

Characterization of 86 Bruxing Patients and Long-Term Study of Their Management With Occlusal Devices and Other Forms of Therapy

Of 353 patients screened, 86 answered positively to questions designed to identify bruxers. The bruxing patient profile revealed that 100% had working excursive interferences, 78% had balancing excursive interferences, and 95.4% had a premature contact into maximum intercuspation. Most of the bruxing patients had a chief complaint that related to pain, and 89.6% of the patients had a craniomandibular disorder. The patients were initially managed with an anterior deprogrammer and were later managed with other occlusal devices as signs and symptoms dictated. Definitive treatment was determined by the patient's maxillomandibular relationship.

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The term bruxism is defined as "the parafunctional grinding of teeth."¹ If left untreated, bruxism can lead to attrition of tooth surfaces, loss of vertical dimension of occlusion, increased muscle tonus, and adaptive changes in the temporomandibular joints (TMJs).² The damage to masticatory structures is related to the duration and magnitude of force applied during the parafunctional activity.³

Controversy exists concerning the etiology of bruxism and the methods of management. Some practitioners believe mild cases of bruxism are of no concern because resulting tooth wear and TMJ remodeling is "adaptive and may be viewed as an accepted aspect of aging."⁴ The etiology of bruxism is also not well understood. Historically, it was believed that bruxism was a result of occlusal prematurities and interferences.^{2,3,5-7} Treatment was then directed at eliminating interferences by establishing ideal occlusion.² One recent study⁸ suggests that occlusal interferences may increase bruxism, but other studies⁹⁻¹¹ suggest that the occlusal condition has little effect, if any, on bruxism and that the habit appears to be related to the patient's emotional status.

Despite an apparent lack of agreement within the dental profession, the most common method of managing the bruxing patient is through the use of occlusal devices. Much controversy exists in this area concerning design preference and mode of therapeutic action of the devices.^{9,12-14} Recent studies comparing different occlusal devices have had unexpected results, as factors that were thought to be therapeutic (such as canine guidance) were found not to affect bruxism.^{7,12} However, a significant number of the studies had experimental design flaws (such as possible improper occlusal devices for the type of therapeutic action required, insufficient time frames, and inadequate patient sample size).

Table 1 Chief Complaints of 86 Bruxing Patients

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|--|----|
| Head- or neck-related pain | 45 |
| Bruxism | 15 |
| TMJ click | 10 |
| Bad bite | 8 |
| Can't open mouth wide | 3 |
| Loss of tooth structure (or vertical dimension of occlusion) | 2 |
| Need extensive restorative dentistry | 1 |
| Nonsymmetric face | 1 |
| Second opinion for orthognathic surgery | 1 |

This study subjectively and objectively evaluated the use of occlusal devices in the management of patients who were aware that they ground their teeth, although bruxism may not have been their primary reason for seeking treatment. The bruxing patients may have had other signs and symptoms of craniomandibular dysfunction (CMD) treated simultaneously in the course of treatment. The patients' clinical signs and symptoms determined the success of treatment. Therefore, in this study, the patients had to be aware of their parafunctional habit; if not, they were excluded from this study because they would not be able to provide appropriate feedback.

Materials and Methods

The subjects of this study were patients treated at the Georgetown University School of Dentistry, Department of Occlusion, for an occlusal problem, CMD, or occlusal parafunctional activity. Records of their course and modes of treatment were kept on computer files by the treating resident, under the supervision of the department chairman. A series of screening questions was used to identify bruxing patients. Each patient's chief complaint, signs and symptoms, preliminary diagnosis, initial management, any subsequent management, and definitive treatment were documented and compiled into tabular form. An intraoral occlusal analysis using mylar articulating ribbon was performed to determine whether the patient had (1) a premature contact into maximum intercuspation, (2) a lateral working interference, or (3) a lateral balancing interference. The patient's maximum opening was measured. The TMJ was palpated to determine whether the joint was painful and whether a click was present when the patient opened and closed. The patient was also questioned to determine the presence and number of headaches or neck aches experienced per month.

Results

A total of 353 patients presented for treatment during the time of this study; 86 (24.4%) were identified as bruxers. There were 68 women and 18 men (comprising 79% and 21% of the sample, respectively), and the average age was 36.4 years. Intraoral occlusal analysis revealed 82 patients (95.4%) had a repeatable premature contact to maximum intercuspation. All 86 (100%) had posterior working interferences in lateral excursive movements, and 67 (78%) had posterior non-working interferences in lateral excursive movements. A patient was considered to have an interference in excursive movements if contact on posterior teeth precluded canine guidance in lateral excursive movements. Evaluation of the TMJs revealed 56 patients (65%) had a unilateral or bilateral click, with 51 (59.3%) having TMJ pain. Multiple headaches or neck aches were found to occur monthly in 52 (60.4%) of the patients.

