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Case Report

Retreatment of a Case of Severe Peri-Implantitis Using a Minimally Invasive Approach: Atraumatic Extraction and Transcrestal Sinus Lift

Eduardo Anitua[1,2,3*]

[1]Private practice in oral implantology, Eduardo Anitua Institute, Vitoria, Spain

[2]Clinical researcher, Eduardo Anitua Foundation, Vitoria, Spain

[3]University Institute for Regenerative Medicine and Oral Implantology - UIRMI (UPV/EHU-Fundación Eduardo Anitua), Vitoria, Spain

[*]**Corresponding autor:** Eduardo Anitua, Eduardo Anitua Foundation, University Institute for Regenerative Medicine and Oral Implantology - UIRMI (UPV/EHU-Fundación Eduardo Anitua), Spain

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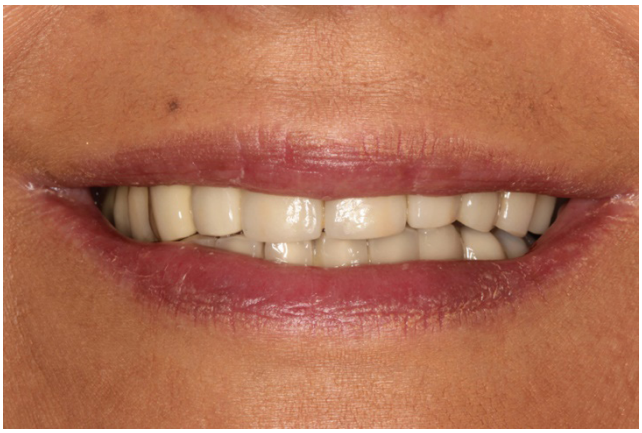
Introduction

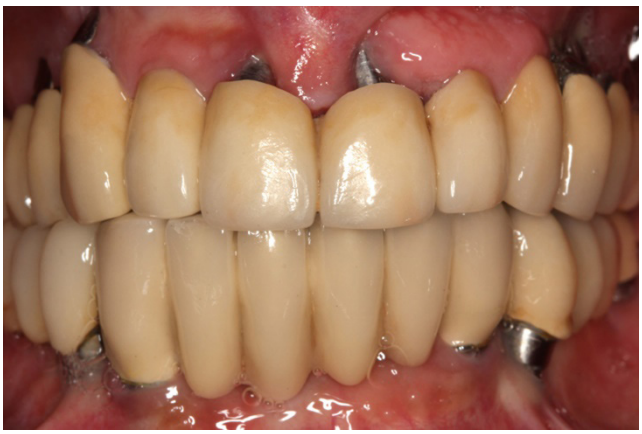
Since the beginning of implantology in the 70's with the advances made by Branemark [1], dental implants have been consolidated as the therapeutic option of choice in many cases of partial or total edentulism for the rehabilitation of patients. With the increased use of this surgical technique and the long-term follow-up of patients, infectious problems, similar to those identified in natural teeth, are beginning to be recognized, with peri-implantitis appearing as a factor in the failure of dental implants in the later phases (once integration and function have been generated) [2-4]. Peri-implantitis is considered an inflammatory pathology that generates destruction of the bone around the implant and later colonization of the implant surface producing a chronic infection with suppuration, bleeding and pain. There is another type of inflammatory pathology that affects implants called peri-implant mucositis, which reversibly affects the implant, without affecting the bone bed and is considered the precursor of peri-implantitis in some cases, when it fails to stabilize with initial treatment [5,6]. Peri-implant mucositis and peri-implantitis are highly prevalent. The mean prevalence of implant-based and subject-based peri-implant mucositis was 29.48% and 46.83%, respectively, and the mean prevalence of implant-based and subject-based peri-implantitis was 9.25% and 19.83%, respectively [5,6]. Due to the presence of these types of pathologies and the impact they have on implants and implant-supported rehabilitations, treatments should be established to address them. The treatments for peri-implantitis reported in the international literature can be divided into two main groups: surgical and non-surgical. The non-surgical ones are based on the use of local antiseptics, removal of bacterial plaque by mechanical methods and the use of systemic antibiotics. Surgical methods include the elevation of a flap, abrasion of the implant surface by different methods as well as polishing of the implant surface (implantoplasty) and subsequent regeneration of the defect generated in the bone bed [7-9]. Even so, there are situations in which a conservative approach with or without surgery of the implants involved in peri-implantitis is not possible and in this case, the implants must be removed (explantation) since it is not viable to maintain them in the rehabilitation when circumferential bone loss is reached or when it affects more than half of the implant, as well as when repeated infections generate continuous symptomatology in the patient [10-12]. For this type of situation, we must be able to count on surgical techniques that allow us to remove the implant in the most atraumatic way possible, in order to leave a sufficient bone bed for re-treatment of the case. Therefore, the technique of implant removal by means of extractors such as the KEXIM kit (Biotechnology institute - Vitoria, Spain) gives us the possibility of explanting the implant with peri-implantitis and in many cases the insertion of a new implant at the same time and place in cases where the residual bone volume allows it [13]. Based on the reversibility of implant dentistry and the likelihood that implants inserted today may have to be removed in the future, our approach to the treatment of patients with dental implants should be the one that generates the least impact and that allows the maximum residual bone volume to be preserved unused, as well as

