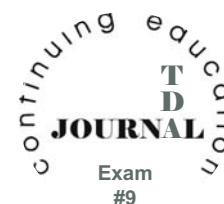


Management of Nocturnal Bruxism with an Anterior Stop Point Appliance

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Dr. John S. DuPont, Jr.

Abstract

Bruxism is an oral parafunctional activity. The more common symptoms are tooth grinding and tooth clenching; however, many other symptoms can be related to bruxism. Dentists treat the results of this condition which may include tooth wear, tooth mobility, tooth fracture, hypertrophy of masticatory muscles, head or neck ache, or poor sleep patterns.

The etiology and pathophysiology of this disorder are still unclear. Anterior stop point appliances have been shown to be beneficial in the management of the signs and symptoms associated with bruxism, including nocturnal headaches in certain patient populations. The object of this study was to determine if anterior bite stop appliances with a small discluding element would be helpful in managing the subject's nocturnal bruxism symptoms.

Introduction

Bruxism has been defined as clenching or grinding of the teeth and these jaw movements are considered to be parafunctional as opposed to a functional activity.¹ Two different types of bruxing seem to be more prevalent—clenching bruxism and grinding bruxism—but other types of non-functioning movements do exist. When these events occur during the day, they are referred to as diurnal and, when they occur at night, as nocturnal. The etiology of bruxism is still unclear and diurnal and nocturnal bruxism conditions are thought to be two different disorders with different etiologies.² Steele suggested that disrupted sleep could give rise to this

parafunctional habit.³ Texts by Okeson and Wright both offer support to the strong role that psychological stresses may play in influencing the incidence of clenching habits.^{1,4}

The term “clenching bruxism” is used to describe biting into centric occlusion (maximum intercuspal position) without significant lateral or protrusive movements. Grinding bruxism is performed in eccentric positions such as bilateral working and non-working in addition to canine and incisal guidance positions.⁵

Research of enamel wear under normal



Dr. Chris Brown

conditions reveals that wear occurs at an approximate rate of about 30 micrometers a year or about 0.3 mm per ten years. Tooth wear of 2 mm in individuals with abusive habits in their middle twenties is not unusual. If nocturnal bruxing is present, these individuals may remove enamel ten times faster than subjects without these habits.⁵

Functional forces have been estimated to be in the 17,200 lbs-sec/day range and parafunctional forces have been suggested to exceed 57,600 lb-sec/day.¹ These parafunctional forces often occur at a subconscious level in both diurnal and nocturnal bruxers and these individuals normally are unaware that it is occurring. Both diurnal and nocturnal bruxing can be very destructive and extremely difficult to manage on some individuals.

Muscle hyperactivity is involved in both of these types of parafunction. MacDonald and Hannam found that the highest muscle activity for all of the different jaw positions tested was generated by vertical clenching of the dentition in the intercuspal position (ICP) or a simulated intercuspal position.⁶

Nocturnal clenching can result in the individual waking up with pain, headaches and often a limited range of motion. Kampe and researchers found a statistically significant correlation between frequent teeth clenching and headaches, pain in the neck, back, throat or shoulders. They suggested that a causal relationship existed between frequent tooth clenching, headaches and the above signs and symptoms.⁷ Lous and co-work-

**Table 1.
Clinical Signs of
Bruxism**

1. Peri-cranial muscle tenderness
2. Headache
3. Tooth wear
4. Mobile teeth
5. Periodontal ligament changes
6. Fractured cusps or teeth
7. Condylar bone remodeling
8. Limited opening
9. Sensitive teeth
10. Masticatory muscle enlargement

ers also found that clenching and grinding the teeth were significantly more common in headache patients.⁸

Clark and co-authors studied nocturnal clenching by comparing baseline data taken during forced clenches while conscious and clenching on arising. They found that some of the individuals in their study were able to exceed the maximum conscious clenching intensities during sleep.⁹ Clenching bruxism may be a cause of chronic tension type headaches.¹⁰

Often bruxism is accompanied by disturbing tooth grinding sounds made by subjects unaware of these abnormal functioning activities and many complain of headaches; however, individuals with clenching bruxism often present with minimal tooth wear and are thus difficult to identify.