Only 15 patients had a chief complaint of bruxism. Most (45) had chief complaints that related to pain – headaches or neck aches, tooth pain, or TMJ pain (Table 1). Discussions with patients confirmed that bruxism was not their primary concern; pain was the major reason bruxing patients sought treatment. Patient education was a factor in the treatment of bruxism, since patients informed about bruxism causing loss of tooth structure, occlusal changes, increased muscle tonus, and CMD were more likely to have bruxism managed by the dentist.

Diagnosis

Only 4 of the patients (4.6%) were diagnosed as bruxers with no associated TMJ or muscle symptoms. Thirty-five patients (40.7%) had muscle spasms associated with bruxism, with 38 (44.2%) having an internal derangement of the TMJ with or without muscle spasm. Four of the patients were diagnosed as having degenerative joint disease (osteoarthritis; 4.6%). Therefore, a total of 77 (89.6%) had CMD.

Initial Treatment

Initial treatment (normally at the first visit) for the bruxing patient consisted of an anterior deprogrammer constructed of autopolymerizing acrylic resin on the patient's maxillary central incisors, which were lubricated with petroleum jelly (Fig 1). Maxillary and mandibular alginate impressions were also made at the first visit. When polymer-



Fig 1 Intraoral view of the anterior deprogrammer showing separation of the posterior teeth.



Fig 2 View of the occlusal surface of the anterior deprogrammer showing desired occlusal contacts in centric occlusion and eccentric movements. Only the mesial aspect of the mandibular central incisors is in occlusion.



Fig 3 Intraoral view of anterior deprogrammer on a 2-mm Biocryl vacuum-formed framework used for extended time management.

ized, the acrylic resin was adjusted until the mandibular central incisors contacted a flat plane with a separation of 1.0 to 1.5 mm in the area of the first molar¹⁵⁻¹⁷ (Fig 2). The bruxing patients were specifically managed with an anterior deprogrammer because this type of appliance (1) reduces the amount of tooth contact, (2) allows for the reduction of muscular function,¹⁸ and (3) alters the input to the central nervous system by proprioception. The patients were instructed to

wear the anterior deprogrammer that night while sleeping. The next day, diagnostic casts were articulated using a centric relation record obtained with the aid of the anterior deprogrammer.¹⁵⁻¹⁶

The patient's symptoms were noted, and the patient was scheduled for a reevaluation. After 2 weeks, patients were given either a new anterior deprogrammer, a mandibular centric relation device, or an anterior reprogrammer or repositioning device, depending on their response to treatment. If the patient was comfortable and there were no clinical signs of dysfunction, a second, more stable anterior deprogrammer was constructed (Fig 3). The new anterior deprogrammer was constructed on a 2-mm Biocryl (Buffalo Dental, Brooklyn, NY) vacuum-formed framework and was used for a minimum of 2 months. Aside from the Biocryl framework, this device functioned in exactly the same way as the anterior deprogrammer constructed of autopolymerizing acrylic resin. At the end of treatment, the patient's condition was evaluated for stability and definitive treatment.

If the patient's response to the first anterior deprogrammer suggested there was muscle dysfunction and signs and symptoms of muscle hyperactivity were not relieved, a mandibular centric relation occlusal device was constructed (Figs 4 and 5).^{19,20} The mandibular centric relation device can be worn easily during the day and will provide more surface area for functional stability. The patient was instructed to use the anterior depro-

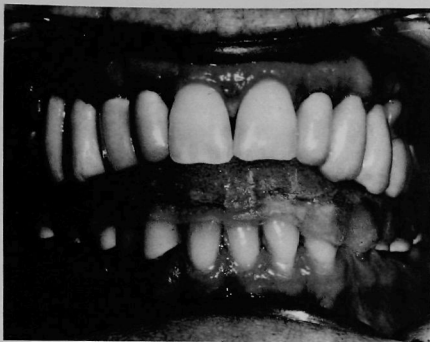


Fig 4 Intraoral view of mandibular centric relation occlusal device used when 24-hour support of temporomandibular articulation is indicated



Fig 5 Occlusal view of mandibular centric relation occlusal device showing desired centric occlusion contacts with immediate posterior disocclusion in excursive movements. (Contacts are highlighted for clarity.)

grammer for sleeping; this, in combination with the mandibular centric relation occlusal device, provided 24-hour support for the stomatognathic system. The design of the mandibular centric relation device allowed the maxillary posterior lingual cusps to contact evenly a flat occlusal plane, with the anterior teeth in lighter contact.¹⁹ This was checked by pulling Mylar articulating ribbon out of the anterior teeth when the patient closed. The design still allowed canine guidance in lateral movements and incisal guidance in protrusive movements, with complete posterior disocclusion in excursive movements.

