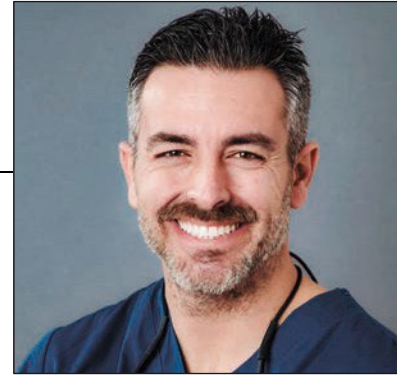


# Successful cases

## Professional maintenance of a patient with an implant using the GBT (Guided Biofilm Therapy) protocol



# Dr. Emilio Rodríguez Fernández



Doctor of Dentistry at University Alfonso X El Sabio, Madrid.  
Master's Degree in Regenerative Surgery using Implantology, University of Szeged.  
Master's Degree in Oral Surgery and Implantology, University of León.  
Professor in charge of the Implantology Master's Course, University of Córdoba.  
Private practice devoted solely to Oral Surgery, Periodontics and Implants. Madrid.

## Eliana Ottaviano



Bachelor's Degree in Dental Hygiene from La Sapienza University, Rome.  
Senior Oral and Dental Hygiene Technician, OPESA, Madrid.  
Private practice as a hygienist at Pradies y Laffond Dental Institute and Iván Malagón Clinic, Madrid.

## Dr. Yari Rodríguez Fernández



Bachelor's Degree in Dentistry. University Alfonso X el Sabio  
Master's Degree in Oral Surgery, Implantology and Periodontics. University of Málaga.

### SUMMARY

There has been a notable increase in fitting and rehabilitating dental implants, particularly due to the good results attained. Nevertheless, this situation has also given rise to the advent of dental implant-related diseases such as mucositis and peri-implantitis. The objective of this article is, by outlining a single case, to tackle the techniques for the care and professional maintenance of patients with implants involving major rehabilitation work using the Guided Biofilm Therapy (GBT) protocol and the EMS Air-flowing device.

## Introduction

There has been a notable increase in the fitting and rehabilitation of dental implants over the last two decades, particularly due to the good results attained. Nevertheless, this situation has also given rise to the advent of dental implant-related diseases such as mucositis and peri-implantitis, with a high level of prevalence. In some cases, these clinical conditions may compromise the integrity of the peri-implant tissues, the esthetic appearance, and the functionality of the prosthesis, as well as having a negative psychological impact on our patients<sup>1,2</sup>. The difference between these two clinical situations stems from the presence or absence of bone loss. Mucositis is defined as irreversible inflammation of the soft tissues associated with the presence of biofilm, while peri-implantitis is characterized by an inflammation of the soft tissues accompanied by a gradual, irreversible loss of the supporting bone surrounding the implants<sup>3,4</sup>.

Clinical and radiological methods are essential for diagnosing peri-implant diseases. Currently, various parameters are taken into account: bone loss equal to or greater than 2 mm since the fitting of the prosthesis, a probing depth equal to or greater than 6 mm, profuse bleeding upon probing, and suppuration, which is associated with bone destruction and mobility of the implant, providing a delayed sign of total destruction of the support bone<sup>4,5</sup>. In addition to local factors like biofilm, systemic pathologies like diabetes mellitus, scleroderma, ectodermal dysplasia, lichen planus, osteoporosis, rheumatoid arthritis and Sjögren's syndrome may also worsen the clinical picture due to their inflammatory potential<sup>6</sup>. In terms of external factors, smoking is considered to be a triggering factor, given that a high prevalence has been observed of peri-implant and periodontal diseases or occlusal alterations<sup>7</sup>.

Exposure of the implant's surface to the oral environment and colonization with organic material that gives rise to a film rich in proteins, glycoproteins and lipids, is known as a precondition for bacterial colonization. The build-up of pathogenic bacteria and the formation of a biofilm around the implants are predisposing factors for the development of an inflammatory process, similar to what occurs in periodontitis<sup>8</sup>.