the use of minimally invasive techniques both for the insertion of implants and for the removal of those implants that are considered to have failed [14,15]. In the following clinical case, we show the treatment of a case of peri-implantitis in the upper jaw where atraumatic explantation of the affected implants is performed and the new approach with dental implants to rehabilitate the patient.

Clinical Case

We present the case of a 53-year-old female patient who came to the dentist's office requesting a solution to a problem of recurrent infection in the implants inserted in the upper jaw. She presents a complete rehabilitation for the upper dental arch cemented on implants and in many points it can be seen in the initial images that there is inflammation, exposure of the implants and prosthetic components and areas with bleeding and spontaneous suppuration (Figures 1 and 2). In the initial radiograph, we can see crater bone losses in several implants as well as horizontal losses in other points. The entire upper rehabilitation is affected by peri-implantitis and the implants should be removed (Figure 3). To continue with the planning of the case, a Cone-beam is performed to observe the implants in detail and the residual bone volume remaining when these implants are removed. In the sectional cuts these bone losses are identified in greater detail and the areas where new implants can be repositioned. Given the bone loss and the scarce pre-existing residual bone volume in most of the locations short implants are planned and in the posterior maxillary sectors the placement of extra-short implants with transcrestal sinus elevation is planned (figures 4-6). Once diagnosed, the patient undergoes atraumatic explantation surgery of the implants affected by peri-implantitis and reimplantation of implants in the sectors where it is possible, as well as regeneration of the sockets where it is not possible to insert new implants at the same time. Regeneration is performed with a PRGF-Endoret fraction 2 clot at the bottom of the alveolus and a fibrin membrane (PRGF-Endoret fraction 1) in the upper most portion sealing the alveolus. The implants inserted in this phase present a good initial stability (between 20 and 35 Ncm) so that an immediate loading prosthesis can be made and placed 4 hours after surgery. This prosthesis is made by means of articulated bars so that the construction can be generated quickly without renouncing to a correct adjustment and hermetism at the level of the prosthesis-implant junction through transepithelial Multi-im (figure 7). In the first quadrant a sinus elevation is performed by lateral approach and the insertion of the implants at this level is delayed until the integration of the filling material. After six months, the implant is inserted in the first quadrant area. Before surgery a new cone-beam is performed to know the height gained after sinus elevation and to plan the height and width of the implant to be inserted. In the sectional planning image of CBCT we can see that there is enough height for the insertion of a 7.5 mm implant, even longer (figure 8), although according to our conservative work philosophy this length will be enough, leaving part of the bone volume gained for future re-treatments if they have to be performed. Our study group has elaborated different biomechanical studies which support this procedure in which the length of the implant from a minimum (5.5mm) is irrelevant in terms of load distribution once the implant is integrated and in function [16-17]. In this same cone-beam we took the opportunity to observe the stability achieved in the implant inserted in the first quadrant, where we can see in the corresponding section how it is perfectly integrated, with no notable bone loss (Figures 9 and 10). At this moment, after the insertion of the implant in the second quadrant, a second set of provisionals is made joining this implant to the rehabilitation to generate a progressive load. In this way we adapt all the occlusal and esthetic parameters to be transferred to the final prosthesis (Figures 11 and 12).





