THE EFFECT OF BRUXISM ON NATURAL TEETH AND PROSTHETIC RESTORATIONS- REVIEW

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ABSTRACT

Purpose. Based on the results of existing research in the literature on bruxism and prosthetic treatment, an attempt was made to draw conclusions about the existence of a possible relationship between the two. Material and method A literature search was conducted for articles in Medline/PubMed and School Google for articles using the terms "bruxism, "prosthetic treatment", dental wear, and relevant studies were analyzed.

Results. Bruxism is a parafunctional habit with a multifactorial etiology. The role of bruxism in the etiology of dental wear is unclear, not considered a major cause. There is no specific treatment to stop bruxism, including prosthetic treatment. The present review addresses the relationship between bruxism and prosthetic treatment, mainly the effect of bruxism on prosthetic restorations.

Conclusions. Bruxism can be included among the risk factors that generate difficulties during oral, dental or prosthetic rehabilitations with support on natural teeth or implants. These difficulties are represented by a large number of cases of failure in rehabilitation therapy in patients with bruxism.

Key words : bruxim, natural occlusion, artificial occlusion

INTRODUCTION

Bruxism is considered the most serious parafunction of the stomatognathic system, being characterized by a strong, isometric contraction of the lifting muscles with the arches in centric or eccentric dental contact [1.2].

There have been many researchers who have tried to define these conditions as accurately as possible. Among them we mention: Ramfjord says that "bruxism is the conscious or unconscious activity of grinding, rubbing or clenching the teeth of the two arches during the day or at night." , and Lavigne et al. Based on studies, the definition of bruxism has evolved from the first considerations referring to dento-dental contacts and muscle contractions to considerations referring to behavioral aspects and knowledge of sleep problems.

The National College of Occlusology Paris shows that bruxism is characterized by continuous or rhythmic motor activity of the masticatory muscles with occlusal contacts, and Rozencweig shows that buxism is characterized by involuntary and unconscious contractions of the masticatory muscles and outside the psychological function.

In 1990 the American Academy of Sleep [3] defined bruxism as a parasomnia because it is a physical phenomenon that

occurs during the disease, in 2005 Lobbezoo et al. define bruxism as a repetitive jaw-muscle activity characterized by tightening or abrasion of teeth and/or stretching or pushing of the jaw [4].

Two forms of bruxism are described: diurnal and nocturnal. Both nocturnal and diurnal bruxism are subclassified into either primary, unrelated to another medical condition, or secondarily associated with neurological disorders or as an adverse effect of medications. Diurnal bruxism is caused by frustration, anxiety and fear, while nocturnal bruxism manifests itself as the forceful clenching of teeth [5, 6].

Some authors have pointed out that sleep and waking bruxism should be viewed as two different entities, perhaps with different etiologies, pathophysiology, risk factors and management plans.

From data recently published in the literature, there is a consensus regarding the multifactorial etiology of bruxism. Premature contacts and traumatogenic occlusion (Karoly) were first considered, so that lately endogenous, neuro-muscular, psychic factors have been incriminated. Authors such as Attanasio and Lobbezoo cited by do Nascimento (2008) show that the etiology of nocturnal bruxism involves local, systemic, psychological and hereditary factors. In the evolution of research on the etiology of this parafunction, an important moment was the consideration of stress as a determining factor. Studies conducted by Rugh and Soldberg (1979) showed that increasing stress levels also increase episodes of bruxism. The role of cognitive-behavioral factors in generating bruxism was also discussed by Clark and Major. (1999), Bader and Lavigne (2000), Kato et al. 2003, which states that patients with nocturnal bruxism have an anxious personality.

In terms of epidemiological prevalence, it is difficult to estimate due to wide variations in methods and diagnosis applied, types of bruxism and differences between examined samples. Various studies show that it is between 8% and 31% in adults. [8, 9,10]; Reding et al. give a frequency of 15.1% in patients aged 13 to 17 years. Oltean et al. [12] states that bruxism has a peak incidence between 24 - 25 years and that most bruxomanis (80%) are not aware that they have this condition, and epidemiological studies published by Ohayon et al. [15,] showed a prevalence of nocturnal bruxism in men between 3.1% and 4.6%, and in women it was between 4.1% and 5.1%. The highest prevalence of nocturnal bruxism was seen in subjects aged 19 to 44 years, and the lowest prevalence of nocturnal bruxism was in older patients up to 65 years.

