INFLUENCE OF BRUXISM ON THE INDICATION AND FOLLOW-UP OF REHABILITATIONS WITH DENTAL IMPLANTS

ABSTRACT

AIM: The objective of this study was to report a clinical case highlighting the main recommendations of the literature to minimize forces applied on implants. **MATERIAL AND METHODS:** A decision was made to increase the number and size of implants installed. Screwed and cemented prostheses were used, combined with an occlusal bruxism night guard. **RESULTS:** Four months after the prosthesis installation, no biological or biomechanical complications were encountered. **CONCLUSION:** There are cases of patients with parafunctional habit who require oral rehabilitation with implants. There are guidelines that enable planning and rehabilitation. It is important to monitor cases to assess the behavior of implants and their suprastructures.

MENINE, Cynthia Weiss*
MARTIN, Juliana Maria Habith**
BEREJUK, Halina Massignan*
SARTORI, Ivete Aparecida de Mattias***

KEYWORDS

Bruxism. Dental implants. Oral rehabilitation.

Latin American Institute of Dental Research and Education, Curitiba, PR, Brazil*
Department of Restorative Dentistry, Pontific Catholic University of Paraná, Curitiba, PR, Brazil**
University of São Paulo, Ribeirão Preto Dental School, Ribeirão Preto, SP, Brazil***
Correspondence: ivetemsartori@gmail.com (SARTORI IAM)

| **Received** 16 Mar 2015 **Received in revised form** 25 Mar 2015 **Accepted** 28 Mar 2015

INTRODUCTION

Several studies have described bruxism as a non-functional motor activity, in which clenching and/or dental grinding are present[1,2]. According to some reports, it affects 10% of the general adult population[3], 20% self-report daytime bruxism and 8% nighttime bruxism[4].

One study quotes Darwin, who reported that a human feeling pain may have the mouth slightly compressed or, more often, retracted lips and clenched teeth[5,6]. A few years later, the term "bruxomania" was introduced to describe the habit of grinding teeth, and it was believed it was caused by cortical brain damage and, occasionally, spinal cord disorders.[5,7] The term is derived from the Greek word "brychein", which translates as grinding teeth.[5]

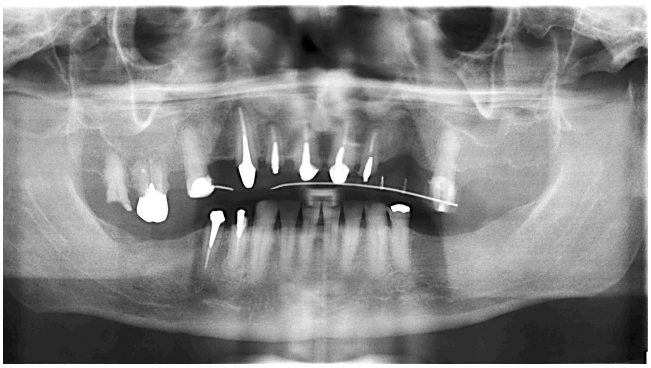
Unlike functional behavior such as talking, chewing or swallowing, parafunctional activities appear to have no functional purpose.[8] For this reason, bruxism is often considered a risk factor for survival of implants.[1] It may cause overload on implants and their suprastructures[1,9], leading to bone loss or implant failure.[1]

Partially or completely edentulous patients with bruxism are difficult to treat. There are always doubts about the best therapy to adopt.This study was designed with the objective to report a case highlighting the main recommendations of the literature to minimize forces applied on implants.

CASE REPORT

A 53-year-old male, J.L.S., sought the dental clinic at ILAPEO (Latin American Institute of Dental Research and Education) with the aim of improving his aesthetics and masticatory function.A panoramic radiograph (Figure 1) was taken.

Figure 1. Initial panoramic radiograph.



Clinical examination revealed posterior edentulous spaces in both arches, provisional restorations in the maxilla (Figure 2) and wear facets on the incisal edges of the lower teeth (Figure 3). Masseter hypertrophy (Figure 4) combined with tooth wear were in line with the patient's reports about grinding and clenching.