Figures 1 and 2: Initial images of the patient showing exposure of the prosthetic components, implants and areas with extreme inflammation.

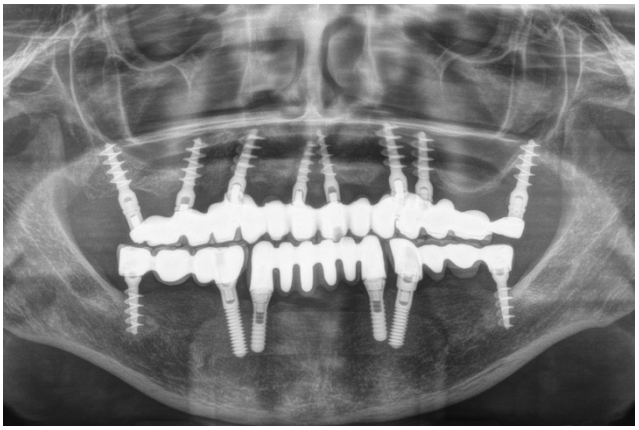
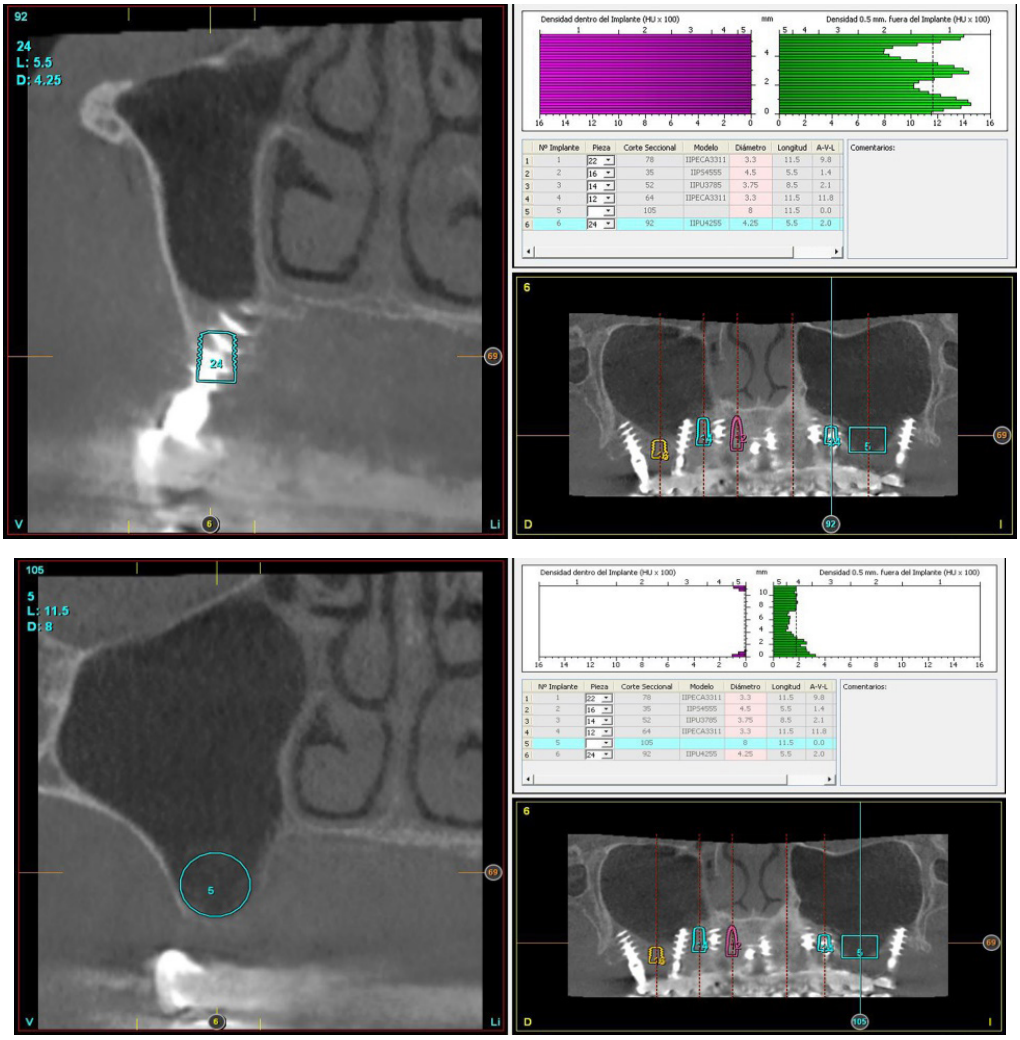
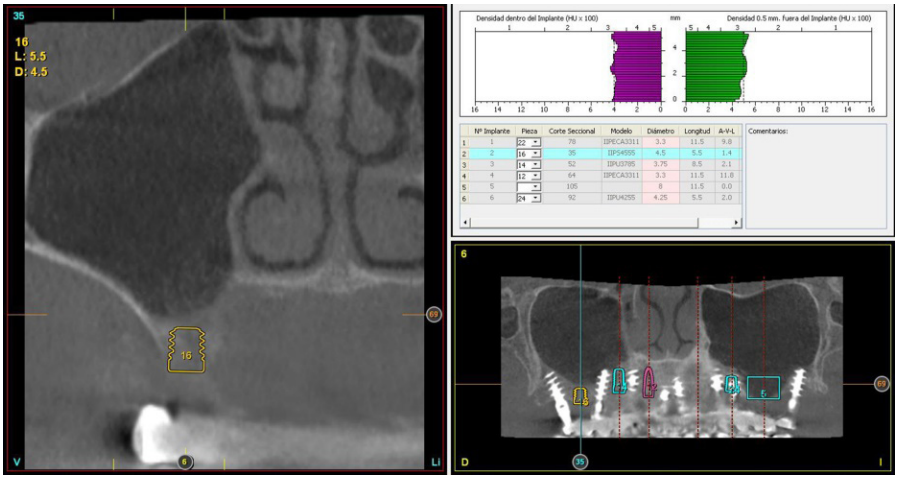


