

Prosthodontic Management of Bruxer Patients: A Review

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Abstract Based on published studies of the relationship between prosthodontics and bruxism, an attempt was made to draw conclusions about the existence of a possible relationship between the two, with a focus on the potential cause-and-effect implications and on the strategies for planning prosthetic treatments in patients with bruxism. PubMed searches were conducted using the terms ‘bruxism’ and ‘prosthetic treatment’, as well as combinations of these and related terms. The few studies judged to be relevant were critically reviewed, in addition to papers found during an additional manual search of reference lists within selected articles. No clinical trials of the reviewed topics were found, and a comprehensive review relying on the best available evidence was provided. Bruxism is a common parafunctional habit, occurring both during sleep and wakefulness. Usually, it causes few serious effects but can do so in some patients. The etiology is multifactorial. No evidence-based guidelines were available for the best strategy for managing prosthetic needs in patients with TMDs and/or bruxism. This review revealed an absence of RCTs on the various topics concerning the relationship between bruxism and prosthodontics. Based on the best available evidence, bruxism may be included among the risk factors and is associated with increased mechanical and/or technical complications in prosthodontic rehabilitation, although it seems not to affect implant survival. Prosthetic changes in dental occlusion are not yet accepted as strategies for solving or helping individual stop bruxism. When prosthetic intervention is indicated in a patient with bruxism, efforts should be made to reduce the effects of likely heavy occlusal loading on all the components that contribute to prosthetic structural integrity.

Keywords: bruxism, prosthetic treatment, clenching

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1. Introduction

Bruxism, which can be considered as a repetitive masticatory muscle activity that is characterized by clenching or grinding of the teeth and/or by bracing or thrusting of the mandible, and that is specified as either sleep bruxism or awake bruxism, depending on its circadian phenotype [1].

For clinicians to treat awake bruxism, they first must diagnose it. A simple first screening step is to ask patients (on a medical history or examination form) whether they clench or grind their teeth. Much parafunctional activity is not accompanied by noise, however, which can make self-awareness difficult [2]. This initial screening can serve as an opening dialogue for clinicians to educate and inform patients about awake bruxism. Another critical way for clinicians to identify a patient with a parafunctional habit is by damage to the tooth structure. This damage includes wear facets, fractured teeth and restorations, craze lines, abfraction lesions, and ultimately loss of teeth [3,4]. Other intraoral signs include indentations along the side of the

tongue, as well as bony exostoses or tori. Periodontal changes, including widening of the periodontal ligament, tooth mobility, and recession, also may occur [5].

If a clinician (or patient) desires a more definitive method of diagnosis, they can use various techniques. To differentiate between sleep and awake bruxism, for example, the clinician can measure the electromyographic activity of the masticatory muscles [6,7,8]. The dentist can prescribe easy to-use electromyographic devices to use during sleep to confirm muscle activity (for example, BiteStrip, Great Lakes Orthodontics). After initial screening and suspicion of a parafunctional habit, more in-depth patient questionnaires (with clear definitions) and at-home journaling can help further identify what type of parafunctional activities the patient engages in and how often. [9,10]

Opinions on the cause of bruxism are numerous and widely varying. Current reviews indicate that the etiology is not fully known but that it is probably multifactorial [11].

Treatment of bruxism is indicated when the disorder causes any of these possible consequences. Unfortunately, there is a striking paucity of high-quality evidence regarding the management of bruxism [12].

2. Material and Methods

PubMed searches were conducted for the last 10 years to identify all peer-reviewed English language papers using the terms 'bruxism' and 'prosthetic treatment', as well as combinations of these and related terms. The following criteria were imposed for inclusion in the review: (1) randomized clinical trials (RCTs) comparing the effectiveness of prosthodontics with other treatments in the management of bruxism; and (2) RCTs comparing the effectiveness of different prosthodontic strategies concerning the management of vertical dimension of occlusion, intermaxillary relationship recordings, occlusal scheme design in the management of prosthetic needs in patients with bruxism. Systematic reviews were also included. Case reports and letters to the editor were excluded from consideration. The few studies judged to be relevant were critically reviewed, in addition to papers found during an additional manual search of reference lists within selected articles.