In the oral cavity, bruxism produces significant manifestations in teeth and periodontal tissues, maxillary bones, jaw lifting muscles, pain and TMJ dysfunction. [14].

Based on the results of available research on bruxism and its effects on the dento-maxillary apparatus, attempts have been made to find a possible causal relationship between the two.

Therefore, the purpose of this paper is to review the literature on the relationships that may exist, directly or indirectly, between bruxism and prosthetic treatment.

MATERIAL AND METHOD

A literature search was conducted for peer-reviewed articles, Medline (PubMed) and school Google for articles

using the terms "bruxism, "prosthetic treatment", dental wear. The desired items were obtained manually from well-known prosthetic references, such as The Journal of Prosthetic Dentistry, International Journal of Proprosthodontics, Journal of Oral Rehabilitations and Journal of Prosthodontics. Since literature on such broad topics would be abundant, the review focused on selected combinations of the two search terms, focusing on the relationship between bruxism and prosthetics, including fixed and removable dentures. The PubMed search for "bruxism" and "prosthetics" revealed a large number of titles and study revisions when the terms were used separately, but relatively small numbers when combined with other terms.

Articles that did not focus exclusively on the relationships that may exist between bruxism and prosthetic treatment were excluded from further evaluation.

PubMed results showed a large number of articles for bruxism, but after applying the limitations, only 66 articles remained. Of these, only 42 relevant articles have been revised and are being discussed in the forthcoming revision. This review aims to provide an overview of the effects of bruxism on dental arches and considerations regarding the choice of materials and treatment techniques.

Effects of bruxism on natural teeth.

Dental wear. The loss of dental tissue from bruxism is called by Ionita S.[18] pathological abrasion, while other authors use the term dental wear [16,17]. Although dental wear is the most important sign of bruxism, in recent years other factors related to dental wear have been highlighted, such as tooth erosion (Johansson et al. 2008). Studies involving patients diagnosed with polysomnography have also reported that there is no considerable relationship between bruxism and tooth wear or temporomandibular dysfunction. [20,26,24] . Therefore, the presence of dental wear is not enough to establish the diagnosis of bruxism. However, a systematic review of the literature concluded that "wear appears to coexist with bruxism," but no clinical trials investigating the influence of nocturnal bruxism on tooth wear have been reported. A recent literature review reinforces the concept of multifactorial etiology of dental wear [12].

Regardless of etiology or clinical form, it will be necessary to restore affected teeth that will involve complex prosthetic treatments. There are insufficient studies on the outcome of prosthetic restoration of worn teeth, which leads to different opinions of prosthetists in different countries on how these complex treatment situations should be managed.

►**Effects of bruxism on dental bridges on natural teeth** Regarding the impact of bruxism on fixed dentures, literature studies have stated that such components shortened the longevity of restorations [12, 27, 29]. Systematic reviews have shown that the survival rate of these types of conventional restorations is 94% after 5 years and after 10 years 89% [29]. Parafunctional behaviors, especially bruxism, can dislodge or damage dental bridges. Many studies have reported that bruxism has been significantly associated with failure of fixed dentures to long-term follow-up and shortened survival time, [20, 22, 23, 27,31]. The most common accident, which can occur in patients with bruxism

who have received prosthetic treatment, is the decementation of restoration. Therefore, an occlusal mouth guard is indicated to be worn during the night and periodic evaluation of the treatments performed.