The anterior stop point appliance uses a design that has been reported to be successful for the relaxation of muscles and relief of myofascial pain.¹¹⁻¹⁴ This anterior contact results in posterior disclusion.

Table 2. Clinical Findings of Patients in this Study

| Patient | Sex | Headache | Masseter Pain | Temporalis Pain | TMJ Pain | Sensitive Teeth | Facial Pain |
|---------|-----|----------|---------------|-----------------|----------|-----------------|-------------|
| 1. | F | X | X | X | X | | X |
| 2. | F | X | X | X | X | X | X |
| 3. | F | X | X | X | X | X | X |
| 4. | M | X | X | X | X | X | X |
| 5. | F | X | X | X | X | X | X |
| 6. | F | X | X | X | X | X | X |
| 7. | F | X | X | X | Myo | | X |
| 8. | F | X | X | X | Myo | | X |
| 9. | M | X | X | X | X | X | X |
| 10. | F | X | X | X | X | X | X |
| 11. | F | X | X | X | X | | X |
| 12. | F | X | X | X | X | X | X |
| 13. | F | X | X | X | X | X | X |
| 14. | F | X | X | X | X | X | X |
| 15. | F | X | X | X | X | X | X |
| 16. | F | X | X | X | X | X | X |
| 17. | F | X | X | X | Myo | | X |
| 18. | F | X | X | X | X | | X |
| 19. | F | X | X | X | X | X | X |
| 20. | F | X | X | X | X | | X |
| 21. | M | X | X | X | Myo | X | X |
| 22. | F | X | X | X | X | X | X |
| 23. | F | X | | X | X | | X |
| 24. | M | X | | X | Myo | | X |
| 25. | M | X | X | X | X | X | X |
| 26. | F | X | X | X | X | X | X |
| 27. | M | X | X | X | Myo | X | X |
| 28. | M | X | X | X | X | X | X |
| 29. | M | X | X | X | X | | X |
| 30. | F | X | X | X | X | | X |
| 31. | F | X | X | X | X | X | X |
| 32. | F | X | X | X | X | X | X |
| 33. | F | X | X | X | X | | X |
| 34. | F | X | X | X | Myo | | X |

Myo = Myofascial Pain Disorder

Appliances with only anterior occlusion have had many different names such as an anterior bite plate, anterior jig, Lucia jig, anterior deprogrammer, maxillary anterior passive appliance, anterior bite stop appliance, anterior occlusal splint and others.

These appliances are normally fitted over the maxillary anterior teeth and occlude with the mandibular incisor teeth,

but the placement can be reversed with mandibular incisors supporting the appliance.

Most anterior bite stop appliances are designed so that the occlusal plane is perpendicular to the long axis of the opposing teeth. Additionally, the anterior appliance can be made to contact only the opposing incisors in an attempt to

minimize the proprioception information to the central nervous system and produce the least muscle function.¹⁵

Anterior bite stop appliances have been shown to decrease electromyographic (EMG) activity significantly in the temporalis and masseter muscles in the group of subjects who both clench and grind.¹⁶ Other researchers also found a decrease in muscle activity in both masseters and temporalis when biting against an anterior bite stop appliance and suggested that the reduced muscle activity may be due to the smaller number and exclusively anterior positioned occlusal contacts.¹⁷

Sessle discussed the effects of these appliances to disrupt muscle contraction intensity, possibly by altering the neuromuscular reflex arcs.¹⁸ It is also thought that seating the condyle in a stable and comfortable position as well as altering the vertical dimension of the contracting muscles may have a positive effect on reducing the incidence and intensity of clenching.¹

In some individuals with a large range of lateral motion, the contralateral cuspid may engage the opposing bite plane surface. This cuspid contact has been shown to initiate muscle hyperactivity in the temporalis muscles and may result in symptom aggravation.¹⁰ Thus reducing the width of the occlusal plane by using a narrow ramp (a discluding element) may decrease the number of opportunities for the contralateral cuspids to contact in some patients.

