

# Surgical Approach to the Treatment of Advanced Periimplantitis: Case Report

Thaynara Patrícia Tavares, Fabiano Araújo Cunha, Rafael Paschoal Esteves Lima

## ABSTRACT

Periimplantitis is a destructive inflammatory disease that affects peri-implant tissues after osseointegration. It is a prevalent condition and does not present an established and consensual therapeutic protocol yet. The objective of this study was to report a case of advanced periimplantitis treated with the implantoplasty technique. The patient presented the diagnosis of generalized periodontitis stage 3 and peri-implantitis in the implants installed in the region of teeth 24 and 25. After periodontal therapy, the implantoplasty procedure was performed, aiming to obtain a smooth and decontaminated surface and favor the insertion of periimplant tissues in the implant body after healing. Photodynamic therapy was also performed. The results showed improvement in the periimplant condition, characterized by significant reduction in the probing depth and bleeding on probing and/or suppuration, enabling the maintenance of the implants.

**Keywords:** Periimplantitis, Implantoplasty, Periimplant Disease.

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**T. P. Tavares**

Faculty of Dentistry, Federal University of Minas Gerais, Belo Horizonte, Brazil.  
(e-mail: thayptavares@gmail.com)

**F. A. Cunha**

Faculty of Dentistry, Federal University of Minas Gerais, Belo Horizonte, Brazil.  
(e-mail: fabianoperio@gmail.com)

**R. P. Esteves Lima\***

Faculty of Dentistry, Federal University of Minas Gerais, Belo Horizonte, Brazil.  
(e-mail: rafaelesteveslima@yahoo.com)

\*Corresponding Author

## I. INTRODUCTION

Dental implants represent an effective rehabilitation alternative for lost teeth replacement, with satisfactory aesthetic and functional performance and high success rates. Implant therapy presents predictable long-term results and contributes to the preservation of the dental structure of adjacent teeth [1].

Periimplant diseases are infectious inflammatory diseases that affect tissues around implants after osseointegration and their function. Mucositis is an inflammatory alteration of the periimplant mucosa that can evolve to periimplantitis, a destructive inflammatory condition. Periimplantitis diagnosis requires the presence of bleeding on probing and/or suppuration, increased probing depth compared to previous exams, and the presence of bone loss. In the absence of previous exams, the diagnosis of peri-implantitis should consider the presence of bleeding and/or suppuration, probing depth greater than 5 mm and bone level of 3 mm or more apical to the most coronary portion of the intraosseous portion of the implant [2].

The number of periimplantitis cases has increased considerably, making this disease a frequent disorder [3]. The prevalence of periimplantitis presents a wide variation, reaching the rate of 39.7%, and is directly associated with the function time of the implant [4]. Additionally, severe cases represent a considerable percentage of destructive peri-implant alterations [5].

Several factors, related to both patient and implant, have

been associated with [6]. Behavioral factors such as oral hygiene and adherence to periodontal maintenance therapy, smoking, diabetes mellitus, genetics, alcoholism, previous history of periodontitis, type of implant surface and radiotherapy have been described in the literature [7]-[9].

The treatment of periimplantitis has as objective the elimination of the etiologic factor, paralyzing the progression of the disease and avoiding the loss of the implant. Several therapeutic options are described in the approach of the destructive inflammatory periimplant disease, considering the severity and progression of the disease. However, despite the high prevalence, there is no established and consensual therapeutic protocol for periimplant treatment, and many cases are conducted empirically [4], [10], [2].

The following study has as an objective presenting a clinical report of periimplantitis treated with the implantoplasty technique.

## II. CASE PRESENTATION

### A. Patient Information

A 55-year-old male patient presented to the Periodontics Clinic of the School of Dentistry, UFMG, in the first semester of 2018 with a complaint of "bleeding gums and bad smell when using dental floss".

The patient reported a family history of diabetes, hypertension and cancer. At the dental appointment, the patient presented high blood pressure and was referred to the

doctor, who diagnosed systemic arterial hypertension and instituted the treatment with Losartana 50mg. The patient has no other systemic changes and does not use any other medication. Additionally, he reported a history of periodontal and periimplant disease, which resulted in the loss of an implant in the area of 12 tooth 8 years ago. Implants in the area of 24 and 25 teeth were performed over 20 years ago. These teeth were lost due to carious lesions and fractures 25 years ago, as the patient reported. In addition to the implants, he reported having already undergone several uneventful dental treatments, including exodontics, non-surgical periodontal therapy, unitary fixed prosthesis and orthodontics. The periodontal treatment was performed approximately 15 years ago, while exodontia and orthodontic therapy were performed 6 and 3 years ago, respectively. Regarding their habits, He brushed their teeth at least twice a day, did not use dental floss frequently, had the habit of biting their nails and consumed alcoholic beverages twice a week. The patient reported never having been a smoker.