Figure 3: Initial radiological image showing all the upper implants affected by peri-implantitis.





Figures 4-6: CT sectional images where we can see the implants to be explanted and the posterior bone atrophy areas where the implants should be inserted by transcrestal sinus lift, in the case of the first quadrant and a sinus lift in the second quadrant.

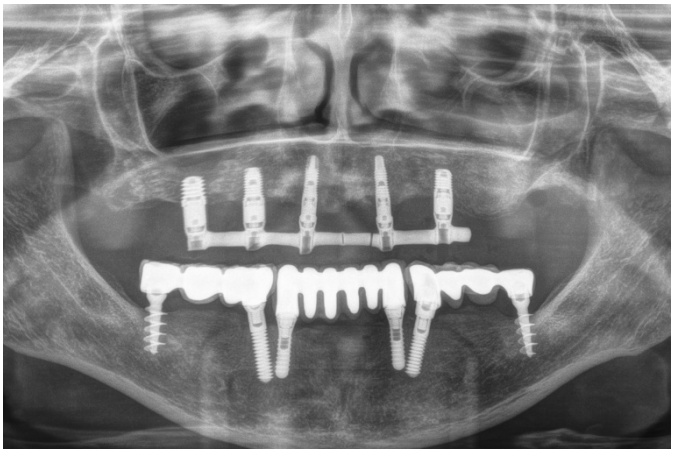


Figure 7: Postoperative panoramic radiograph after explantation of the upper implants and the new insertion of implants in the upper jaw and immediate load prosthesis placed 4 hours after surgery.