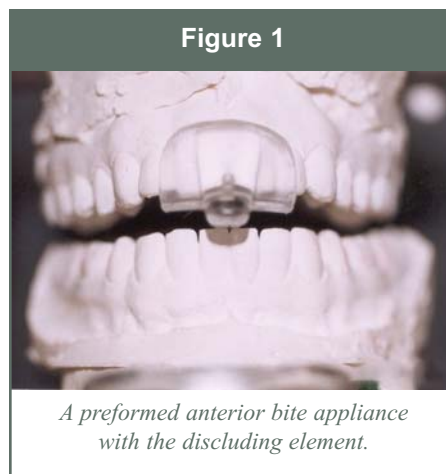
This modification has also been effective for managing bruxism symptoms by suppressing intensity of the clench by exploiting the nociceptive trigeminal inhibition reflex.¹⁹ These appliances can be used to diagnose headaches and other symptoms.^{11,15} In a previous evaluation of an anterior bite appliance with a discluding element on 230 subjects as reported by Christensen, eighty percent (80%) of the treated patients received relief of bruxing, clenching, temporomandibular disorders (TMD), sensitive teeth and headaches.²⁰ Indications for the use of anterior bite plate appliances are, in general, the same clinical signs of bruxism as listed in **Table 1**.

Additionally, if a subject reports with clinical signs and symptoms such as tooth wear, mobile teeth, injury to the periodon-

tal ligament, limited opening, fractured or sensitive teeth, an anterior bite splint may be tried as a diagnostic tool. Anterior bite appliance therapy for sleep bruxism has proven to be effective in some patient populations by controlling pain and reducing the destructive consequences.²¹

Materials and Methods

In order to qualify for this study patients had to have the following conditions: nocturnal bruxing or clenching, headaches and an Angle's Class I skeletal relationship. Thirty-four (N=34) patients met the above criteria for this study from a group of 176 TMD and myofascial pain (a painful musculoskeletal condition that can affect the masticatory muscles)



patients. These conditions were differentiated by using muscle palpation to determine pain, tenderness, trigger points and charting of referred pain patterns, in addition to stethoscopic and Doppler evaluation of their temporomandibular joints. Additionally, all were evaluated for tooth wear, sensitive teeth and masseter or temporalis muscle hypertrophy by subjective visual examination of each pair of muscles, **Table 2** and **Table 3**.

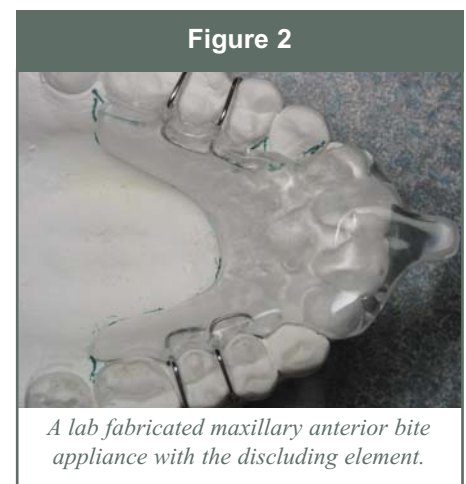
Twenty-six (26 or 76.4%) patients in this study were women and eight (8 or 23.6%) were men. The reports of discomfort in an area of the head (headache) were located in the temporalis areas mainly but some radiated to frontal and vertex areas. Their reported symptom of pain from these headaches ranged from moderate, a noticeable constant discomfort (58.8%), to severe, a constant discomfort (41.2%) and all had some degree of this pain reported while sleeping. The headache pain lasted from one hour to

several hours after awakening.