The objective of this article is, by outlining a single case, to tackle the techniques for the care and professional maintenance of patients with implants involving major rehabilitation work using the Guided Biofilm Therapy (GBT) protocol and the EMS Air-Flowing device. This type of device uses a technology for cleaning surfaces utilizing a jet of air along with abrasive powder. Using a nozzle, it can be inserted into periodontal pockets, thereby removing all the biofilm sticking to the implants or the root cement exposed<sup>9</sup>.

## Materials and methods

The patient is a 61-year-old woman who came in for an appointment for a general check-up. 8 years ago, rehabilitation work was carried out on a fixed prosthesis with eight implants and the patient reported that she had not gone in for her periodic check-up appointments.

During the clinical examination, there were no signs or symptoms of peri-implant disease. Nevertheless, the time that has passed since the date of the rehabilitation work (2015) and the lack of clinical follow-up were taken into consideration. Professional maintenance work was planned in accordance with the EMS GBT protocol. The description of this is as follows: Once the patient's clinical history was updated, a clinical examination was carried out along with a complementary x-ray examination.



**FIG.1** Initial situation.



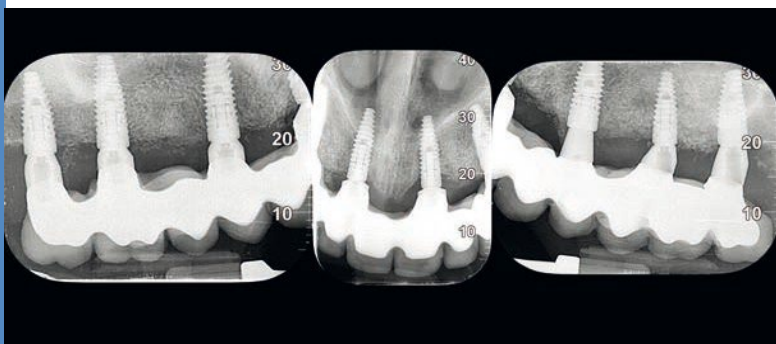
**FIG.2** Initial orthopantomography.



## Successful cases |

For this purpose, a panoramic x-ray was taken that enabled passive adjustment of the prosthesis to be assessed, in addition to which a series of periapical x-rays were taken of the implants involved in the restoration for the purpose of assessing the marginal bone in detail. During the oral examination, we could observe that it was a monolithic prosthesis fully implanted using screws, consisting of a cast chrome-cobalt structure covered with pink and white ceramics.

A plaque revealer (biofilm discloser) was then applied topically using a sponge both for rehabilitation purposes and on the prosthetic abutments in order to view the biofilm and make it possible to work out the most effective way of eliminating it. In the first phase, the Air Flow system was used because it is a minimally invasive technique that is suitable for removing the initial microbial load, spots and any early build-up of dental calculus.



**FIG.3.** Periapical series.



**FIG.4.** GBT protocol: plaque revealer or biofilm discloser.



**FIG.5.** Plaque sticking to the abutments and gums.



**FIG.6.** GBT protocol with Airflow Plus powder.



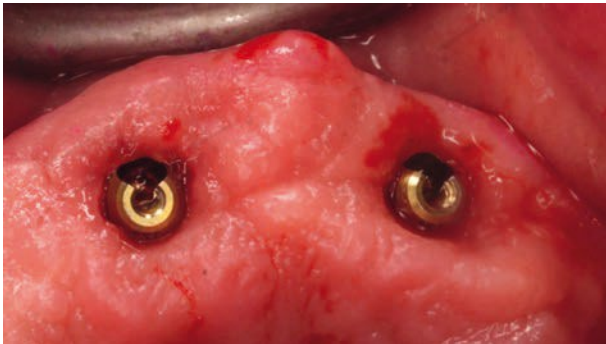
**FIG.7.** Air-Flowing the abutments.



