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# Preventive Intervention For Bruxism

A Peer-Reviewed Publication

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## Educational Objectives

This article will review the etiology and diagnosis of bruxism, as well as treatment approaches.

Upon completion of this course, the dental professional will be able to:

1. List the signs and symptoms that lead to a diagnosis of bruxism and describe the differences between awake and sleep bruxism
2. List treatment approaches to bruxism
3. List the differences between a traditional laboratory-fabricated and a chairside-fabricated nightguard
4. Describe the technique for fabricating a chairside nightguard with visible light curing material.

## Abstract

Bruxism is a parafunctional occlusal activity, that may exist as either sleep bruxism or awake bruxism. Bruxers have more noticeable signs of dental attrition, abfractions, and occlusal pits on their natural teeth than other patients. Clinical approaches to managing bruxism can be categorized as acute, preventive and chronic, with the approach depending on the patient's signs and symptoms. Preventive intervention is required if a patient presents with tooth wear. A primary preventive approach in the treatment of bruxism is the fabrication and utilization of a nightguard.

## Introduction

It has been estimated that over 45 million people in the United States exhibit the signs and symptoms of sleep bruxism and that 20% of the population has awake bruxism.<sup>1</sup> All age groups have been reported to exhibit the behaviors and clinical signs and symptoms of bruxism.<sup>1-7</sup> Bruxism is a parafunctional occlusal activity. Sleep bruxism has been characterized as grinding of teeth or clenching of the jaw which may be associated with premature tooth wear, tooth or restoration fracture (Figure 1), temporomandibular disorders, and temporal headache upon awakening.<sup>2</sup> With awake bruxism, unlike sleep bruxism, the patient is aware of jaw clenching.<sup>1</sup> This differentiation can be characterized by a person's involuntary clenching of the teeth in reaction to specific stimuli, without a grinding component, and can be related to a tic or habit.<sup>2</sup> Both types of bruxism are either primary (idiopathic, with no associated medical condition), or secondary (iatrogenic, with an associated medical condition).<sup>3</sup>

The etiology of bruxism is unclear, and its onset appears to be associated with many factors. Kampe et al. found that 69% of patients studied had stress as the primary cause of bruxism.<sup>8</sup> Chronic bruxers in this study were reported to have an elevated stress rate and a greater vulnerability to stress. Okeson reported that parafunctional habits such as bruxism are a result of occlusal dissonances and stress.<sup>9</sup> While a number of studies have investigated an association between temporomandibular disorders and bruxism, the findings have not been conclusive.<sup>10-12</sup> Bruxism appears to

be mainly regulated centrally (cortically) and not peripherally (intraorally).<sup>1,2,13</sup> Most contemporary hypotheses point to psychological factors and stress as contributing to the initiation and continuance of parafunctional habits.<sup>2,8,14</sup> If identified, the etiology of the parafunction is important to achieve successful treatment.<sup>15</sup>

Figure 1. Maxillary incisors chipped and fractured due to bruxism.



## Diagnosing Bruxism – Signs and Symptoms

For both new and recall patients, a comprehensive oral exam should be performed. As part of this exam, the functioning surfaces of the teeth should also be evaluated for any signs and symptoms of bruxism and tooth wear. Patients who report tooth clenching and/or grinding have more noticeable signs of dental attrition, abfractions, and occlusal pits on their natural teeth than other patients.<sup>14</sup> Bruxism can be centric with the teeth in maximum intercuspation and pressed together without lateroprotrusive movements of the mandible (clenching); or, eccentric with active movement of the mandible leading to tooth wear (grinding).<sup>14</sup> Typically, in a patient with bruxism, the tooth surfaces in occlusal function demonstrate wear facets not caused by physiologic or functional habits.<sup>16</sup> The length of time a patient has been bruxing contributes to the amount of tooth wear. (Figure 2) Worn incisal edges, wear facets, symptoms of orofacial pain, and a history of stress can all be present in both sleep and awake bruxism.<sup>1-3</sup>

Figure 2. 42-year-old with moderate maxillary arch wear.