All subjects had tenderness in the temporalis muscles and thirty-two (32 or 94.1%) had tenderness in the masseter muscles. Twenty-eight (28 or 82.2%) had TM joint tenderness and six individuals (6 or 18%) had myofascial pain dysfunction as described in Lund's text as a chronic muscle pain condition characterized by regional pain associated with specific sites of regional tenderness.²² Twenty-one subjects (21 or 61.7%) had tooth sensitivity or tooth pain. The tooth wear was slight on one subject, mild on eighteen (18 or 52.9%) subjects and moderate on fourteen (14 or 41.2%) and severe on one. The opening jaw range of motion average was 39.7 mm and the lateral range of motion on the right averaged 7.2 mm and the left over 7.8 mm. Visual evaluation revealed that eight subjects (8 or 23.5%) had bilateral hypertrophy of the masseters and fourteen (14 or 41.2%) had hypertrophy of both the masseters and temporalis muscles. Twelve patients had no hypertrophy (12 or 35.3%). All jaw relationships were Angle's class I in this study.

Thirty-two (32) subjects were fitted chairside with a preformed anterior bite stop appliance with a discluding element, **Figure 1**, and two had lab-fabricated appliances placed in the maxillary arch, **Figure 2**. The anterior bite stop devices used in this study had discluding elements with the occlusal surface of the discluding element set perpendicular to the opposing incisors. A snug fit or clasp retention was used to withstand the bruxing forces at night and to ensure that the appliance did not dislodge during sleeping.

Further evaluation of the discluding element was necessary by instructing



patients to retrude and protrude their mandibles to determine if the opposing teeth can get in front of or behind the discluding element. If this occurs, it may be detrimental to the treatment outcome and the discluding element should be extended buccally or lingually to prevent this from occurring.

The free-way space was evaluated. The posterior teeth should not be opened beyond 2 mm as free-way space may be violated. Reducing the height of the discluding element was done to conform. The patient is then asked to close against the discluding element with a piece of articulating paper to achieve even opposing incisor contacts. The right and left lateral movements were evaluated next. It is preferable that the contralateral cuspids do not contact the discluding surface during these excursive movements. If slight contact occurs, the discluding element should be narrowed. Cuspid contact may affect the management success on some subjects.

Discussion

Each individual in this study was aware they clenched their teeth at night because of an independent observation. All experienced nighttime head and face pain. All of these patients had taken anti-inflammatory medications and fifteen (15) had unsuccessfully tried migraine medications.

The patients in this study were to wear these appliances at night or at times of identified need. Symptom evaluation, adjustments of the appliances for tissue impingement, free-way space checking and range of motion evaluations were done at these visits. The subjects were seen at two-week, four-week and two-month intervals over six months to assure treatment success, with no changes to the dental occlusion. Home care instructions are the same as with any appliance.

Prior to treatment, a number of patients had questions about the appliance and how it could help reduce their symptoms. During the examining process, those individuals were asked to place their fingertips over the middle and anterior temporalis areas and to clench down very hard. While sustaining these muscle contractions, they were instructed to try and feel the amount of contraction in these muscles. Next, an anterior stop device with a discluding element was placed over

Table 3. Additional Clinical Findings

| Patient | Tooth Wear | Opening ROM | Lateral ROM-R | Lateral ROM-L | Hypertrophy Masseter/Temporalis |
|---------|------------|-------------|---------------|---------------|---------------------------------|
| 1. | mild | 50 | 9 | 9 | both |
| 2. | mild | 35 | 6 | 6 | both |
| 3. | mild | 50 | 5 | 8 | both |
| 4. | mild | 37 | 7 | 7 | both |
| 5. | mild | 42 | 9 | 9 | both |
| 6. | mild | 37 | 7 | 8 | both |
| 7. | mild | 43 | 9 | 10 | masseters |
| 8. | mild | 38 | 7 | 7 | masseters |
| 9. | mild | 29 | 2 | 2 | none |
| 10. | mild | 52 | 8 | 6 | none |
| 11. | mild | 37 | 6 | 6 | none |
| 12. | mild | 38 | 5 | 7 | none |
| 13. | mild | 46 | 10 | 12 | none |
| 14. | mild | 34 | 6 | 5 | none |
| 15. | mild | 18 | 7 | 8 | none |
| 16. | mild | 30 | 5 | 6 | none |
| 17. | mild | 41 | 7 | 7 | none |
| 18. | mild | 37 | 5 | 6 | none |
| 19. | mod. | 40 | 6 | 7 | both |
| 20. | mod. | 43 | 11 | 12 | both |
| 21. | mod. | 45 | 8 | 9 | both |
| 22. | mod. | 35 | 5 | 6 | both |
| 23. | mod. | 34 | 6 | 7 | both |
| 24. | mod. | 46 | 11 | 9 | both |
| 25. | mod. | 32 | 4 | 4 | both |
| 26. | mod. | 26 | 4 | 7 | masseters |
| 27. | mod. | 45 | 10 | 10 | masseters |
| 28. | mod. | 21 | 5 | 4 | none |
| 29. | mod. | 33 | 6 | 7 | none |
| 30. | mod. | 38 | 5 | 6 | both |
| 31. | mod. | 17 | 7 | 4 | masseters |
| 32. | mod. | 37 | 6 | 7 | masseters |
| 33. | severe | 32 | 5 | 6 | both |
| 34. | slight | 43 | 8 | 8 | masseters |