**FIG.8.** Topical application with chlorhexidine 0.20% and hyaluronic acid.

Applying it on and in the gums requires low-power semi-circular movements (level 3), with a maximum amount of water and maintaining a working distance of 2 to 5 mm, using Airflow Plus powder (erythritol + chlorhexidine in the form of 14 nm particles). This product is only slightly abrasive, has optimal penetration power in areas that are difficult to access, is hydrophobic and is comfortable for the patient, which is also why it is advisable to apply it on the dorsal surface of the tongue.

Then, using Piezon PS No Pain technology in the form of a PI MAX Instrument (ultrasound tool with a tip made from polyether ester ketone (PEEK) and carbon), the calculus stuck to the implants was removed and the adjacent esthetic restorations were performed in the lower dental arcade. Should it be more convenient for this instrument to be used with linear motions, you should take into consideration that only the last two millimeters of it are active.



**FIG.9.** Occlusal view of the decontaminated abutments.



**FIG.10.** Front view of the abutments and the keratinized gum free of plaque.



**FIG.11.** Basal surface of the prosthesis full of plaque and food residues.



**FIG.12.** Cleaning and decontamination of the connections with the Pi-Max tip.



**FIG.13.** Prosthesis free of plaque and tartar after passing the Pi-Max tip over it.



**FIG.14.** GBT protocol with Pi-Max tip at the level of the prosthesis's connections.



## Successful cases |



**FIG.15.** GBT protocol with Airflow Plus powder on the basal surface of the prosthesis.



**FIG.16.** Basal surface of the decontaminated prosthesis.



**FIG.17.** Prosthesis in the mouth after three weeks.



**FIG.18.** Clinical appearance of the abutments and gums after three weeks.



**FIG.19.** Prosthesis free of plaque and connections free of the tartar that was stuck to them.



**FIG.20.** Occlusal view of the maxilla. Pink gums, no bleeding and abutments free of plaque.

In the first phase, the Airflow system was used because it is a minimally invasive technique that is suitable for removing the initial microbial load, spots and any early build-up of dental calculus.

## Results

The patient came in for a check-up consultation three weeks after the operation. Once again, the plaque revealer was applied to assess hygiene and the plaque's penetrating power in terms of the basal surface of the prosthesis.

## Successful cases |

During the examination, it was possible to note the patient's good habits, the absence of bleeding upon probing, and a low percentage of plaque on the basal surface. Again, the importance of care and personal maintenance was emphasized. After six months, hygiene habits were checked using the plaque revealer, and a noticeable improvement was observed. Nevertheless, this time the prosthesis was not removed. Its removal and cleaning on an annual basis were planned with a view to having as little build-up of plaque as possible, to prevent bleeding and the advent of peri-implant diseases.

---

It is an increasingly frequent occurrence to encounter a greater number of clinical trials that approve of using air-polishing systems for treating pre-implant mucositis rather than conventional techniques.

---

## Discussion

---

The correct treatment of peri-implantitis is, however, a controversial topic<sup>10,11</sup>. Therefore, prevention plays a key role in maintaining healthy pre-implant tissues. Over the last five years, it has become an increasingly frequent occurrence to encounter a greater number of clinical trials that approve of using air-polishing systems for treating pre-implant mucositis rather than conventional techniques<sup>12-14</sup>.

Mensi *et al.*, in an *in vitro* study on four dental implant surfaces, demonstrate that blasting with glycine or erythritol when used for more than 45 seconds is more effective than the steel or PEEK ultrasound tips commonly used in terms of the amount of surface area that is decontaminated<sup>15</sup>. Cha *et al.*, in another *in vitro* study that compared the level of alteration of the SLA surface area after applying various decontamination methods, reached the conclusion that both ultrasonic tips and brushes with titanium bristles altered the surface and using PEEK tips even left fragments behind, while air-polishing with glycine powder was capable of decontaminating the surface of the implant without physically altering it<sup>16</sup>.

These conclusions are noteworthy given that, until now, implantoplasty seemed like the only effective option capable of stopping bone loss in treated cases of peri-implantitis<sup>17</sup>. Furthermore, it is known that implantoplasty also causes the release of metallic microparticles from the implant, from the attachments, or from the prosthesis itself which are capable of releasing inflammatory mediators and negatively influencing the management of tissues affected by peri-implantitis<sup>18</sup>.