Five months after extraction of teeth #1 and #2, the right maxillary sinus was surgically lifted (Figure 5). Two 4.3 x13mm Alvim CM type (Neodent, Curitiba, Brazil) implants were installed in the region of #3 and #2.The insertion torque for both was 45Ncm. In the

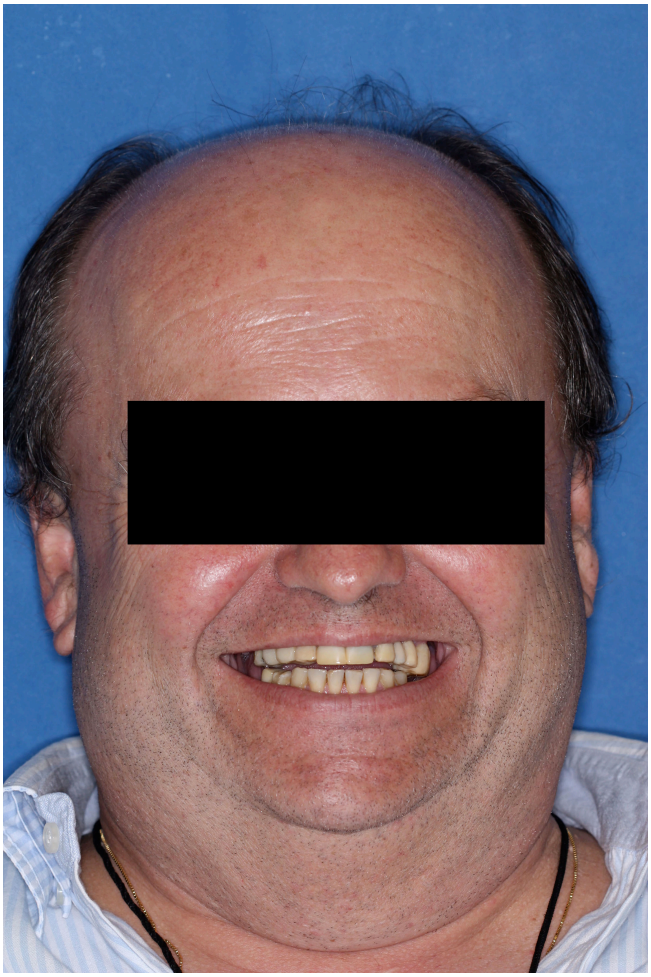
region of tooth #5 a Titamax CM EX implant (Neodent), 3.75 x 13mm, was installed, with insertion torque of 60Ncm.

Figure 2. Occlusal view of maxilla after extraction of teeth #1 and #2.

Figure 3. Occlusal view of the mandible.

After four months, implants were placed in the mandible in the regions of #20 (Alvim CM, 4.3x11.5mm, Neodent), #19 (Titamax CM Medular, 3.75x11mm, Neodent) and #30 and #31 (Titamax CM EX, 3.75x11mm, Neodent). The insertion torques were 45 Ncm, 60 Ncm, 60 Ncm and 70 Ncm, respectively. The following month, two more implants were installed in the areas corresponding to #11 and #12 (Alvim CM, 3.5x13 mm, Neodent). The insertion torque was 65 Ncm. Approximately five months later, tooth #7 was extracted and a Drive CM (4.3x16mm, Neodent) implant was installed with 60 Ncm torque.

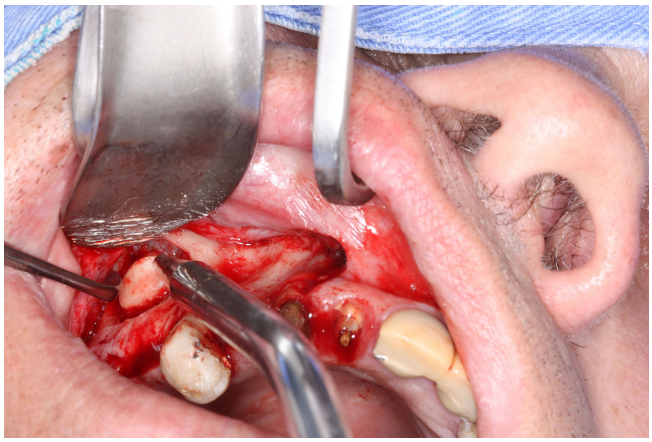
Figure 4. Initial frontal appearance of the smile.



After the osseointegration period, the prosthetic phase of the treatment began. First, the patient's vertical dimension of occlusion (VDO) was established by installing new provisional crowns (Figure 6). The patient was

given three months to adapt before the impressions were taken, for the subsequent copings trial and occlusal registration.

Figure 5. Surgical procedure for sinus lifting and installation of maxillary implants, right side.