the two maxillary incisors with the occlusal plane perpendicular to the mandibular incisors. Again, they were asked to cover the temporalis muscles with their fingertips and bite hard. At this time most could feel a substantial reduction in the temporalis contraction ability. This simple demonstration seems to help the patient understand how the device might be helpful.

Results

Six months after treatment began the average improvement in the patient's symptoms was 74.1 percent. One year after placement, seven (7) subjects reported a significant symptom reduction with nighttime appliance wearing (over 90% improvement) while eleven (11) other individuals reported improvement in their symptoms at a fifty to sixty percent (50 - 60%) level.

The results of this study are corroborated by Christensen's findings²⁰ that 74.1 percent had abatement of their bruxism.

Conclusion

Anterior point stop appliances are a simple and effective method to manage clenching bruxism symptoms. They have been proven effective for the management of bruxism symptoms. They can be fitted chairside to either arch or can be laboratory fabricated.

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QUESTIONS FOR CONTINUING EDUCATION ARTICLE - CE EXAM # 9

- | | |
|---|---|
| <ol style="list-style-type: none"> Bruxism is: <ol style="list-style-type: none"> an oral parafunctional activity a paranormal habit a functional psychological manifestation of organic disease a result of too much politics When bruxism occurs during the day it is called: <ol style="list-style-type: none"> diurnal biurinal nocturnal subconscious Nocturnal bruxism may remove enamel: <ol style="list-style-type: none"> ten times faster five times faster nocturnal and diurnal bruxism are the same when headache is also present What is involved in these parafunctional activities? <ol style="list-style-type: none"> stress muscle hyperactivity ADHD psycho-social disorder The anterior stop appliance results in: <ol style="list-style-type: none"> loss of vertical dimension posterior disclusion posterior occlusion centric occlusion | <ol style="list-style-type: none"> Anterior bite stop appliances have been shown to: <ol style="list-style-type: none"> decrease vertical dimension create centric intercuspation decrease electromyographic activity increase hyperactivity Anterior bite splints are effective in: <ol style="list-style-type: none"> increasing periodontal ligaments diagnosing celphagia managing bruxism symptoms managing electrolyte imbalance One criterion for inclusion in this study was: <ol style="list-style-type: none"> Angle's Class I skeletal relationship Angle's Class II skeletal relationship Angle's Class III skeletal relationship all the above The anterior discluding element works by exploiting the: <ol style="list-style-type: none"> temporomandibular joint free-way space centric occlusion the nociceptive trigeminal inhibition reflex In evaluating the appliance, the posterior teeth should not: <ol style="list-style-type: none"> be in centric occlusion incorporate retention clasps be covered occlusally opened beyond 2 mm |
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See the Answer Form on the next page and follow all instructions regarding submission of TDA Continuing Education Exam # 9, "Management of Nocturnal Bruxism with an Anterior Stop Point Splint," for CE credit.

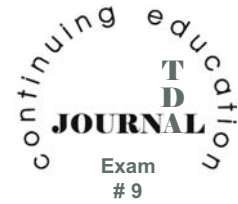
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