The use of plaque revealers is not a new practice in the field of dentistry<sup>19</sup>. It is a key tool for educating patients regarding hygiene and brushing techniques. Furthermore, incorporating it into the GBT protocol is of great importance, given that it enables easy visual detection, simple removal, and increases the predictability of the treatment<sup>20</sup>.

Lastly, it would seem that using the GBT protocol along with the Piezon PI MAX Instrument (EMS, Nyon, Switzerland) has shown it is capable of reducing bleeding and the pocket depth in a way that is less invasive and more effective than conventional protocols known to date<sup>21,22</sup>.

## Conclusions

---

Lack of follow-up and maintenance subsequent to treatment with dental implants may lead to numerous surprises. Professional maintenance using GBT therapy is emerging as an integral strategy that is effective for preserving the health of periodontal and peri-implant tissues. On the other hand, using erythritol offers significant advantages such as its anti-microbial and anti-inflammatory properties which, moreover, are enhanced by the small size of the particles and their penetrating power without damaging the surfaces of the implants, the abutments, or the prosthesis.

---

Using erythritol offers significant advantages such as its anti-microbial and anti-inflammatory properties which, moreover, are enhanced by the small size of the particles and their penetrating power

---

Dental plaque revealer is, in this case, also a valuable tool for improving preventive dental care and promoting better oral health in patients. Success with dental implants is conditional not only upon the patient's good habits, but also on follow-up and professional maintenance. The GBT protocol has proven to be effective, efficient, comfortable, and minimally invasive. This makes it our therapy of choice for maintenance of patients fitted with prostheses over implants.

## Conflicts of interest

---

The authors hereby declare that they do not have any conflicts of interest.