3. Results

No clinical trials of the reviewed topics were found, and a comprehensive review relying on the best available evidence was provided. Bruxism is a common parafunctional habit, occurring both during sleep and wakefulness. Usually, it causes few serious effects but can do so in some patients. The etiology is multifactorial. No evidence-based guidelines were available for the best strategy for managing prosthetic needs in patients with bruxism.

The first search step identified only 10 citations with the query "prosthodontics" AND "bruxism." None of them satisfied the inclusion criteria. No clinical trials of the reviewed topics were found. The protocols for management of bruxism can be divided into occlusal, behavioral, pharmacological and, miscellaneous approaches [13].

3.1. Occlusal Approaches

Two categories of occlusal management strategies for bruxism can be distinguished: 'true' occlusal interventions and occlusal appliances.

3.1.1. 'True' Occlusal Interventions

This category, that includes approaches like occlusal equilibration, occlusal rehabilitation and, orthodontic treatment that is aimed at 'achieving harmonious relationships between occluding surfaces. In the literature, however, no high- quality evidence that supports the use of these irreversible techniques in the management of bruxism can be found.

3.1.2. Occlusal Appliances

The second category of occlusal management strategies for bruxism contains the frequently used occlusal appliances. Most of them are hard acrylic-resin stabilization appliances, mostly worn in the upper jaw [14,15,16,17].

Several studies assessed the efficacy of occlusal splints in groups of bruxism patients, either with a before-after [18] or case-control design studies [19,20,21,22,23,24]. The latter include comparison groups treated with gabapentin [20], with palatal appliances [21], or adopting different protocols as far as the intermittent vs continuous appliance wearing [19], the different vertical dimension of occlusion (VDO) [24] and the appliance design [22,23] are concerned. The investigations comparing different occlusal appliance designs and treatment regimens suggest that stabilization splints are better than palatal splints [21]; an intermittent use is superior to continuous wearing [19]; a 3 mm increase in VDO is more effective than a 6 mm increase [24]; in reducing sleep bruxism.

3.2 Behavioral Approaches

A wide variety of behavioral approaches have been tried in the management of bruxism.

3.2.1. Biofeedback

Biofeedback uses the paradigm that bruxers can 'unlearn' their behavior when a stimulus makes them aware of their adverse jaw muscle activities ('aversive conditioning'). This technique has been applied for bruxism during wakefulness as well as for sleep bruxism. While awake, patients can be trained to control their jaw muscle activities through auditory or visual feedback from a surface EMG. For sleep bruxism, auditory, electrical, vibratory and, even taste stimuli can be used for feedback.

3.2.2. Other Behavioral Approaches

Other behavioral approaches that have been described in the literature for the management of bruxism include psychoanalysis, autosuggestion, hypnosis, progressive relaxation, meditation, self-monitoring, sleep hygiene, habit reversal/habit retraining and, massed practice [13].

3.3. Pharmacological Approaches

The use of medication in the management of bruxism has been studied increasingly over the past decades.

One of the oldest reports on a pharmacological approach for bruxism is the one published by Chasins [25]. He concluded that the short-term administration of the muscle relaxant methocarbamol yielded 'good control and improvement of the bruxism habit.

In a more recent study, it was shown that sleep bruxism did improve with the frequently prescribed, non-specific muscle relaxant clonazepam (a benzodiazepine), although the maintenance of its therapeutic efficacy, its long-term tolerability and, its risk of addiction need further attention [26].

Another drug that affects muscle function, by exerting a paralytic effect through inhibition of acetylcholine release at the neuromuscular junction, is botulinum toxin [27]. In general, the findings from botulinum toxin studies are supportive of its effectiveness to reduce the intensity of sleep bruxism episodes, but not their frequency [28].

Taking the above-described evidence together, it can be concluded that although some pharmacological

approaches for bruxism seem promising, they all need further efficacy and safety assessments before clinical recommendations can be made.

