

Multidisciplinary integration of odontology and sleep unit

Treatment of a patient with severe bruxism, loss of vertical dimension, tooth wear and fracture of dental implants

Dr Eduardo Anitua, DDS, MD, PhD, Spain



Bruxism can be defined as a repetitive masticatory activity in which teeth are clenched and/or grinded. It is accompanied by other symptoms such as headache, facial and muscular tension in the peri-oral area as well as in the head and neck and sometimes pain in the temporomandibular joint (TMJ).^{1,2} It was first described in medical literature in 1907 by Maria Pietkiewicz^{1,2} and was related to sleep in the first clinical approach. However later it has been shown that in some patients this habit also persists during the day, in phases of concentration or in moments of stress during daily activity.²⁻⁴ The main consequence of these parafunctional movements, in addition to the consequent distress to the TMJ, is tooth wear and the appearance of fractures and fissures in the dental enamel. The attrition in some patients can be so intense that it exposes the pulp cavities with the formation of irreversible pulpitis and even pulp necrosis, which in many cases requires endodontic treatment of the affected tooth.^{1,5}

Bruxism can be accompanied by sleep disorders, as well as body movements, respiratory problems, increased muscle activity and heart rhythm alterations.¹ Sleep disorders comorbid with bruxism include obstructive sleep apnea-hypopnea syndrome (SAHS), parasomnias, restless legs syndrome, mandibular myoclonus and rapid eye movement disorders.¹ SAHS is the sleep disorder most frequently associated with bruxism and other dental parafunctions and is nowadays a clear sign that the patient may suffer from this potentially lethal disorder. This association has been demonstrated in different epidemiological studies over the years.⁶⁻¹⁰ Our study group has further shown that the presence of dental wear in patients should result in a detailed analysis of

Fig. 1: Initial situation: Extreme wear of the upper arch with areas where dental pulp is practically exposed and moderate wear of the lower arch can be observed, as well as an implant without its crown in the mandibular anterior-inferior area. **Figs. 2 & 3:** Images of severe occlusal wear and collapsed bite, with contact only at the level of the anterior teeth, in addition to the extrusion of some pieces of the lower arch such as canines and premolars.

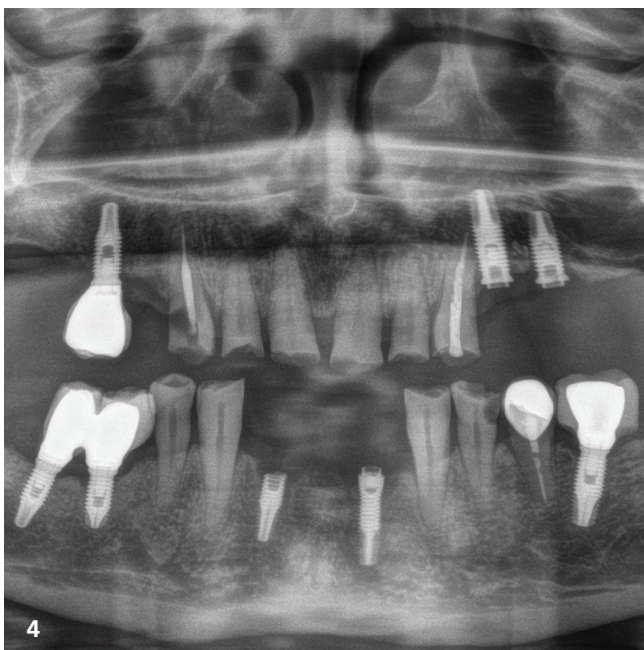
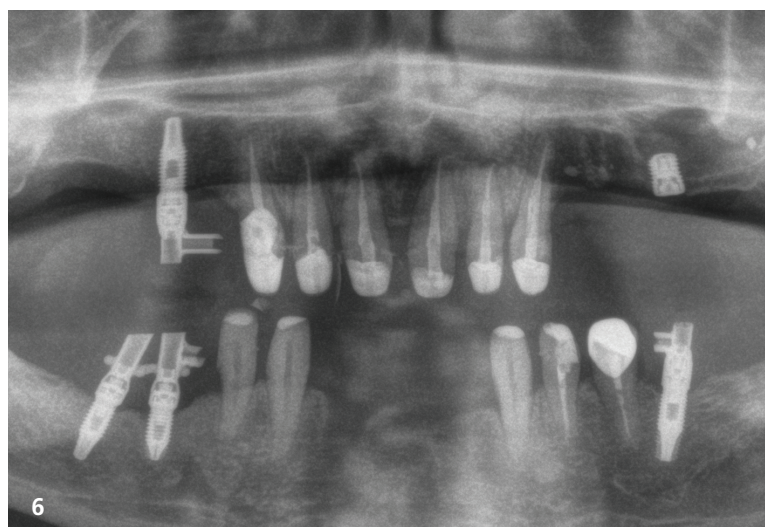
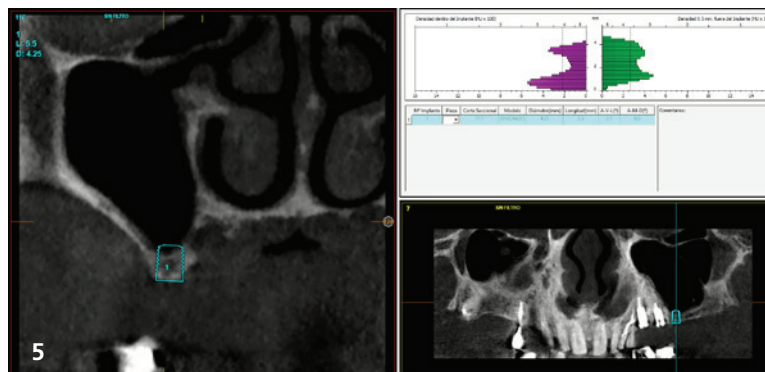