### B. Clinical findings

In the general objective exam, it was observed blood pressure of 150/100 mm/Hg. After starting the treatment of systemic arterial hypertension, systolic and diastolic pressure presented values within normal parameters in subsequent consultations. The specific objective examination showed a generalized change in gingival shape and contour. Absence of teeth 18, 17, 12, 27, 28, 38, 37, 45 and 48, presence of satisfactory restorations, absence of caries and presence of implants in the regions of elements 24 and 25 were observed in the dental examination.

### C. Diagnostic assessment

A periodontal clinical examination of all teeth and implants was performed, with a millimeter periodontal probe, to evaluate the periodontal parameters. Insertion loss, increased probing depth and generalized gingival bleeding were observed. The observed periodontal presentation was compatible with the diagnosis of generalized periodontitis stage 3 [11]. Additionally, the presence of suppuration around the implants in the region of 24 and 25 teeth was observed, as well as gingival bleeding and probing depth ranging from 5 mm to 12 mm, confirming the diagnosis of periimplantitis. The present implants were not mobile. The evaluation of the plaque index showed an index of 61%, evidencing inadequate biofilm control. Complementary periapical radiographic examination of all teeth and implants present was requested, revealing extensive bone loss around the implants in the region of 24 and 25 teeth (Fig. 1).



Fig. 1 – Initial periapical radiography of implants in the region of elements 24 and 25.

### D. Therapeutic Intervention

Initially, the patient was submitted to periodontal therapy associated with the cause. Orientation procedures of biofilm control, supragingival scaling, coronary polishing, evaluation of biofilm retention factors and subgingival scaling in sites with periodontal pockets were performed. At each consultation, oral hygiene guidelines were reinforced. The patient was extremely motivated, and his biofilm control showed significant improvement at each evaluation. Approximately 45 days after the end of the initial periodontal therapy, a new evaluation of periodontal clinical parameters and a new oral hygiene evaluation were performed. There was a significant improvement in the periodontal condition and a high degree of control of the biofilm by the patient. At this time, the intervention in implants in the region of 24 and 25 teeth was planned. Considering the favorable response to the periodontal treatment presented by the patient, its motivation and adequate control of the biofilm and the stability of the implants, we opted for the treatment of the diagnosed periimplantitis. Considering the pattern of the periimplant bone defect the treatment of choice was the implantoplasty.

One week before the periimplant surgical intervention a photodynamic therapy session was performed. The methylene blue photosensitizing agent 0.005% was applied with a blunt needle in the pockets around the implants and the pre-irradiation period of one minute was considered. Later, diode laser irradiation (Laser Duo®, MMOptics, São Carlos, São Paulo, Brazil) was performed using a wavelength of 660 nm and a flexible tip for 90 seconds in each pocket.

The surgical drug protocol included the prescription of 2 g of Amoxicillin, 100 mg of nimesulide and 500 mg of dipyron one hour before surgery. In the postoperative period amoxicillin 500 mg and metronidazole 400 mg were prescribed every 8 hours for 7 days, nimesulide 100 mg every 12 hours for 4 days and dipyron 500mg every 6 hours for 2 days.

The surgical procedure of the implantoplasty was performed in early June 2019. This is a respective therapy procedure to modify, polish and smooth the implant surface by removing exposed spikes and their antibacterial decontamination. The materials used were: KG 1052, KG 1111, KG 1111F and KG 1111FF diamond drills, KG Viking amalgam finishing and polishing kit, "CA" amalgam rubber tips (Dedeco) and Angelus PM 8, PM 6 and PM 4

spherical carbide drills.

Initially, a total tooth thickness flap of 22 to 26 was performed. For the removal of the spikes from the implants, diamond drills were used in decreasing order of granulation under constant irrigation with sterile saline solution. After the removal of the spikes, the rubbers for finishing and polishing of amalgam were also used in decreasing order of abrasiveness. The rubbers were used to promote a greater smoothing of the implants surface, providing less accumulation of biofilm and better healing of soft tissue. All the granulation tissue present around the implants was removed with the aid of periodontal curettes. Osteoplasty was performed with the spherical carbide drills in low rotation. After mechanical decontamination, 20% citric acid gel was used as a chemical decontamination agent on the surface of the implants. This acid was applied for 5 minutes, followed by abundant irrigation with saline solution. Subsequently, the flap was repositioned, and the interdental suture was performed with 5.0 nylon thread.