3.4. Miscellaneous Approaches

Multiple papers describe management strategies for bruxism that do not readily fit either one of the above-used categories of occlusal, behavioral, or pharmacological approaches. Some of them are related to physical therapy, while other is related to a surgical procedure in the oral region. Ackerman²⁹ described his approach of instructing the patient with bruxism to develop his/her jaw-opening muscles. The objective is 'to develop the depressor muscles so that they will be as strong or as firm as the elevator muscles. Then, they will hold the mandible in balance'. Ackerman expressed the hope that by adopting this philosophy, future efforts to eliminate bruxism would be more successful. Also, Quinn [30,31] suggested the use of physical rehabilitation techniques (isokinetic exercises) for depressor muscle strengthening. According to this author, such exercises will assist in, amongst others, correcting bruxism.

Some reports an uncontrolled series of patients receiving electrical stimuli to the masseter muscles [32]. Findings are suggestive of the effectiveness of such electrical stimuli to suppress sleep bruxism.

Jadidi et al [33] reported a promising treatment for the reduction of masticatory muscle motor hyperactivity. The Grindcare device monitors temporalis muscle activity, identifying individually biocalibrated electromyographic (EMG) events associated with bruxism. During a treatment mode, it delivers an innocuous electrical pulse to the skin overlying the temporalis muscle contingent upon EMG activity exceeding individually biocalibrated levels associated with bruxism. In individuals with sleep bruxism, treatment with Grindcare led to a 40% to 50% reduction in EMG events.

3.5. Considerations when Treating Bruxer Patients

The potentially greater load on restorations if there is bruxism, heavy chewing forces, or unfavorable loading directions between teeth, means that great caution is needed in the design of the restoration if the risk of mechanical failure is to be reduced.

Most clinicians and researchers agree that a metal occlusal surface, and preferably one of high noble content, is preferred to minimize wear of the natural dentition [34].

For conventional fixed prosthodontics, single crowns should be constructed whenever possible and FDPs should be of minimal extension [34].

Splinting should be avoided whenever possible, especially in cases of confirmed bruxism. Similarly, splinted secondary abutments as compensation for a short, poorly retentive primary abutment is contraindicated: the chances of cementation failure, rather than being reduced, will probably be as great as at the short abutment [34].

The occlusal design of extensive rehabilitations in patients with bruxism should be as straightforward as possible. Basic requisites such as asymmetrical distribution of interarch contacts, occlusal stability, and

subjective comfort are generally enough to optimize function [35,36,37]. Keeping this in mind, some technical schemes such as canine guidance for disocclusion or some interarch recording techniques such as individually mounted articulators and facebows may help manage the clinical conditions of severe occlusal instability.

3.6. Effects of Bruxism on Implant Restorations

Systematic reviews have concluded that a causative relationship between occlusal forces and loss of osseointegration has never been demonstrated [38,39]. Bra"gger et al. [40] recognized a causal relation between bruxism and fracture of the suprastructure, but they could not show the relation between bruxism and failure of the implant itself. On the other hand, Engel et al. ⁴¹ suggested that bruxism never affected the marginal bone loss of the dental implant. From these studies, it is difficult to conclude that bruxism is a risk factor for dental implants. Since most of the clinical research in dental implants excluded subjects with bruxism, there are only a few research data on the influence of bruxism on dental implant outcomes, and there is still no scientific evidence for a causal relation between bruxism and implant failure.

4. Conclusion

This review revealed an absence of RCTs on the various topics concerning the relationship between bruxism and prosthodontics. Based on the best available evidence, bruxism may be included among the risk factors and is associated with increased mechanical and/or technical complications in prosthodontic rehabilitation, although it seems not to affect implant survival. Prosthetic changes in dental occlusion are not yet accepted as strategies for solving or helping individual stop bruxism. When prosthetic intervention is indicated in a patient with bruxism, efforts should be made to reduce the effects of likely heavy occlusal loading on all the components that contribute to prosthetic structural integrity.

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