PERIODONTALLY AFFECTED TEETH**

ABSTRACT

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Introduction

Periodontitis is a non-contagious inflammatory disease and affects 11.2% of the world's population, being the sixth most widespread disease. It is the mainly incriminated condition responsible for the loss of teeth among the adult population, patients with periodontitis being exposed to a continuous risk of developing total edentation, masticatory dysfunction and alteration of facial aesthetics.

The progression of periodontal disease and the sequelae produced by it exert a negative impact on the quality of life, self-esteem, subsequently leading to an increase in the costs of specific care. Also, the most recent studies associate periodontitis with systemic conditions such as: diabetes mellitus, adverse events occurring in pregnancy, cardiovascular diseases, autoimmune diseases, the treatment of periodontitis necessarily involving risk factor control.

In the last half-decade, 3 major advances have taken place in Periodontology, both in clinical practice and in medical research, these making possible a more accurate diagnosis and a targeted and personalized treatment depending on the severity and complexity of periodontal disease. The first progress is represented by the introduction of the New Classification Scheme for Periodontal and Peri-implant Diseases and Conditions (2018) that is based on a multidimensional system of staging and grading. Staging depends on the severity of progression at the time of the initial evaluation as well as on the complexity of the disease management, while grading provides additional information about the biological characteristics of the condition and is based on the retrospective determination of the progression rate as well as on the assessment of the risk of progression and last but not least, on the anticipation of treatment results.

Among the patients with periodontitis described by this New Classification, patients with Stage IV Periodontitis (the most severe stage) who represent a category of patients with special treatment needs are highlighted. They emerge from patients with stage III periodontitis characterized by the presence of deep periodontal lesions extended to the apical third of the root and/or multiple extractions. The complexity of treatment is augmented by increased teeth mobility and by teeth loss squeals (masticatory dysfunction, collapse of the posterior occlusion and dental evasion by dental migrations). A feature of this stage is that in the absence of an adequate control of the disease and in the absence of an adequate prosthetic rehabilitation, there is a risk of total edentation. Most commonly, the therapeutic management of these patients involves the stabilization of mobile teeth and the prosthetic rehabilitation of the

masticatory function, as well as orthodontic treatment, inter-disciplinary treatment being a key factor in achieving therapeutic success.

The need to select the appropriate intervention through a rigorous decision-making process, based on scientific evidence led to the elaboration of the S3 level Clinical Practice Guideline for periodontitis for stage I-III periodontitis (2018) by the experts of the European Federation of Periodontology (EFP). This represents the second significant progress made in Periodontology of the last decade and recommends a step-by-step approach of the periodontal treatment depending on the stage of the disease.

Since stage IV periodontitis overlaps only partially with stage III periodontitis in terms of the characteristics of severity and complexity, anatomical and functional sequelae caused by the multiple teeth loss (>5 teeth) and by clinical attachment loss, require additional interventions. These aspects led to the development and publication in 2022 of the S3 Level Clinical Practice Guideline (CPG) for stage IV periodontitis, which represents the third major advance in Periodontology of the last decade.

The first part (General Part) of this thesis reflects the current state of knowledge and can be summarized in the following paragraphs.

The main objective of supportive therapy (TS) is to maintain periodontal stability (BOP< 10% of sites; PPD ≤ 4mm, negative BOP) by preventing the recurrence of periodontal disease and avoiding further tooth loss.

The changes brought by the International Workshop from 2017 and by the New Classification Scheme of Periodontal Diseases and Peri-implant Conditions led to the post-therapeutic classification of patients with periodontitis in: patients with periodontitis with reduced but healthy periodontium or patients with gingival inflammation. Both categories of patients have an increased risk of recurrence/ progression of periodontal disease, these being the subject to TS.

There is a general consensus in the scientific community of Periodontology regarding the final outcome of periodontal treatment: the absence of moderate periodontal pockets with PPD> than 4mm that show BOP or the absence of deep periodontal pockets with PPD≥ 6mm. Previous research shows that sites with PPD> 5 mm are a risk factor for periodontal disease progression and tooth loss.

The reasoning of TS is closely related to the biofilm's etiological role in the onset and progression of periodontal diseases. Recently, the S3 level CPG for stage I-III periodontitis issues an open recommendation on the use of antiseptics within TS in specific cases as an individualized treatment approach based on the needs and characteristics of the case.

The treatment plan of stage IV periodontitis patients aims at obtaining the clinical benefits resulting from the step (1 to 4) sequence approach described by GPC for stages I-III periodontitis. In addition, the specific treatment needs imposed by the periodontal destruction pattern characteristic to stage IV are taken into account: rehabilitation of masticatory function, aesthetic and phonetic functions, restoration of masticatory comfort, treatment of secondary occlusal trauma, restoration of the vertical dimension of occlusion

The Second Part (Personal Contributions) comprises three studies (a clinical study and two retrospective studies).