Post-operative recommendations were prescribed, and the patient was guided regarding the proper care to be taken.

#### E. Follow-up and outcomes

The first post-surgical evaluation was performed approximately 10 days after the implantation. The suture was removed and presented a clinical condition compatible with an adequate healing response. The patient reported a good postoperative, uneventful and without unforeseen events.

The periimplant clinical examination was performed after 3 months of surgery. A significant improvement of the periimplant condition was observed, with a reduction of the probing depth and the percentage of sites with bleeding at the probing or suppuration (Table 1). The patient did not report any discomfort, he informed that he was able to sanitize the region well and was extremely satisfied with the outcome.

The radiographic follow-up was performed 13 months after the implantation (Fig. 2). In this examination no change in bone level was observed compared to the initial radiography. The patient reported no complaints and considered that there was an improvement in the inflammatory condition.

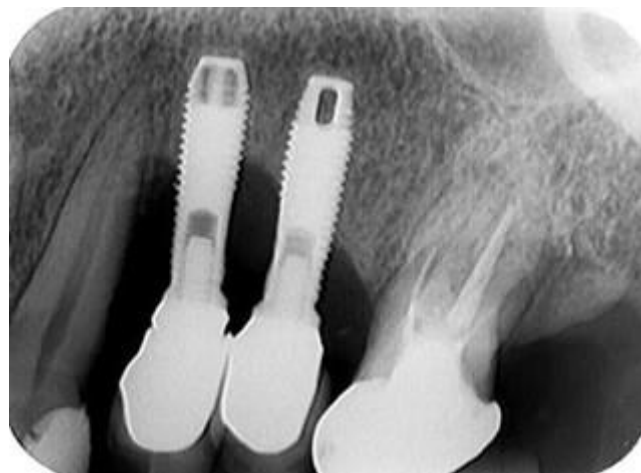


Fig. 2. Final periapical radiography after 13 months of implantoplasty in the region of teeth 24 and 25.

TABLE 1: PERI-IMPLANTS PARAMETERS OF 24 E 25 IMPLANTS AT BASELINE AND 3 MONTHS AFTER IMPLANTOPLASTY

Peri-implants parameters	Baseline	3 months after implantoplasty
Probing deeth (mean)	8.3 mm	4.5 mm
Bleeding on probing (%)	100%	38%
Suppuration on probing (%)	100%	0%

### III. DISCUSSION

Periimplantitis is an inflammatory condition of periimplant tissues that presents a variable prevalence due to the variability of the studies analyzed, reaching rates close to 40% [4] and incidence from 1 to 23% in 10 years [12]. However, there is no well-established treatment protocol in the periimplantitis approach and often the determination of a prognosis and the elaboration of a treatment plan demonstrates great complexity. Several therapies have been used in an attempt to prevent the progression of periimplant bone loss, including surgical and non-surgical therapies, which can be used according to the degree of disease progression. Additionally, success rates for the various therapeutic options are described [13]-[18].

The present study describes a case of advanced periimplantitis successfully treated by the implantoplasty technique. The follow-up revealed that the clinical parameters evaluated showed a significant improvement, with a reduction in bleeding on probing and periimplant probing depth. Radiographic analysis at 13 months showed stability of bone level. Complementarily, the patient presented a good response and adequacy to treatment.

In this clinical case, the extent of bone loss indicated an extremely doubtful prognosis for periimplant treatment and even unfavorable to treatment. Periimplantation lesions usually progress circularly around the affected implants [19]. This bone loss can affect the quality and quantity of bone which are very important factors in the evaluation for implant maintenance [20]. In the presence of very extensive peri-implant bone loss, implant stability may be compromised and, normally, its removal should be considered for resolution of the inflammatory condition [21, 22]. In the current case, although the implants presented a percentage greater than 50% of bone loss, they did not present mobility. Besides the stability of the implants, the good response of the patient to the previous periodontal treatment and their motivation contributed to the possibility of treatment for periimplantitis being considered, even in the presence of an extremely advanced stage of loss of supporting bone tissue.