The porcelain crowns followed the same guidelines as the provisional crowns: mutually protected occlusion, VDO, anatomy and Spee curve (Figures 7-10).

The patient was recommended to use an occlusal night guard, in order to minimize forces from the parafunctional habit and protect the teeth and implants from possible complications. This guard was made of acrylic resin with the mandible in centric occlusion.

The buccal cusps of the lower teeth uniformly touched the flat surface of the guard and protrusion and lateral movements were in line with the principles of mutually protected occlusion (Figures 11 and 12).

Follow-ups took place monthly. Four months after installation of the prostheses, there were not any biological or biomechanical complications (Figure 13 and 14).

Figure 6. Provisional rehabilitation in acrylic resin.

Figure 7. Front view of cemented crowns.

Figure 8. Checking the right posterior occlusion teeth.

Figure 9. Checking the left posterior occlusion teeth.

Figure 10. Checking the anterior occlusion teeth.

Figure 11. Occlusal guard.

DISCUSSION

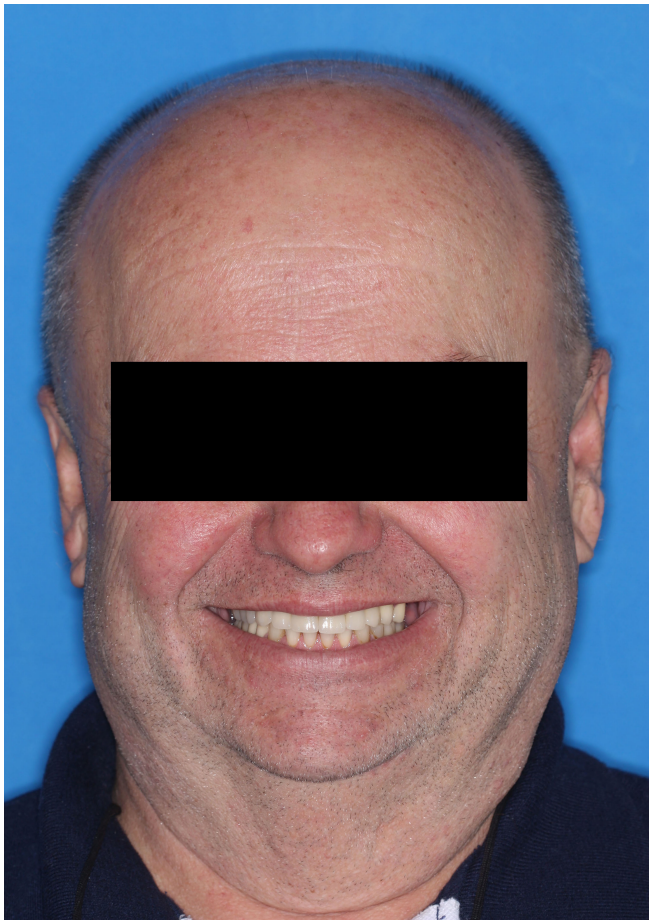
Although there is a growing amount of knowledge about the etiology, diagnosis and management of bruxism, there is still little evidence about whether it causes overload on dental implants.[3] One study found that most guidelines for treating bruxism patients undergoing rehabilitation with implants are based on individual opinion and not on scientific information.[2] Other studies have also noted the small amount of reliable evidence on the topic.[2,10-12] However, when therapy is required, as in the case presented here, it is necessary to know the indications, limitations and necessary care.

Figure 12. Front view of the patient.

The clinical case presented some characteristic signs of bruxism, such as wear facets in the lower teeth[1,10] and swelling of the masseter muscle[2]. The suspicion was confirmed through anamnesis, because the patient reported daytime clenching. Although studies have considered that the etiology of tooth wear is multifactorial[13], i.e., the worn teeth do not characterize the habit, there were other confirming factors in this case.According to this study, a combination of phenomena:

erosion, abrasion and attrition, which are the result of patterns of jaw movements, concomitant disorders (for example, gastric reflux) and external factors, such as consumption of acidic drinks, may be the cause of wear.In addition to hypertrophy of the masseter, another sign that might indicate parafunctional habit is the existence of tooth marks on the tongue.[14]

Figure 13. Final front aspect of the smile.