Finally, if the patient, after 2 weeks' management with the anterior deprogrammer, exhibited signs of TMJ dysfunction such as a click, pain, or deviation of the mandible upon opening or closing, an anterior reprogrammer or repositioning device was used to manage the occlusion at a maxillomandibular relationship at which the joint would not exhibit signs of dysfunction.^{2,20-22} The patient continued to use the reprogrammer until signs and symptoms were eliminated for a suitable length of time (normally 6 to 8 weeks) to decrease inflammation and to allow step-back procedures to be initiated.¹⁹⁻²¹

Of the 86 patients who began therapy with an anterior deprogrammer, 41 had further management with a mandibular centric relation occlusal device and 12 patients were placed on an anterior repositioning occlusal device. There may have

been an overlap of management modality as signs and symptoms dictated.

Definitive Management

The average length of therapy using an occlusal device was 15.5 months. After the patient reported that symptoms were alleviated and after it was judged that the condition had stabilized, the patient was evaluated for readiness for definitive therapy. Two criteria were used in making this determination: a normal and anatomically compatible TMJ and relaxed musculature with no discomfort upon palpation.²³ There were five options for definitive management with which temporomandibular articulation could be maintained. These were as follows.

1. For some patients, it was possible to continue functioning with occlusal devices, returning periodically for follow-up adjustments and evaluations. Patients had various reasons for electing to continue management with the occlusal devices: comfort, finances, an inability to cope with further dental treatment. For 21 patients (43%), this option provided a viable method of continually supporting the temporomandibular articulation while reducing, if not eliminating, the bruxism.
2. If the patient's occlusion was within the rule of thirds as described by Burch²³ and presented by Neff,²⁴ occlusal adjustment could

provide support of the temporomandibular articulation. Three patients (8%) were managed in this manner.

3. A third possibility, especially for patients whose teeth had previous restorations or had been subjected to years of trauma or attrition, was prosthodontics, whether selective crowns or fixed or removable partial dentures. Fourteen patients (30%) were managed prosthodontically.
4. If the patient had few restorations and the dentition was sound (albeit malposed), orthodontic therapy was considered. Seven patients (16%) were managed in this way, with the dentist working closely with the orthodontist.
5. In some patients orthognathic surgery was used in combination with orthodontic treatment to correct severely malposed maxillary and mandibular arches. This was the treatment of choice for cases involving anterior repositioning. Four patients (8%) required this form of management.

Discussion

This study developed a profile of the typical patient who presented to the Georgetown University School of Dentistry, Department of Occlusion, and followed the management of these patients with regard to their bruxism. Perhaps the most obvious and perplexing aspect of the patient profile was that all the patients managed had lateral excursive interferences (100% had working interferences and 78% had nonworking). This was considered perplexing because much of the recent published data indicates a lack of relation between occlusion and bruxism.⁹⁻¹¹ The recent trend among many practitioners in this field is to consider bruxism a centrally mediated sleep disorder precipitated by stress.⁹

Although it was not our intention to determine the etiology of bruxism, the results indicated that the typical patient had gross occlusal discrepancies, especially in excursive movements. While many of these occlusal discrepancies may have been caused by tooth attrition due to bruxism, the fact that all the patients had working interferences may indicate that a relationship exists between the bruxism and occlusion. This is supported by a recent study which suggested that placement of a 0.1-mm occlusal interference in the area of the first molar could induce bruxism.⁸ It has been shown in EMG studies that bruxism is predominantly associated with stage 2 and REM stages of sleep.⁹ It has also

been shown that both bruxers and nonbruxers have an increase in EMG activity; however, instead of grinding their teeth, nonbruxers tend to have an increase of body movement.⁹ More research is needed in this area to determine whether occlusal interferences in excursive movements distinguish the bruxers from the nonbruxers.