Fig. 4: Initial radiograph showing several caries in the remaining teeth as well as implants not loaded for different reasons. Fractured prosthetic components inside the connection within the two upper implants and the implant in position 32. Implant in position 42: fractured at the level of the implant crown. **Fig. 5:** Section of the planning CBCT showing how the extra-short implant can be placed in the second quadrant. **Fig. 6:** Panoramic radiograph after upper endodontics, core build-up and placement of temporary resin crowns to raise the vertical dimension.



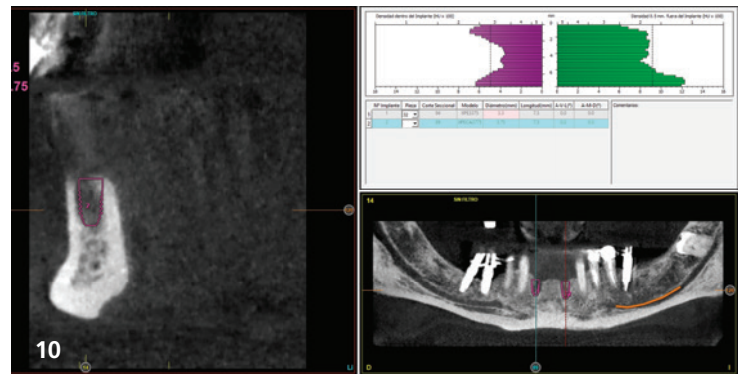
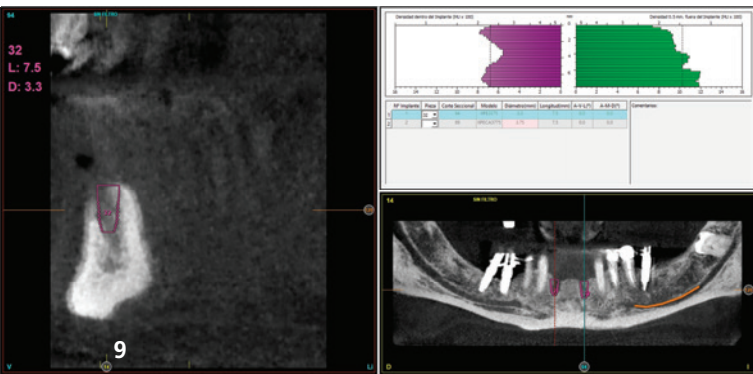
their sleep, since the degree of dental wear is directly related to SAHS by means of the apnea-hypopnea index (AHI).¹¹⁻¹³ This association is directly proportional, and it is confirmed that patients with more severe attrition also have a higher AHI index, which is also associated with a higher incidence of enamel, dental root and prosthesis fractures.¹²⁻¹⁴ Therefore, patients with moderate or severe dental wear, high enamel cracks and/or destruction of prosthetic restorations should undergo a sleep study to confirm or rule out the presence of this pathology. This need is twofold: on the one hand it is necessary to know if our patient

suffers from SAHS as it can be life-threatening, and secondly, rehabilitating a patient without solving this problem (if it exists in an underlying form) will lead to the failure of any rehabilitation placed since the presence of SAHS will continue to cause the patient to have uncontrolled episodes of occlusal tension.