Despite the fact that polysomnography is becoming accepted as an effective tool to confirm bruxism[8,15], this diagnostic resource was not used because there were clear signs of parafunctional habit. Therefore, the guideline that anamnesis combined with clinical examination is still the best alternative to diagnose bruxism was chosen.[2]

Figure 14. Final panoramic radiograph.

Since this patient required rehabilitation with implants, a literature review enabled us to understand the various measures required to minimize possible complications by reducing the forces applied to the implants[1,2].Thus, the number of implants was increased[1,2,12,16]and an implant was installed for each missing tooth, thereby avoiding the presence of a free or cantilevered extremity, which could be detrimental.[1,2,10,16] The diameter and the length of implants were also larger[1,2,12,16] where possible, to reduce the impact of forces generated by bruxism.

Screwed and cemented implant-supported prostheses were used, in line with studies that recommend the mechanical bonding of implants using prostheses to create better distribution of forces, thus reducing stress in bone surrounding implants.[1,2] Regarding the type of prosthesis, screwed

implants are recommended, because they are easily reversible, which is very useful when there is fracture of the implant or in long-term treatments.[12]

In order to distribute the forces on the long axis of the implant, the prostheses should be designed to decrease the occlusal area with reduced inclination of the cusps in order to minimize the lateral forces resulting from eccentric parafunctional movements[2,10,11]. These recommendations were followed in this case as much as possible.

The patient received guidelines regarding daily control of bruxism and was advised to use a smooth acrylic resin night guard. Occlusal guards improve the distribution of loads resulting from teeth grinding, redirecting them vertically[1], and also prevent dental damage and wear[2]. These principles have also been applied to rehabilitation with implants. Another purpose of guards is to assess the severity or effects of bruxism, by observing how much the guards themselves become worn.[11]

In the months following the completion of the rehabilitation treatment, attention should be paid to possible consequences of occlusal overload on implants. These effects can be divided into two groups: biological and biomechanical complications. Biological complications consist of implant loss before the completion of osseointegration, or bone loss around osseointegrated implants. Biomechanical complications consist of failure of one or more system components (for example, fracture of the implant, loosening or fracture of the connection screws or screws of the intermediate, excessive wear or porcelain or acrylic fracture)[1]. Monthly follow-ups were carried out after the end of rehabilitation in order to check the occlusal contacts and reinforce the advice regarding care.

Studies have found greater number of biomechanical complications with bruxism patients.[16-19] Similarly, one study found an increase of biological complications (loss of implants) in patients with parafunctional habit[20]. On the other hand, others have reported no association between bone loss and occlusal overload[21,22]. Another study was not successful when trying to establish a cause-effect relationship between bruxism and implant failure, and attributed this result to the paucity of research in which the materials are fully comparable.[1] A study in monkeys found increased bone resorption around implants when occlusal trauma was induced, even in healthy peri-implant tissue.[23] Another study in dogs, concluded that occlusal overload represents the lowest, if any, risk to the integrity of dental implants in an inflammation-free tissue.[24] These data reflect that the literature remains controversial and there is no evidence that bruxism is the cause of implant failure.

Measures should be taken when there

are complications with implants and their suprastructures. In the event of recurrent cases of breaking or loosening of screws, a reassessment of the prosthesis should be carried out, since these signals indicate lack of passive adaptation and are generally followed by the implant fracture. [16] In cases where the occlusal guard use does not help to reduce the effects of bruxism, the use of Pergolide, an agonist of dopamine D1 and D2 receptors, has demonstrated lasting efficacy in the management of bruxism.[15]

CONCLUSION

Based on the literature and clinical experience, it seems reasonable to conclude that (1) there are cases of patients with parafunctional habit who require oral rehabilitation with implants; (2) there are guidelines that enable planning and rehabilitation; (3) it is important to monitor cases to assess the behavior of implants and their suprastructures.

REFERENCES

1. Lobbezoo F, Brouwers JE, Cune MS, Naeije M. Dental implants in patients with bruxing habits. J Oral Rehabil 2006;33(2):152-9.

2. Manfredini D, Bucci MB, Sabattini VB, Lobbezoo F. Bruxism: overview of current knowledge and suggestions for dental implants planning. Cranio 2011;29(4):304-12.

3. Lobbezoo F, Van Der Zaag J, Naeije M. Bruxism: its multiple causes and its effects on dental implants - an updated review. J Oral Rehabil 2006;33(4):293-300.