Quite frequently, we can encounter fracture of cladding material especially ceramic, occlusal wear of aggregation elements and even fracture of the metal skeleton of deck bodies,

Regarding the materials recommended for achieving fixed restorations in patients with severe bruxism, the literature is limited, and the choice should be made based on general rationale rather than scientific data. The choice of material might be difficult if the antagonist teeth are natural. The wear process affecting restoration materials is almost always studied experimentally in laboratories. In cases of high occlusal load, such as for example in the case of bruxists, the situation becomes very complex. We must consider not only the risk of wear of the restorative material, but also the antagonistic teeth. We must also bear in mind the need for sufficient strength in all components of the superstructure. Thus, gold and ceramic materials are more preferred than resins in treating patients with bruxism, because they are more resistant to damage and loss of substance [13,16, 17]. Metal or metal-ceramic restorations seem to be the safest choice in conditions of excessive occlusal force, as in the case of bruxism. Several published clinical studies on material wear in bruxism patients have shown that resin materials have 3-4 times more substance loss than gold or ceramics. In recent years, new pottery, for example zirconia, has shown improved mechanical properties and may show promise in bruxist restorations. However, a systematic review of fixed zirconia restorations showed complications. [19]

Therefore, there is no consensus in the literature on the long-term consequences of bruxism and its treatment.

As far as studies on the effects of bruxism on removable dentures are concerned, there are few in the literature. In the case of fully removable dentures, clinical experience indicates that bruxism is a frequent cause of mucosal pain and even fractures of the denture bases. The relationship between bruxism and increased ridge resorption has not been investigated, but may be considered a possible factor related to the extent of ridge reduction. In the case of removable prostheses, fractures of dental crochets, secondary connectors of teeth of artificial arches may occur in patients with bruxism.

Discussion.

Research focused on the relationship between bruxism and prosthetic therapy is scarce. Relatively few relevant articles with the search terms used were listed in PubMed, and other texts were found by manually searching article reference lists. There is no evidence that prosthetic therapy, or any other treatment available, can eliminate bruxism.

Therefore, the review was directed at the effects of bruxism on different types of prosthetic restorations and the effectiveness of excessive loading of opposite natural teeth, restorative materials and structural integrity of dentures.

Conclusions

Bruxism is the most serious form of parafunction of the dento-maxillary apparatus with a multifactorial etiology and

a prevalence in adults between 8% and 31%. Bruxism disrupts tooth morphology and generates difficulties during oral, dental or prosthetic rehabilitations with support on natural teeth or implants. These difficulties are represented by a large number of cases of failure in rehabilitation therapy in patients with bruxism. Due to the complexity of bruxism in terms of etiology and treatment, it should be noted that at this moment there is a general mobilization of specialists in the field of psychiatry, neurophysiology and dental medicine to explain the etiopathogenic mechanisms of bruxism.