Bruxism can also have a major impact on the esthetic appearance of a smile.<sup>14</sup> An esthetically youthful smile is characterized by maxillary central incisors that are slightly longer than lateral incisors.<sup>17</sup> Worn anterior teeth give the appearance of an older smile with the incisal line of the maxillary incisors having a straight appearance, resulting in the teeth being not only shorter but also appearing wider. (Figure 3)

Figure 3. Worn maxillary central incisors with a wider appearance.



**Clinical Approaches to Treating Bruxism** There have been many clinical approaches to the treatment of bruxism.<sup>2</sup> These can be categorized as acute, preventive and chronic management of bruxism, with the approach selected based upon the patient's signs and symptoms. In the case of acute symptoms where the patient is experiencing pain, pharmacotherapeutics may be required.<sup>2,10</sup> Preventive intervention is required if a patient presents with tooth wear, and can include an occlusal splint (nightguard) and stress management recommendations. A primary preventive approach in the treatment of bruxism is the fabrication of a custom hard, plastic nightguard. While there is not enough evidence to demonstrate that a nightguard can reduce sleep bruxism, hard plastic nightguards can reduce tooth wear.<sup>18-20</sup> Preventive measures are important. If no preventive intervention occurs, tooth wear will continue and definitive restorative interventions will be required.<sup>14,21-25</sup> Restorative interventions can be as minimally invasive as direct composite resin restorations<sup>23,24</sup> to a more complex treatment plan that requires complete restorative rehabilitation with indirect restorations.<sup>21,26</sup> The complexity of treatment depends on the occlusal vertical dimension.<sup>21,27,28</sup>

### Preventive Intervention: Occlusal Nightguard Therapy

When the diagnosis of bruxism has been made and tooth wear does not necessitate restorative intervention, a primary approach of prevention using occlusal nightguard therapy is indicated.<sup>18-21,29</sup> Even after restorative interventions, the use of a nightguard is still indicated.<sup>19,30</sup> Traditionally, this entails laboratory fabrication of a nightguard. Alternatives include OTC nightguards and a chairside-fabricated nightguard.

### Traditional Laboratory-fabricated Nightguards

Traditional laboratory-fabricated nightguards require at least two office visits and are available as rigid, hard plastic full-coverage designs, and as partial-coverage designs. Resilient laboratory-fabricated nightguards that soften at intraoral temperatures are also available.

During the first visit, maxillary and mandibular impressions and an occlusal bite registration are taken. It is important that teeth and restorations with fractures or caries are first treated, to ensure that the nightguard will fit. The impressions should be taken using vinylpolysiloxane or polyether impression material, rather than less accurate alternatives such as alginate. It is not necessary to first block out undercuts as these will be blocked out on the stone model in the laboratory. This first visit may include a face bow transfer to enable the laboratory to accurately mount the stone casts on an articulator. Depending on the material, a heat- or light-cured, or vacuum-formed, nightguard can be fabricated. Typically, a hard acrylic resin nightguard is requested using polymethylmethacrylate (PMMA). If the patient has an allergic hypersensitivity to PMMA,<sup>31-33</sup> a soft polyvinyl material or a non-PMMA resin should be used instead.

During the patient's second visit, the nightguard is fitted and adjusted. The occlusion should be checked and adjusted as necessary to ensure smooth gliding. If the nightguard is too tight, the internal aspects should be checked for any ridged areas that may need adjusting. If impinging on soft tissue, it should be trimmed to relieve this. Adjustments can be made using acrylic burs. The nightguard should then be polished until it is smooth again. The chairside time required for adjustments will vary. Factors influencing this include any interim tooth movement that occurred after the first visit as well as any inaccuracies (impression-taking, occlusal registration, mounting of the casts, and fabrication). In some cases, relining or relief of selective tooth bearing surfaces may be required. As a final step, the patient should be instructed in care of the nightguard. Daily cleaning should be carried out using a toothbrush and either water or denture cleanser, followed by thorough rinsing. If a denture cleanser is used, it must be compatible with the nightguard material - this can be checked with the laboratory and the denture cleanser manufacturer. The steps required for fabrication of hard, plastic traditional nightguards can be found in Table 1.