4. Lavigne GJ, Khoury S, Abe S, Yamaguchi T, Raphael K. Bruxism physiology and pathology: an overview for clinicians. J Oral Rehabil 2008;35(7):476-94.

5. Nadler SC. Bruxism, a classification: critical review. J Am Dent Assoc 1957;54(5):615-22.

6. Darwin, C. Expression of the emotions in man and animals. New York, D. Appleton and Co., 1898. apud Nadler SC. Bruxism, a classification: critical review. J Am Dent Assoc 1957;54(5):615-22.

7. Nadler SC. Bruxism, a classification: critical review. J Am Dent Assoc 1957;54(5):615-22.

8. Tosun T, Karabuda C, Cuhadaroglu C. Evaluation of sleep bruxism by polysomnographic analysis in patients with dental implants. Int J Oral Maxillofac Implants 2003;18(2):286-92.

9. Becker W, Becker BE. Replacement of maxillary and mandibular molars with single endosseous implant restorations: a retrospective study. J Prosthet Dent 1995;74(1):51-5.

10. Hsu YT, Fu JH, Al-Hezaimi K, Wang HL. Biomechanical implant treatment complications: a systematic review of clinical studies of implants with at least 1year of functional loading. Int J Oral Maxillofac Implants 2012;27(4):894-904.

11. Komiyama O, Lobbezoo F, De Laat A, Iida T, Kitagawa T, Murakami H, Kato T, Kawara M. Clinical Management of Implant Prostheses in Patients with Bruxism. Int J Biomater 2012;2012:369063.

12. Ng DY, Wong AY, Liston PN. Multidisciplinary approach to implants : a review. N Z Dent J 2012;108(4):123-8.

13. Johansson A, Johansson AK, Omar R, Carlsson GE. Rehabilitation of the worn dentition. J Oral Rehabil 2008;35(7):548-66.

14. De Boever JA, Nilner M, Orthlieb JD, Steenks MH; Educational Committee of the European Academy of Craniomandibular Disorders. Recommendations by the EACD for examination, diagnosis, and management of patients with temporomandibular disorders and orofacial pain by the general dental practitioner.J Orofac Pain 2008;22(3):268-78.

15. Van der Zaag J, Lobbezoo F, Van der Avoort PG, Wicks DJ, Hamburger HL, Naeije M. Effects of pergolide on severe sleep bruxism in a patient experiencing oral implant failure. J Oral Rehabil 2007;34(5):317-22.

16. Balshi TJ. An analysis and management of fractured implants: a clinical report. Int J Oral Maxillofac Implants 1996;11(5):660-6.

17. Brägger U, Aeschlimann S, Bürgin W, Hämmerle CH, Lang NP. Biological and technical complications and failures with fixed parti al dentures (FPD) on implants and teeth after four to five years of function. Clin Oral Implants Res 2001;12(1):26-34.

18. Ekfeldt A, Johansson LA, Isaksson S. Implant-supported overdenture therapy: A retrospective study. Int J Prosthodont 1997;10(4):366-74.

19. Salvi GE, Brägger U. Mechanical and technical risks in Implant therapy. Int J Oral Maxillofac Implants 2009;24 Suppl:69-85.

20. Glauser R, Rée A, Lundgren A, Gottlow J, Hämmerle CH, Schärer P. Immediate oclusal loading of Brånemark implants applied in various jawbone regions: a prospective, 1-year clinical study. Clin Implant Dent Relat Res 2001;3(4): 204-13.

21. Lindquist LW, Carlsson GE Jemt T. A prospective 15-year follow-up study of mandibular fixed prostheses supported by osseointegrated implants. Clinical results and marginal bone loss. Clin Oral Implants Res 1996;7(4):329-36.

22. Zortuk M, Kilic E, Yildiz P, Leblebicioglu I. Effect of parafunctional force on dental implant treatment in bruxism: a case report (two year results). J Int Dent Med Res 2011;4:25-29.

23. Miyata T, Kobayashi Y, Araki H, Ohto T, Shin K. The influenceof controlled occlusal overload on peri-implant tissue. Part 3: A histologic study in monkeys. Int J Oral Maxillofac Implants 2000;15(3):425-31.

24. Heitz-Mayfield LJ, Schmid B, Weigel C, Gerber S, Bosshardt DD, Jönsson J, Lang NP, Jönsson J. Does excessive occlusal load affect osseointegration? An experimental study in the dog. Clin Oral Implants Res 2004;15(3):259-68.