REFERENCES

1. Burlui V. – Gnatologie clinică, Ed. Junimea Iaşi 1979
2. Burlui V. – Protetică dentară. Litografie U.M.F.Iaşi, 1989
3. American Sleep Disorder Association: International Classification of Sleep Disorders: Diagnostic and Coding Manual Rochester, Minn: 1990; Sleep Holoistic online.com
4. Lobbezoo F, Ahlberg J, Raphael KG, et al.- International consensus on the assessment of bruxism : report of a work in progress. J Oral Rehabil 2018;45(11): 847-844.
5. Capetillo-Hernandez GR, Torres- Capetillo EG, OchoMartinez RE, Flores-Aguilar SG. – Bruxism and its relationship to stress and anxiety. Journal Spain 2019 ; 6(11): 16-19.
6. Bratu D, Nussbaum JF.- Bazele clinice şi tehnice ale protezării fixe. Ed. Signata 2001
7. Capetillo-Hernandez GR, Torres- Capetillo EG, OchoMartinez RE, Flores-Aguilar SG. – Bruxism and its relationship to stress and anxiety. Journal Spain 2019 ; 6(11): 16-19.
8. Bracci A, Djukic G, Favero L, Salmaso L, Guardi-Nardini L, Manfredini D - Frequence of awake bruxism behaviours in the natural environment. A 7-day, multiple – point observation of real-time report in healthy young adults. J Oral Rehabil 2018, 45(6): 423-429.
9. Manfredini D, Winocer E, Guarda-Nardini L, Paesani D, Lobbezoo F.- Epidemiology of bruxism in adults: a systematic review of the literature. J Orofac Pain 2015; 27: 99-110.
10. Melo G, Duarte J, Pauletto P, et al.- Bruxism; An umbrella review of systematic reviews. J Oral Rehabil 2019; 46(7): 666-690.
11. Mesko ME, Hutton B, Skupien JA, Sarkis-Onofre R, Moher D, Perreira- Cenci T.- Therapies for bruxism: A systematic review and network meta-analysis (protocol). Syst Rev 2017; 6 (1): 4.
12. Oltean D, Nimigean VR, Oltean MA,- Reabilitarea Orală. Ed Universitară Carol Davila Bucureşti 2007.
13. Mikeli A, Walter MH. Impact of Bruxism on Ceramic Defects in Implant-Borne Fixed Dental Prostheses: A Retrospective study. The Intern J of Prosthod. 2016; 29(3): 296-298.
14. Mercuţ Veronica (sub redacţia) – Bruxismul de la cauze la efect. Ed.Medicală Universitară Craiova 2011.
15. Ohayon M, Kasey K, Guilleminault C. – Risc factors for sleep bruxism in the population. http: // chestjournal: chestpubs. org/content/119/1/53. full;
16. . Forna N.C. - Protetica Dentară Vol. I, II; Ed. Enciclopedică Bucureşti 2011.
17. Mercuţ Veronica (sub redacţia) – Bruxismul de la cauze la efect. Ed.Medicală Universitară Craiova 2011.
18. Ioniţă S, Petre A. - Ocluzia dentară. Ed. Didactică şi Pedagogică, RA Bucureşti 2003.
19. Alharby A şi col. – Parafunctional Behaviors and Its Effect on Dental Bridges. J Clin Med Res.

2018; 10(2); 73-76.
20. Heintze DS, Rousson V, Stober T. – Patient-and therapy – related factors on the wear of denture teeth – Results of a clinical trial. Dent Mater 2016; 31: 302-307.
21. Manfredini D, Winocer E, Guarda-Nardini L, Paesani D, Lobbezoo F.- Epidemiology of bruxism in adults: a systematic review of the literature. J Orofac Pain 2015; 27: 99-110.
22. Mengatto CM, Coelho-de-Souza FH, de Souza Junior OB. – Sleep bruxism: challenges and restorative solutions. Clin. Cosmetic and Investig Dentistry 2016: 8: 71-77Jokubauskas L, Baltruśaityte A, Pileičikiene G .- Oral appliances for managing sleep bruxism in adults : a systematic review from 2007 to 2017. J Oral Rehabil 2018; 4591): 201-204.
23. Manfredini D, Poggio C. – Prosthodontic planning in patients with temporomandibular disorder and/or bruxism; A systematic review . J Prosthod Dentistry 2017; 117(5): 606-611
24. Manfredini D, Lobbezoo F.- Role of psychosocial factors in the etiology of bruxism. J Orofac Pain 2009; 23(2): 153-166.
25. Goldstein RE, Auclair Clark W. – The clinical management of awake bruxism. JADA 2017; 148 (6) : 387-391.
26. Yip K.H., Smales R.J., Kaidonis J.A. –Differantial wear of teeth and restorative materials: clinical implications. Int J prosthodont 2004; 17: 350-356.
27. Babiloni AH, Lavigne GJ. – Sleep Bruxism; A „ Bridge" Between and Sleep Medicine. J Clin Sleep Med. 2018; 14(8): 1377-1386.
28. Godoy de Oliveira AT et al.- Aesthetic Rehabilitation in Teeth with Wear from Bruxism and Acid Erosion. The Open Dentistry J, 2018; 12:486-493.
29. Lobbezzo F, van der Zang J, van Selms MK, et al.- Principles for the management of bruxism . J Oral Rehabil 2008; 35(7):509-523.
30. Johansson A, Omar R, Carlsson GE. Bruxism and prosthetic treatment: a critical review. J Prosthodont Res 2011; 55(3):127-136.