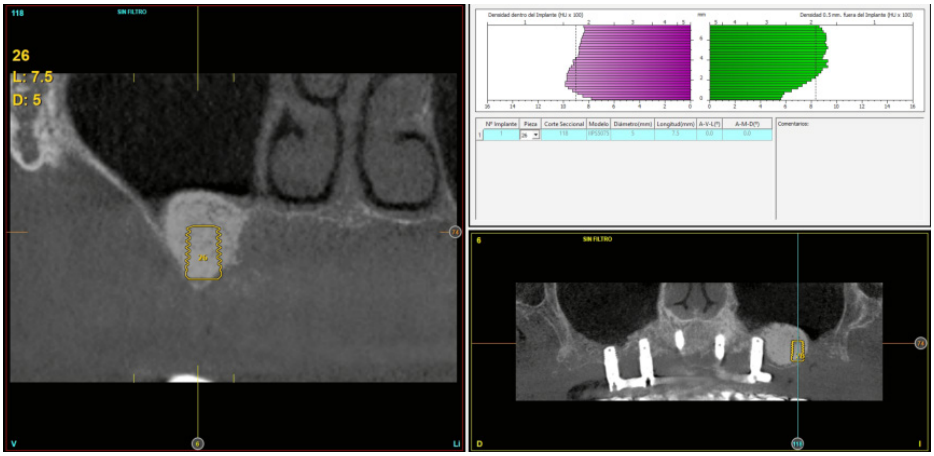


Figure 8: Post-sinus lift CT image.

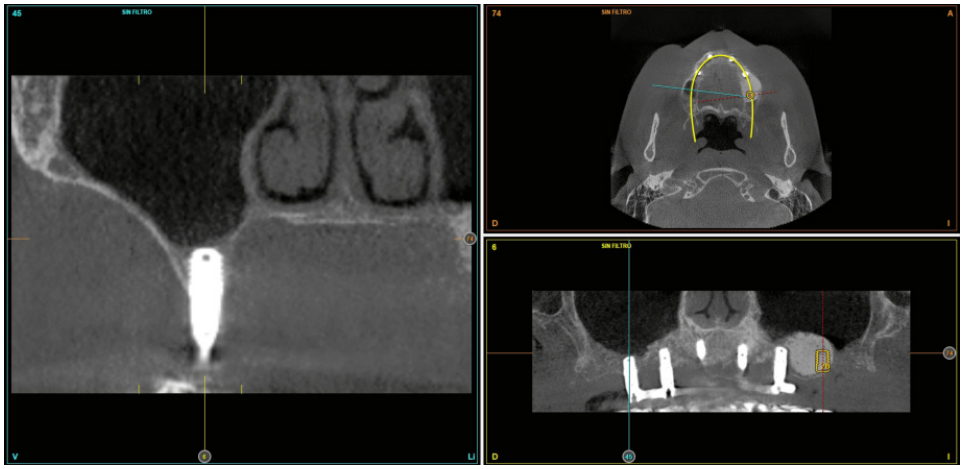


Figure 9: CT image of first quadrant rehabilitation with a short implant with a six months follow-up.