## Bibliography

- Jacob R, Vranckx M, Vanderstuyft T, Quiryren M, Salmon B. *CBCT versus other imaging modalities to assess peri-implant bone and diagnose complications a systematic review?* Eur J Oral Implantol. 2018;(1):77-92
- López-Soto O., Cerezo-Correa M., Paz-Delgado A. Variables relacionadas con la satisfacción del paciente de los servicios odontológicos. Gerencia y políticas de salud. 2010; 9: 124-136.
- Bender, P., Salvi, G., Buser, D., Sculean, A., & Bornstein, M. (2017). Correlation of Three-Dimensional Radiologic Data with Subsequent Treatment Approach in Patients with Peri-implantitis: A Retrospective Analysis. The International Journal of Periodontics & Restorative Dentistry, 37(4), 481-489.
- Doornewaard, R., Jacquet, W., Cosyn, J., & De Bruyn, H. (2018). How do peri-implant biologic parameters correspond with implant survival and peri-implantitis? A critical review. Clinical Oral Implants Research, 29, 100-123. doi:10.1111/clr.13264
- Monje, A., Amerio, E., Vilarrasa, J., Sanz-Martín, I., Nart, J. (2020). Periimplantitis: Diagnóstico clínico y factores asociados a la patología. Rev Científica la Soc Española Periodoncia, 16.
- Guevara Callire, L. Y., Falcón Guerrero, B. E. ., Flores-Chipana, N., Mamani-Mamani, L., Mamani-Alejos, R. ., Mamani-Perea, H., Ramos-Arce, S., Taya-Venegas, D., & Yunganina-Laura, S. (2021). Diabetes mellitus como factor de riesgo de la periimplantitis. Revista Odontológica Basadrina, 5(1), 59-65. <https://doi.org/10.33326/26644649.2021.5.1.1088>
- Mazel A, Belkacemi S, Tavitian P, Stéphan G, Tardivo D, Catherine JH, et al. *Peri-implantitis risk factors A prospective evaluation.* J Investig Clin Dent. 2019;10(2):e1239
- Salvi, G. E., Furst, M. M., Lang, N. P. & Persson, G. R. 2008. One-year bacterial colonization patterns of Staphylococcus aureus and other bacteria at implants and adjacent teeth. Clin Oral Implants Res, 19, 242-8..
- Müller N, Moëne R, Cancela JA, Mombelli A. *Subgingival air-polishing with erythritol during periodontal maintenance.* J Clin Periodontol 2014; 41: 883-889. doi: 10.1111/jcpe.12289.
- Tomasi C, Regidor E, Ortiz-Vigón A, Derks J. *Efficacy of reconstructive surgical therapy at peri-implantitis-related bone defects.* A systematic review and meta-analysis. J Clin Periodontol. 2019;46(S21):340-56.
- Pulcini A, Bollain J, Sanz-Sánchez I, Figuero E, Alonso B, Sanz M, Herrera D. *Clinical effects of the adjunctive use of a 0.03% chlorhexidine and 0.05% cetylpyridinium chloride mouth rinse in the management of peri-implant diseases: A randomized clinical trial.* J Clin Periodontol. 2019 Mar;46(3):342-353.
- Bollain J, Pulcini A, Sanz-Sánchez I, Figuero E, Alonso B, Sanz M, Herrera D. *Efficacy of a 0.03% chlorhexidine and 0.05% cetylpyridinium chloride mouth rinse in reducing inflammation around the teeth and implants: a randomized clinical trial.* Clin Oral Investig. 2021 Apr;25(4):1729-1741.
- Vouros I, Antonoglou GN, Anoixiadou S, Kalfas S. *A novel biofilm removal approach (Guided Biofilm Therapy) utilizing erythritol air-polishing and ultrasonic piezo instrumentation: A randomized controlled trial.* Int J Dent Hyg. 2022 May;20(2):381-390.
- Mensi M, Viviani L, Agosti R, Scotti E, Garzetti G, Calza S. *Comparison between four different implant Surface debridement methods: an in-vitro experimental study.* Minerva Stomatol. 2020 Oct;69(5):286-294.
- Cha JK, Paeng K, Jung UW, Choi SH, Sanz M, Sanz-Martín I. *The effect of five mechanical instrumentation protocols on implant surface topography and roughness: A scanning electron microscope and confocal laser scanning microscope analysis.* Clin Oral Implants Res. 2019;30(6):578-87.
- Matsubara VH, Leong BW, Leong MJL, Lawrence Z, Becker T, Quaranta A. *Cleaning potential of different air abrasive powders and their impact on implant surface roughness.* Clin Implant Dent Relat Res. 2020 Feb;22(1):96-104.
- Lasserre JF, Brex MC, Toma S. *Implantoplasty Versus Glycine Air Abrasion for the Surgical Treatment of Periimplantitis: A Randomized Clinical Trial.* Int J Oral Maxillofac Implants. 2020 Jan/ Feb;35(35):197-206.
- Trindade R, Albrektsson T, Tengvall P, Wennerberg A. *Foreign body reaction to biomaterials: on mechanisms for buildup and breakdown of osseointegration.* Clin Implant Dent Relat Res. 2016 Feb;18(1):192-203.
- Chetrus, Viorica; Ion, I R. *Dental plaque classification, formation and identification.* International Journal of Medical Dentistry; Iasi Tomo 3, N.º 2, (Apr/Jun 2013): 139-143.
- Mensi M, Scotti E, Sordillo A, Agosti R, Calza S. *Plaque disclosing agent as a guide for professional biofilm removal: A randomized controlled clinical trial.* Int J Dent Hyg. 2020 Aug;18(3):285-294.
- Toma S, Lasserre JF, Taïeb J, Brex MC. (2014) *Evaluation of an air-abrasive device with amino acid glycine powder during surgical treatment of peri-implantitis.* Quintessence Int 45:209-219.
- Baima G, Citterio F, Romandini M, Romano F, Mariani GM, Buduneli N, Aimetti M. *Surface decontamination protocols for surgical treatment of peri-implantitis: A systematic review with meta-analysis.* Clin Oral Implants Res. 2022 Nov;33(11):1069-1086.