The present clinical case shows a patient with extreme bruxism, with a very intense wear of the remaining teeth as well as several fractures of implant prostheses, their prosthetic components inside the implants and even the implants themselves. This patient was analysed both from dental and sleep unit points of



Figs. 7 & 8: Temporary situation after elevation of the vertical dimension.



Figs. 9 & 10: Planning CBCTs of the implants for the mandibular incisors, showing the area of the removed implants has already regenerated.

view and a joint treatment from both disciplines has been carried out to ensure the success of the procedure and achieve a substantial improvement in the patient's quality of life.

Clinical case

The 62-year-old male patient requested treatment for his very worn and highly sensitive teeth, and to replace missing teeth, some of which had already been replaced and the treatment had failed. In the initial examination, moderate dental wear could be observed in the lower arch, and severe dental wear in the upper arch, with areas where the pulp chamber could even be seen through the dentine. In the area corresponding to the lower left lateral incisor a fractured metal component was visible through the gingiva that the patient indicated to be a dental

implant (Fig. 1). In the lateral images, the evident existing dental wear, a collapse of the occlusion with an evident loss of the vertical dimension and an extrusion of the lower teeth leaving part of their root exposed to the oral milieu was observed. These images also showed that the entire occlusion rested on the anterior area (Figs. 2 & 3). The radiograph also showed several implants without loading: two in the second quadrant, with broken prosthetic components inside the implant and two lower implants, with broken components in one of them and a fracture of the implant head in the other implant. There were also several cavities and some restorations on implants that were currently in function without complications (Fig. 4).

Considering the patient's oral condition and other related symptoms (daytime tiredness and somnolence, snoring), the patient was referred to the sleep unit for a respiratory polysomnogra-

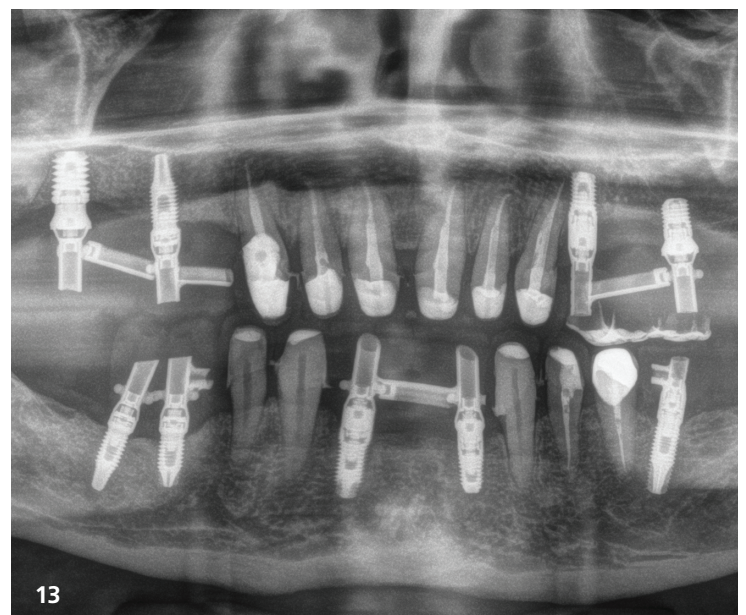
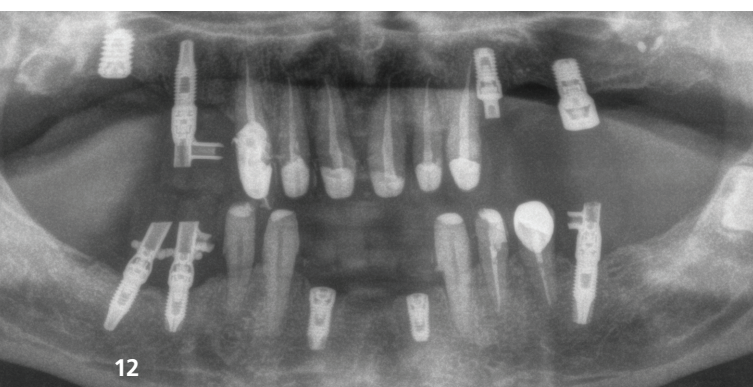
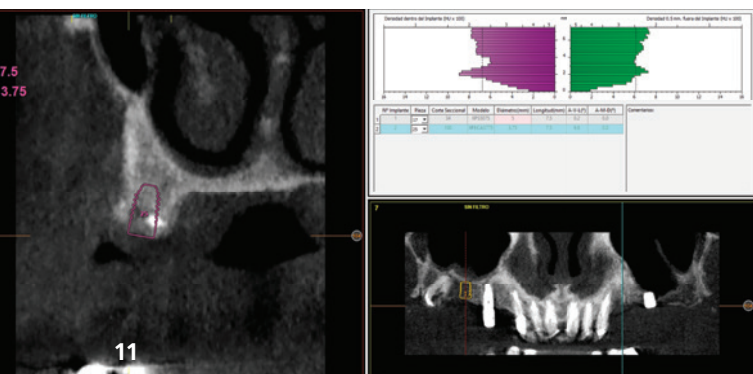