The patient profile also showed a high correlation between bruxism and dysfunction of the temporomandibular articulation. These data support other data^{25,26} concerning the relationship between bruxism and temporomandibular articulation dysfunction.²⁶ The pain experienced can be caused if the condyle is distally positioned by microtrauma and violates the space occupied by the highly vascular and innervated retrodiscal tissue.²⁶

Our patients were managed with the use of an anterior deprogrammer. The anterior deprogrammer was used to (1) separate the posterior teeth, (2) relax the masticatory muscles,^{18,27,28} (3) determine whether the TMJs were normal,²⁸ (4) reduce tooth contact, (5) alter proprioception to the central nervous system, and (6) register the particular position of the TMJs.²⁹

Many patients found relief from bruxism with the use of an anterior deprogrammer which freed the mandible from any tooth-guided position and prevented further tooth attrition. Also, previous studies^{27,29} have shown that an anterior deprogrammer would function to protect the patient from the deleterious effects of bruxism to the tooth structures, the masticatory muscle, and the TMJs. Some of the patients needed further support of the temporomandibular articulation because the anterior deprogrammer did not relieve all signs and symptoms of dysfunction. Because the anterior deprogrammer could not be worn at all times, a mandibular centric relation occlusal device or a mandibular reprogrammer was provided for these patients to allow for maximum support of the temporomandibular articulation during the day. The anterior deprogrammer functioned for support at night. The average length of therapy using an occlusal device was 15.5 months, with the shortest time being 2 months. This may be one reason that experimental data may not correlate well with clinical data; many experimental data are collected over time periods of less than 2 months.^{1,2,4,5,7-11,15}

Summary

Out of 353 patients presented for screening, 86 were diagnosed as bruxers. Patient profile analysis

revealed that 79% were female, 21% were male, mean age was 36.4 years, 65.1% had TMJ click, and 59.3% had TMJ pain. All patients had posterior working interferences and 78% had balancing interferences, with 95.4% having a premature contact into maximum intercuspation. Diagnosis of the patients revealed that 40.7% suffered from muscle spasms, 44.4% had an internal derangement of the TMJ with or without muscle spasm, 4.6% had osteoarthritis, 4.6% had a loss of vertical dimension of occlusion, 4.6% had bruxism with no other signs or symptoms, and 1.2% had occlusal trauma. The management of the patients consisted of construction of an anterior deprogrammer, with additional occlusal devices as the patient's signs and symptoms dictated. The average length of management with occlusal devices was 15.5 months. Definitive forms of treatment when the patient's condition was considered stable were occlusal devices (43%), prosthodontics (30%), orthodontics (16%), occlusal adjustment (18%), orthognathic surgery (8%), and referral to neurologist (2%).

The bruxing patients in this study had occlusal discrepancies in excursive movements especially. These interferences are factors that may distinguish bruxers from nonbruxers.

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Resumen

Caracterización de 86 pacientes con bruxismo y estudio a largo plazo de su manejo con dispositivos oclusales y otras modalidades terapéuticas

Luego de examinar a 353 pacientes, se determinó que 86 respondieron afirmativamente a las preguntas que fueron hechas para detectar bruxismo. El perfil de los pacientes que bruxaban reveló que el 100% tenían interferencias en las excursiones de trabajo, el 78% tenían interferencias en las excursiones de balanza, y el 95.4% tenían un contacto prematuro en intercuspidación máxima. La queja principal de la mayoría de los pacientes afectados por bruxismo estaba relacionada al dolor, y el 89.6% de los pacientes sufrían de un desorden craneomandibular. Los pacientes fueron tratados inicialmente con un desprogramador anterior, y luego fueron tratados con otros dispositivos oclusales teniendo en cuenta los signos y síntomas que se presentarían. El tratamiento definitivo fue determinado por la relación maxilo-mandibular del paciente.

Zusammenfassung

Kennzeichnung von 86 zähneknirschenden Patienten und langfristigen Untersuchungen über deren Behandlung mit okklusalen Behelfen und anderen Formen von Therapie

Von 353 überprüften Patienten, 86 gaben positive Antworten zu Fragen, die für die Identifizierung von Zähneknirschern beabsichtigt waren. Das zähneknirschende Patienten Profil zeigte, dass 100% praktische, abschwefende Hinderungen hatten; 78% hatten ausbalancierende, abschwefende Hinderungen, und 95.4% hatten einen vorzeitigen Kontakt zu einer maximalen Interkusipation. Die meisten der zähneknirschenden Patienten hatten eine Hauptbeschwerde, die mit Schmerz verbunden war; 89.6% dieser Patienten hatten Krianiomandibulare Störungen. Zuerst wurden die Patienten mit einem vorderen Umsteuerer (Deprogrammer) behandelt und später wurden sie mit anderen okklusalen Behelfen behandelt, je nach Anzeigen und Symptomen. Die endgültige Behandlung wurde durch das maxilomandibulare Verhältnis des Patienten entschieden.