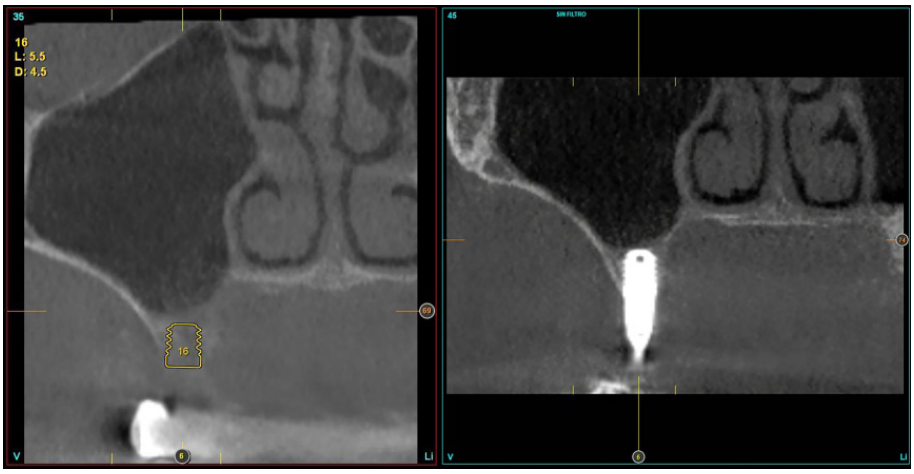
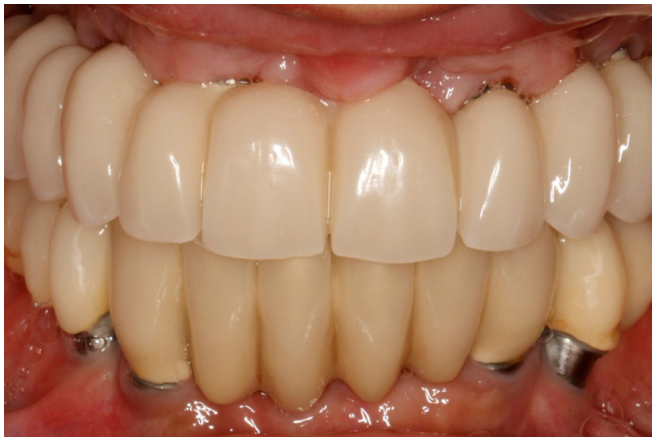
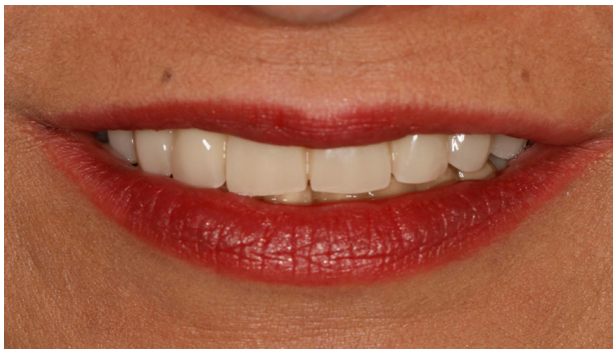


Figure 10: CT before and after in the follow-up of 6 month after the implant insertion and the immediate loading.





Figures 11-12: Images of the progressive loading prosthesis after insertion of the second quadrant implant.

Three months after progressive loading, the definitive prosthesis is made using a Cad-Cam milled structure on which ceramic is then placed. This prosthesis is screwed to the Multi-im transepithelials placed at the beginning of the treatment, thus maintaining the hermetic seal at the prosthesis-implant junction and favoring the stability of the soft tissues inserted at this level. The rehabilitation is divided into three sections to generate a better biomechanical behavior in the flexion of the maxilla during mastication, as can be seen in the final radiographs (Figures 13-15). The patient continues in treatment and three years later we can observe the stability of the treatment in the follow-up images compared with the initial state (figures 16-19).