Fig. 11: Planning of the second quadrant implant placed in the area of previous implant removal. **Fig. 12:** Panoramic radiograph after insertion of the new implants. The patient continued with his provisional prosthesis while waiting for the new implants to be loaded. **Fig. 13:** Radiograph with the new progressive loading prostheses with all implants integrated.



Figs. 14 & 15: Intra-oral and smile appearance of the second set of provisionals.

phy. The result of the test indicated that the patient suffers from SAHS, with mild apneas, with an AHI of 11.8 (in supine decubitus). Thus, treatment with a mandibular advancement device (DIA-Biotechnology Institute) was indicated once occlusal stability had been recovered to stabilise the device. It was decided to begin treatment by recovering the patient's vertical dimension, for which it was necessary to perform several root restorations in the anterior-superior sector and to place provisional crowns, as well as to replace the current implant prostheses with provisional prostheses with the required increase in height.

In addition, surgery was scheduled to explant all the implants that were unloaded and not recoverable due to serious damage to the internal screw and fractures. Further a distal implant was placed in the second quadrant behind the explantations, which was decided to be an extra-short implant (5.5 mm), thus

avoiding a sinus lift at this level (Figs. 5 & 6) and reducing the morbidity of the process. This first opening of the vertical dimension with provisional prostheses allowed us to configure the final occlusal pattern and to generate a progressive extension of the masticatory muscles which was very contracted (Figs. 7 & 8).

Three months later, the implants could be placed in the areas of the explantations that are completely regenerated. For this purpose, the provisional prostheses were removed, and the implant placement surgery was performed in the lower incisor area (Figs. 9 & 10). The second quadrant area was also ready to receive the implant and an additional implant was placed in the first quadrant for greater stability in the future implant-supported rehabilitation of that area (Fig. 11). The patient continued with the provisionals, waiting for the new implants to be loaded,