Table 1. Steps for fabrication of traditional hard, plastic nightguards.

<b>1st patient visit</b>
Maxillary and mandibular impressions
Bite registration
Casts poured in stone and trimmed
Laboratory work authorized
<b>2nd patient visit</b>
Nightguard returned from laboratory
Nightguard fitted and adjusted

## Over-the-counter Nightguards

Over-the-counter (OTC) 'boil-and-bite', hybrid and patient-ready nightguards are available. Boil-and-bite nightguards are constructed of thermoplastic resin. The patient places the nightguard in boiling water for several seconds to soften it, then places it over his or her teeth and adapts it by using a gentle biting motion and either lip/air pressure or finger pressure, depending on the manufacturer's instructions. Boil-and-bite nightguards may use a tray to hold the nightguard while it is softened in boiling water and then positioned over the teeth. Hybrid nightguards consist of an outer hard shell and an inner thermoplastic lining that is softened, placed in the outer shell, and positioned over the teeth. The patient must appropriately thermosoften the nightguard (not too little and not too much) and adapt it, then, potentially, trim it. With patient-ready nightguards, the patient places the nightguard in his or her mouth without softening it first. A number of designs are available, including nightguards with posterior teeth coverage only with an anterior strap and full occlusal coverage. (Figure 4) Patients should first see a dentist for evaluation and diagnosis before using an OTC nightguard. The ability to adjust OTC nightguards is de facto limited, as well as limited by the patient's abilities. In the case of OTC nightguards constructed of non-thermoplastic material there is less opportunity to adjust them and only a limited number of sizes are available. OTC nightguards offer no provision for occlusal adjustment. Within these limitations, OTC nightguards offer patients an inexpensive option as an alternative to a custom-fabricated nightguard.

Figure 4. OTC nightguards.



## Single-visit, Light-cured Nightguards

Recently a single-visit, impressionless, chairside, light-cured nightguard has been introduced (iNterra™, Dentsply Caulk). The material is non-PPMA and contains a blend of aliphatic and aromatic urethane methacrylate resins, ethoxylated dimethacrylate ester, acrylate esters and light-cure photoinitiators. Chairside fabrication eliminates steps and costs required for laboratory-fabricated nightguards - impressions, bite registration, casts and a second

visit are not required. Preventive intervention can start immediately as there is no waiting period while the nightguard is fabricated. The final nightguard is hard, wear resistant and resilient.

The nightguard is available as individual, single-use arch forms, packaged in silicone molds in light-safe sealed envelopes. The horse-shoe shaped arch form design has no palatal coverage. The arch forms have a unique wedge shape that is thicker in the posterior dimension and thinner in the anterior, following the 3:1 ratio of rotational closure of the interocclusal distances between anterior incisal edges and posterior occlusal surfaces. Maeda et al. found that there were significant improvements in comfort, breathing and swallowing by trimming mouthguards in a horseshoe shape and with no palatal soft tissue coverage. This shape did not compromise retention or stability.<sup>34</sup> The arch form is available in small, medium and large sizes, and the Starter Kit contains 1 small, 2 medium, and 1 large arches together with a single bite registration material cartridge with mixing tips and a video providing an overview and step-by-step guide for nightguard fabrication. It is recommended that the clinician and staff review this before using the materials. As with any new technique, the first use of the material can be provided for an office staff member in need of a nightguard for familiarization with the technique. Both maxillary and mandibular arches can be used for the fabrication of a nightguard. For most cases the maxillary arch is a better choice for nightguard fabrication than the mandibular arch, and was used in the case described below.