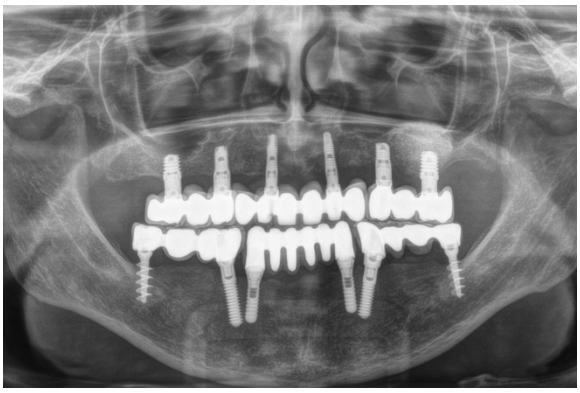
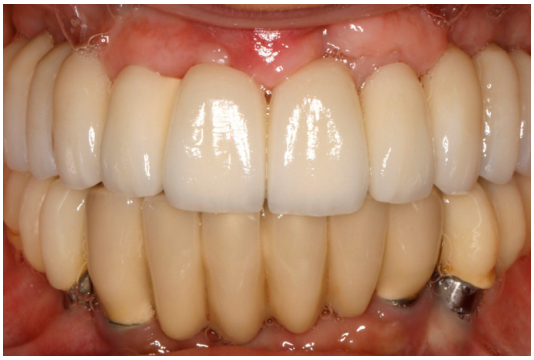
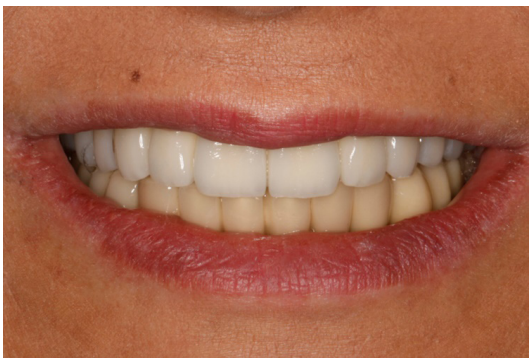
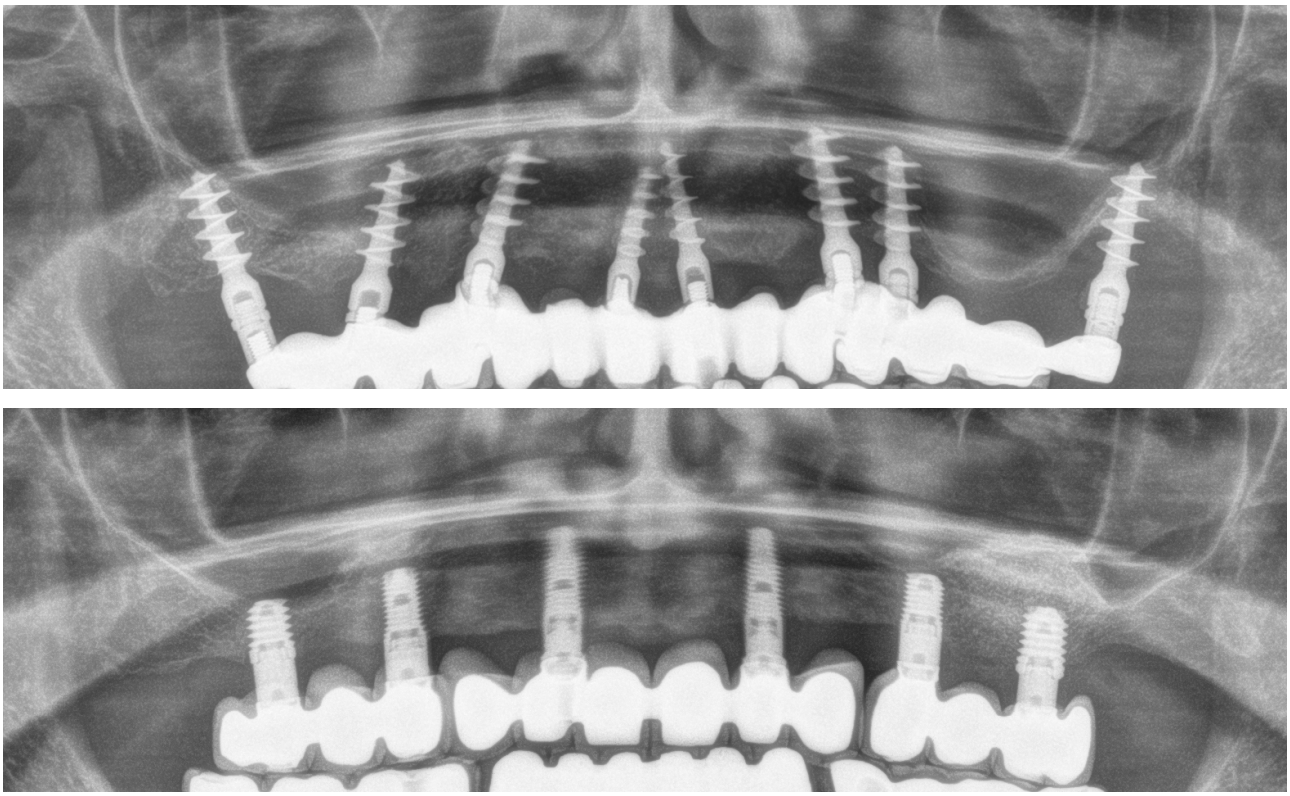


Figure 13: Final radiographic image of the rehabilitation placed after its elaboration. We can see how it has been divided into three sections to favor the biomechanics of the set and the dispersion of the tensions in the surrounding bone of the implants during mastication.