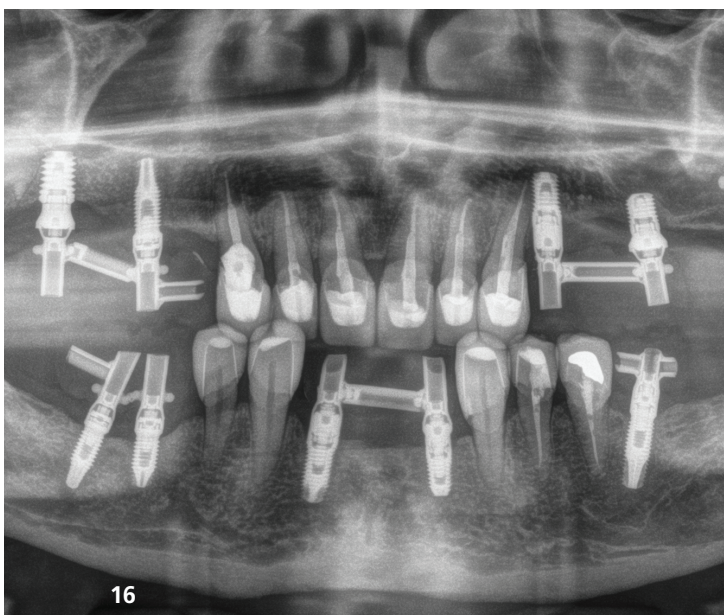


Fig. 16: Radiograph with the definitive crowns and the provisional prostheses on implants adapted to them. **Figs. 17 & 18:** Clinical images of the final crowns on teeth and implants. The aesthetic parameters achieved in this phase can be observed and the occlusion, vertical dimension and occlusal plane are stable.

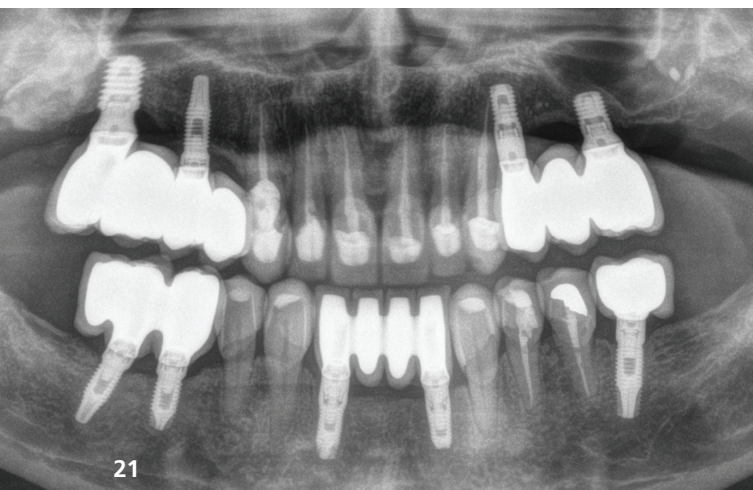
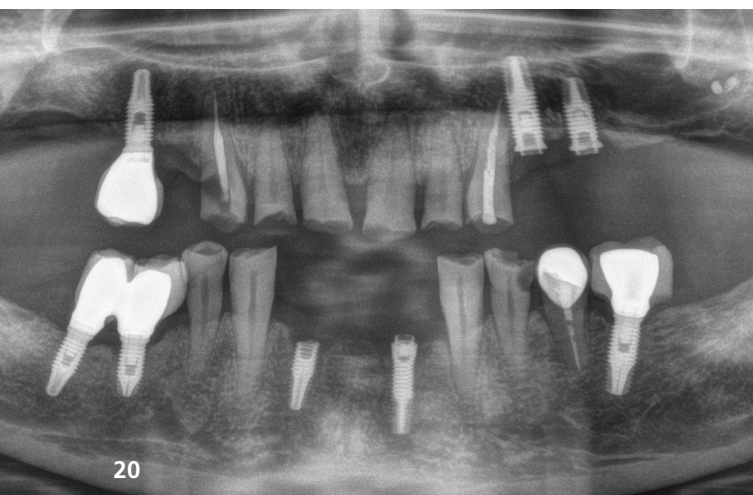
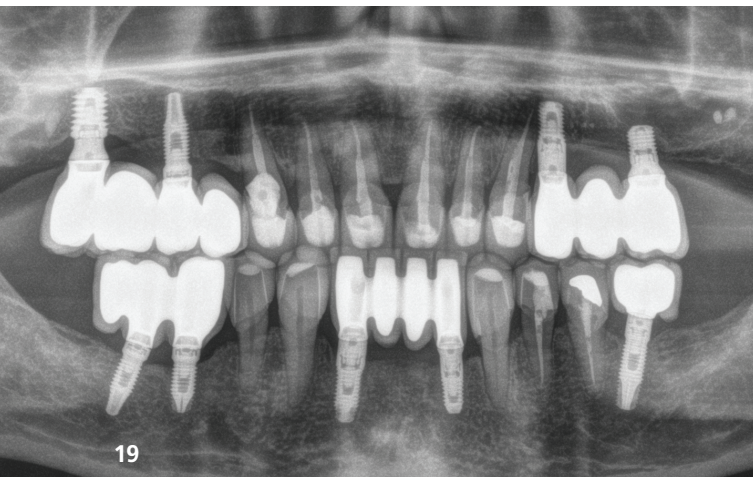


Fig. 19: Final radiograph of the patient with the complete prostheses and the definitive crowns. **Figs. 20 & 21:** Initial and final radiograph at one year follow-up with total stability of the treatment achieved.

which were scheduled in two surgical phases, while occlusal adjustment of the new vertical dimension continued (Fig. 12).