## Fabricating the Chairside Nightguard

Before fabricating the nightguard, teeth and restorations with fractures or caries should be restored. The teeth should also be scaled, root planed and polished so that the fit of the final nightguard will be snug against the teeth. Any severe undercuts and notching of the cervical areas of teeth to be included in the nightguard must be blocked out using a rigid bite registration material. This will prevent the nightguard from distorting or locking into place during fabrication. Similarly, if there is an existing fixed partial denture, the gingival embrasure areas and pontic area should be blocked out with the bite registration material. Large gingival embrasures that do not have papilla should also be blocked out.

## Arch Form Dimensions and Selection

The appropriate-sized arch is selected for the patient. Pre-existing diagnostic casts or the silicone holder from a previously fabricated nightguard can be used to help in arch form sizing and selection. If using the silicone mold for this, be sure to disinfect and or sterilize the silicone between uses.

Remove the selected arch form and its sealed silicone mold from its light-safe pouch and remove the flexible

film from the top of the silicone mold. Do not discard the flexible film. Set it aside, as it will be used in the extraoral light-curing/polymerization process. The arch-shaped flexible film must remain attached to the top (occlusal portion) of the nightguard material that is facing the occlusal surfaces of the opposing arch. Next, take the arch form out of the silicone mold (Figure 5), and set the silicone mold aside. If the dimensions of the arch form need to be adjusted, use slight finger pressure to pull and stretch the material, or if the arch is slightly oversized, use scissors to trim the excess. (Figure 6) If additional thickness is necessary due to specific anatomic features of a patient's tooth surfaces, missing teeth or arch misalignment, two arch forms can be used together to form a single nightguard. In some cases you may want to use another arch form for adding to the nightguard during fabrication. If so, do not contaminate it during the adjustment additions.

### **Adapting the Nightguard Intraorally**

Have the patient rinse with a glass of water or mouthwash to lubricate the teeth (a lubricating medium may be used, but is not necessary). Then, center and place the exposed resin side of the arch form against the teeth. With slight finger pressure, adapt the facial and lingual surfaces of the arch form to the middle third of the facial surfaces and almost to the gingival third of the lingual surfaces of the teeth (Figure 7) and adapt the material into the facial and lingual tooth embrasures. Do not over-compress the material during the adaptation process, as the resin must be at least 1 mm in thickness for nightguard rigidity. After adaptation, check that the material is covering the teeth adequately, correctly oriented, and adapted to the teeth. Next, have the patient bite lightly into the material and evaluate the areas of tooth contact on the flexible film still present on the surface of the nightguard material. Request the patient to lightly bite down and then open, having him or her repeat the movement. Then have the patient lightly bite down in protrusive and lateral protrusive positions on the flexible film. Patients need to be instructed to bite gently by stepping through the movements, rather than dragging their teeth through the border movements of the occlusal excursions. This rehearsal will make fabrication easier for the patient and clinician, and this technique will create a functionally generated occlusal path on the nightguard surface. It is critical that the clinician watch and help guide the patient's mandible during these movements to avoid the patient overbiting and perforating and/or thinning the material's surface. Occlusal contact registrations must be limited to very minimal indentations in the material's surface. After the nightguard is polymerized, these rough ridges will be smoothed and polished to create flat-plane, point contacts that the patient will be able to easily glide his or her teeth over.

Figure 5. Arch form removed from mold.

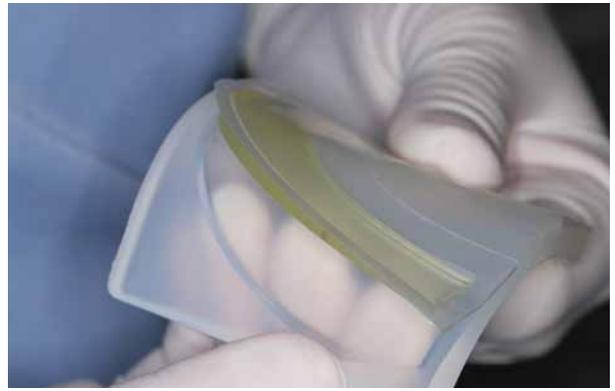


Figure 6. Excess arch material can be trimmed with scissors.