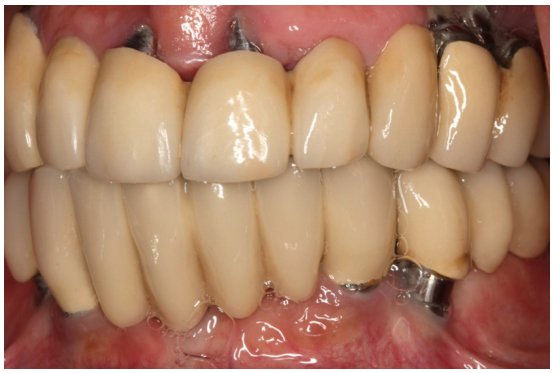


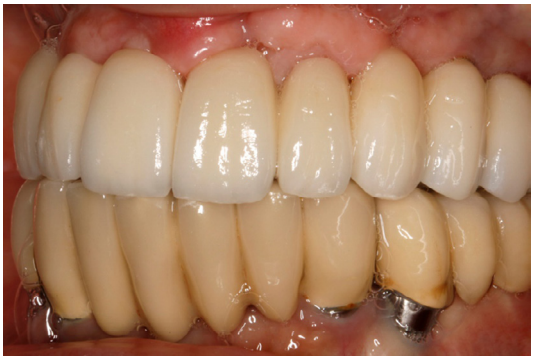


Figures 14-15: Images of the definitive prosthesis once it has been made and placed on the patient.



Figures 16-17: Initial and three-year radiographic images. We can observe the change in the rehabilitation (distribution and number of implants) and the stability of the treatment performed in the second instance.





Figures 18-19: Initial and three-year intraoral images. In these images we observe the change in the peri-implant soft tissues, as well as the stability of the final prosthesis.

Discussion

Implants affected by severe peri-implantitis with circumferential bone loss (type III or IV according to the classification of Jovanovic and Spiekermann (1995) [18], present a poor prognosis due to bacterial colonization of the surface and the impossibility of complete detoxification of the surface [12,19]. When conservative treatments are chosen, which do not involve implant extraction, either surgical or non-surgical, the survival rates of treated implants, even in less severe cases such as type II or IV, are low. Heitz-Mayfield [20] reports a five-year survival rate of 63% for implants treated for peri-implantitis, despite the fact that the initial year after treatment was 100%. In a systematic review on this subject, implant survival figures of 81.73%-100% at 3 years (seven studies), 74.09%-100% at 4 years (three studies), 76.03%-100% at 5 years (four studies) and 69.63%-98.72% at 7 years (two studies) [21] were obtained. For this reason, and due to the high predictability of the explantation kit and its protocol used in this article, our study group advocates the extraction of implants severely affected by peri-implantitis such as those shown in the current clinical case as a safe and predictable alternative [10-13]. Moreover, the possibility of being able to perform immediate retreatment in the patient, with the insertion of a new implant even in the same area and surgical procedure, often facilitates the approach to these cases [14]. In addition, we should bear in mind that peri-implantitis is a chronic infection with occasional flare-ups maintained over time and this fact can lead to bacteremia with repercussions on the general condition of the individual [22]. It has been shown that certain levels of pro-inflammatory proteins such as serum fibrinogen are higher in patients with peri-implantitis and cardiovascular problems than in those patients with this cardiovascular pathology without peri-implantitis. Although this association has not been recognized as evident because more studies are needed to support it, it seems that this association exists and should be studied in depth.

Conclusions

Advanced cases of peri-implantitis can be treated with the atraumatic explantation technique described in this article with high success rates. In addition, implant replacement in these patients with chronic recurrent infections is recommended, especially when the progression of the bone defect and the exposure of the implant surface makes it impossible to regenerate new bone in the affected area once the pertinent treatments to detoxify the area have been carried out.

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