The first study evaluates the clinically and microbiologically effects produced by a single subgingival application of a gel with NaOCl compared to a 1% chlorhexidine gel (CHX) and a placebo gel during subgingival ultrasonic re-instrumentation during TS. The population of the study consisted of 62 patients, included on the basis of the following criteria: diagnosis of stage III-IV periodontitis established at the onset of the initial therapy, at least 6 months of TS before inclusion in the study, the presence of at least 4 sites with PPD \geq 4 mm + BOP or PPD of 5 mm to 8 mm \pm BOP. All sites that showed treatment indications were re-instrumented at baseline and then at 3, 6, 9, 12 months. At baseline, in addition, a gel with NaOCl (Perisolv®) was subgingival applied in test group, a gel with CHX 1% was applied (Chlorhexamed® 1% gel, GSK, Germany) in the first control group, and a placebo gel was applied in the second control group. Also, 4 non-adjacent reference sites were chosen for each subject which were used for data' statistical analysis and for collection of microbiological samples at baseline and at the end of the study (12 months). The semi-quantitative analysis of the detection rate of the following bacterial species was performed in the laboratories of the Department of Biochemistry in the Faculty of Dental Medicine of UMFVBT: *Aggregatibacter actinomycetemcomitans* (A.a.), *Porphyromonas gingivalis* (P.g.), *Prevotella intermedia* (P.i.), *Tannerella forsythia* (T.f.), and *Treponema denticola* (T.d.).

The second study of this part had a retrospective design and aimed at investigating the factors that influence the survival rate of the teeth used as prosthetic abutments to support stabilizing fixed and hybrid prosthetic restorations (fixed component, mobilizable component) in patients with stage IV periodontitis. The inclusion criteria for this study were: patients in TS diagnosed with stage III / IV periodontitis; presence of an extensive stabilizing prosthetic restoration (at least 6 elements) or of a hybrid prosthetic restoration inserted at least 5 years prior to data collection, presence of panoramic radiographs (OPGs) and periodontal re-evaluations at the beginning and at the last visit of TS. The data was retrospectively obtained from patients' personal data charts, periodontal re-evaluations and after examination of the

OPGs. The factors (the patient was considered a statistical unit) that influenced the survival rate of the teeth were evaluated during statistical analysis of the data.

I considered this retrospective study to be important for my personal research because it was a tool in evaluating the medium-term results of the therapeutic strategies used for maintaining teeth with severely reduced periodontal support.

The upright mentioned approaches were applied so far on the stage III-IV periodontitis patients in the private clinic where the first clinical trial was conducted and from where the study population selected for the second retrospective research was obtained.

The third study, currently being submitted for publication, is a retrospective study which aimed to compare the clinical and radiological changes in periodontal and peri-implant status occurring in a population with progressive/ uncontrolled periodontitis (previously treated) and at least one unaffected/minimally affected implant. In addition, the association between changes in periodontal parameters and peri-implant conditions over a mean observation period of 7.6 years of TS was investigated. The inclusion criteria were as follows: (1) diagnosis of stage III and IV periodontitis, grade B, C, (2) followed/did not follow the TS regularly, (3) the presence of periodontal disease progression after the insertion of the implant considered in the study, (4) ≥ 18 years, (5) the presence of at least one implant inserted before or after active treatment, (6) the presence of at least one unaffected/minimally affected implant. After obtaining the ethical approval, the necessary data were retrospectively collected from the patients' personal data charts, from the periodontal re-evaluations and following the examination of the OPGs. During statistical analysis intra- and inter-group comparisons were made for the clinical and radiographic parameters in order to evaluate the changes that occurred during an observation period of 7.6 years of TS.

This retrospective study is of interest in the context of the personal research carried out during doctoral studies (which focused on severe forms of periodontal disease) because it addresses to that isolated population of patients who manifest a degradation of periodontal status (despite adherence to TS) as opposed to peri-implant status that remains stable.

Conclusions and Personal Contributions.

From the three studies conducted, the following conclusions can be drawn:

1. The first study of the Special Part on the clinical effect obtained after use of a NaOCl gel in subgingival re-instrumentation during TS in patients with stage III-IV periodontitis shows that a single adjuvant use of a NaOCl gel can provide statistically significant benefits in controlling inflammation and residual periodontal pockets compared to the placebo group. These benefits are clinically evidenced by "pocket closure".

2. It was also observed that the stability of the clinical effect was maintained up to 12 months after administration.
3. In contrast, the use of the NaOCl gel in combination with subgingival re-instrumentation and air-flow powder during TS did not produce statistically significant changes in the detection scores of the 5 investigated bacteria at none of the study reference timepoints.
4. The second study (retrospective) showed that medium-term retention of severely periodontally compromised teeth (initial radiographic bone loss $\geq 60\%$) is possible for patients with stage IV periodontitis with the help of extensive, immobilizing prosthetic restorations (both FDP and hybrid PDDP). During the period considered for statistical analysis, only 3.51% of the abutment teeth were lost. In 6.57% cases, the loss of abutment teeth led to prosthetic restoration loss.
5. Although the survival rates of prosthetic restorations remained above 80% for about 5 years, surprisingly, survival curves for patients who regularly adhered (RC) to TS reported a similar result to that of the group that irregularly participated to TS (IC).
6. Comprehensive periodontal and inter-disciplinary prosthetic treatment helps to minimize the technical and biological complications that may occur during TS.
7. The results of the third study (retrospective) show that the level of the crestal bone around implants appears to be more stable compared to the level of the alveolar bone around the natural teeth even when exposed for a long time to severe uncontrolled periodontal disease
8. Also, smoking and the diagnosis of periodontal disease have been significantly associated with increased probing depths in peri-implant sites, while FMPS, smoking and the diagnosis of periodontal disease have been significantly associated with peri-implant bone loss.
9. Unaffected/minimally affected implants appear to benefit of a combination of clinical factors including the position of insertion in the posterior mandibular region, smaller diameters, and screwed multi-unit restorations.