A further three months later, with the implants perfectly integrated in both the upper and lower arches, a second set of

progressively loaded provisionals was made, including all the upper and lower implants. They were still resin prostheses to allow all the necessary adjustments to be made during these planning phases of the vertical dimension. Implant prostheses were also elaborated with a metallic base structure of articulated bars and the resin with the necessary anatomy was loaded on it (Figs. 13–15). These prostheses also provided the opportunity to carry out the aesthetic adjustments requested by the patient for the final prosthesis.

Two months later, a stable vertical dimension was achieved, and the definitive crowns were placed. These crowns were made of ceramic (e.max) and cemented with resin cement. Once in place, the implant-supported temporaries were leveled for the final provisional phase (Fig. 16). One month later, the definitive crowns for the implants were placed, thus completing the case. The crowns on implants were screwed on multiple transepithelial (Multi-im) in metal-ceramic with metal drilling by CAD/CAM and subsequent addition of the ceramic by hand (Figs. 17–19). The aesthetic parameters achieved in this phase can be observed and the occlusion, vertical dimension and occlusal plane are stable.

At this point the patient was referred to the sleep unit, to treat his SAHS as good anterior and posterior stability and a recovered vertical dimension were achieved. The patient was treated with the mandibular advancement device and after two titrations with a change of tensor (to achieve the minimum effective protrusion) the patient's AHI was reduced to 3. The patient continued to undergo revisions and there were no prosthetic complications or fractures of the rehabilitation components one year later (Figs. 20–25).

Discussion

It is of vital importance to identify the possible causal factors that have led the patient to a situation of severe tooth wear and to be able to correct the situation from a prosthetic point of view, avoiding the relapse of the situation by addressing all the factors involved, because if only the function is rehabilitated, without paying attention to the parafunctional habits and their etiology, we will be doomed to a new failure.^{15,16} It is evident that once the occlusion has deteriorated to the point of generating a bite collapse and vertical dimension, the patient cannot be treated only from the point of view of the sleep disorder, or prevent further wear by rehabilitating the bite, but rather a multidisciplinary approach must be taken addressing all the factors that can influence or prolong the situation. Therefore, approaches that only focus on one of the issues usually fail in the long term in this type of cases, resulting in added frustration for the professional and the patient, who find that time and time again the treatments performed do not produce the desired result.^{17,18}

It is also necessary for a correct result of the case not to produce severe muscular distension in patients with such a collapsed bite, considering that the opening action of the vertical



Figs. 22–25: Images before and after treatment at one year of follow-up showing the stability achieved and the preservation of the rehabilitation.

dimension produces a great stretching in the masticatory muscles and can generate contractures and imbalances during the reconstruction phase. Thus the more malleable and soft materials such as composite resins and the progressive stretching of the musculature through provisional prostheses can be the key to a correct result.^{19–23} Planning is therefore of utmost importance, as in other complex cases, thus avoiding very large openings of the vertical dimension in a short time and the use of definitive prostheses without going through different phases of provisionalisation that allow us to accommodate the articulation, musculature and occlusal pattern.^{19–25}

Finally, it is important to bear in mind that patients with significant dental wear should undergo a SAHS evaluation before undergoing dental rehabilitation and that this syndrome should be treated concomitantly once the necessary occlusal support is achieved. Tooth wear should be treated as another sign of possible SAHS and dentists should be aware of it and include it in their differential diagnoses.

Conclusion

The multidisciplinary approach between the Sleep Unit and Odontology has led to the comprehensive treatment of a patient with severe dental wear and SAHS, and further resulted in maintaining this treatment in the long term.



Literature



Author details



Contact address

Dr Eduardo Anitua

Eduardo Anitua Foundation

José María Cagigal 19, Vitoria, Spain

+34 945 160653

eduardo@fundacioneduardoanitua.org