In addition, the absence of risk factors diabetes mellitus and smoking, significantly related to failure in the treatment of periimplantitis, [13], [23] and the patient's desire for maintenance of implants were considered. The two implants in question, if removed, would affect aesthetics and function, in addition to the difficulty of a new rehabilitation with implants due to extensive bone loss, with the need for extensive grafts in a bone defect not favorable to regeneration. The fixed partial prosthesis or the removable partial prosthesis would be therapeutic alternatives for rehabilitation in case of implant removal. The important loss of bone support presented by 23 tooth in the distal represented a challenge in rehabilitation with both fixed

partial prosthesis and removable partial prosthesis. In addition, the patient reported that he would not like a rehabilitation with removable prosthesis, emphasizing his preference in trying to maintain the implants.

The implantoplasty was the option of choice for treatment in this case because it provides greater decontamination of the implant surface compared to mechanical debridement alone [24], [25]. A limitation of debridement is an obstacle to adequately decontaminate the implant spires. Removal of the coils facilitates decontamination and is more efficient than maintenance. Implantoplasty not only provides better decontamination of the implant surface and reduced possibility of bacterial recolonization, but also favors the insertion of periimplant tissues into the implant body after healing [25].

This technique combined with bone grafting, in some areas, is already proving to be effective in treating advanced periimplantitis in the long term [26]. However, as mentioned above, in the present clinical case the morphology of the bone defect in the implant area was not favorable to regeneration. The configuration of the bone defect can be considered a clinical parameter that potentially influences the outcome after regenerative therapy of periimplantitis lesions [27], which justifies the option to treat the case with implantoplasty only. It is worth emphasizing that regenerative techniques alone do not treat the disease, however they can favorably alter the morphology of the bone defect [14].

Implantoplasty, alone or combined with other techniques, presents a high success rate in the treatment of periimplantitis [21], [28], [15]. However, it presents limitations such as technical difficulty, possible weakening of the implant body, a possible release of titanium particles that can generate an inflammatory process and a possible aesthetic damage with the appearance of the metallic part of the implant in the mouth [21], [25], [29]. The limitations inherent to implantoplasty should be clearly discussed with the patient when presenting the proposed treatment plan. In the case presented, the patient was guided regarding the limitations, including the possibility of fracture and the aesthetic impairment, considering the extensive area of the implant in which the removal of the spires would be necessary.

There is no consensus in the literature about the change in implant strength due to implantoplasty, this factor may vary according to implant diameter [30], [29]. Some studies show that, in the short and medium term, there do not seem to be any notable mechanical complications and that the implants seem to present good implant resistance [31], [29]. On the other hand, there are studies that show that the fatigue resistance of implants, after implantoplasty, is diminished and that the different implant connections also influence the resistance [32].

In the present case, besides implant surgery with the removal of granulation tissue, photodynamic therapy was used prior to the surgical procedure. Photodynamic therapy has been widely used in dentistry for tissue decontamination. This therapy uses a light source to activate a photosensitizing agent in the presence of oxygen, forming reactive oxygen species harmful to microorganisms. Photodynamic therapy has shown good results as an adjunct

to periodontal treatment, promoting significant reduction of pathogenic microorganisms, in the treatment of periimplantitis, as well as in decontamination of the root canal system in endodontics [33]-[35].

The patient in question had a history of implant loss and diagnosis of periodontitis. These are important risk factors for periimplantitis [19]. Studies have reported that implants installed in individuals with a history of periodontitis presented significantly higher chances for the development of peri-implantitis when compared to implants installed in individuals without a history of periodontitis. In the presence of a history of periodontitis, the incidence rate of periimplantitis is approximately 29% over 10 years, while in individuals without prior periodontal disease this rate is 6% [19]. The study by Dreyer et al. (2018) [36] demonstrated a prevalence of periimplantitis of 9.0% for regular participants in a maintenance program and a significant increase in the prevalence rate among individuals not participating in the maintenance program. Therefore, regular preventive maintenance is critical to preserving the results obtained with the proposed treatment and to preserving periimplant health in the long term.

The results observed in the current clinical case presented were considered satisfactory, however the evaluation time was reduced. The patient presents an important risk factor, history of periodontitis, and requires a rigorous maintenance program. Additional studies are needed, preferably of the trial-clinic type, with larger samples and longer follow-up time, to evaluate the efficacy of implantoplasty in the treatment of periimplantitis.

#### IV. CONCLUSION

The implantoplasty presented significantly favorable results in the treatment of periimplant infection of the present clinical case, contributing to a significant reduction of probing depth and reduction of inflammation, as well as implants maintenance.

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**Rafael Paschoal Esteves Lima\***

DDS, MSc and PhD in Periodontology.

Adjunct Professor of Periodontics.

Federal University of Minas Gerais – Brazil.