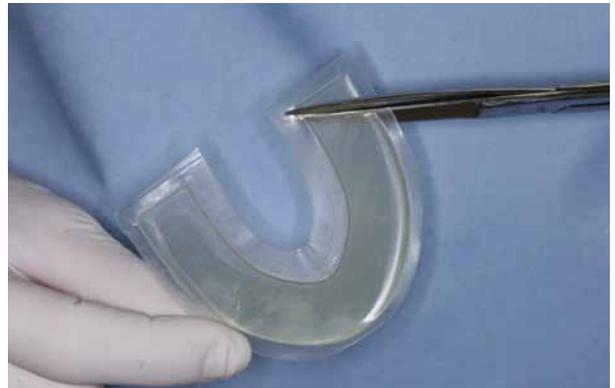


Figure 7. Adaptation to the facial and lingual surfaces.



### **Light-curing the Nightguard**

Light-curing the nightguard is a multistep process, and involves light-curing extraorally after partial intraoral light-curing. In order to light-cure the nightguard, an iNterra™ VLC Curing Unit (Dentsply Caulk) or a Triad® 2000 VLC Curing Unit (Dentsply Trubyte) is required.

In addition, a visible light curing device is required to intraorally light-cure the nightguard to hold its shape upon removal. Quartz halogen light curing units have a higher energy output and will cure the VLC resin material more efficiently than an LED VLC curing unit. The curing light

should have a power density of 500 mw/cm<sup>2</sup> with a spectral output of 470 nm. If an LED light is used, it is recommended that 50% more curing time be used. The resin material has a yellow-orange color before polymerization due to the color of the camphoroquinone photoinitiator. Once completely light-cured, the resin has a clear appearance.

### **Intraoral Light-curing**

**Facial light-curing:** When it is confirmed that the occlusal and excursive contacts have been lightly registered into the flexible film surface still covering the VLC material, ask the patient to lightly bite in centric occlusion and to hold that position while the handheld intraoral light-curing tip is directed at right angles to the facial surfaces of the nightguard at a distance of no more than 1 mm from the nightguard surface. You can gently push the light probe tip into the flexible film that covers the nightguard material to further adapt the material to the tooth surfaces. (Figure 8) Step cure for 5 to 10 seconds each the entire facial surface of the nightguard in the posterior and anterior regions for a single thickness nightguard. If you have used a double thickness of nightguard or added additional nightguard material to select locations due to tooth position or missing teeth, light-cure these areas for at least 10-20 seconds. The entire arch should take approximately 1 minute to light-cure for a single thickness, 2 minutes for a double thickness. **Palatal and occlusal light-curing:** Ask the patient to open and verify the lingual adaptation of the nightguard material. Step cure the palatal surfaces of the arch for 1-2 minutes following the same protocol as the facial surfaces. When the palatal surfaces have been light-cured, light-cure the occlusal surfaces of the nightguard.

The total intraoral curing time is dependent on which light you use. Total curing time is 3 minutes with a quartz halogen curing unit for a single thickness of nightguard material and 5-6 minutes for a double thickness of nightguard material. If using an LED curing light the total curing time for a single thickness of material would be 4 ½ minutes.

### **Removal and Stabilization of the Nightguard**

Once intraorally light-cured, the nightguard is semirigid and not yet fully polymerized. Remove it from the mouth with a snap release. Seat and release it onto the teeth at least 3-4 times to assure proper removal and fit. With the nightguard properly and completely seated, light-cure any soft areas of the material. When all intraoral light-curing is completed and the nightguard has been seated and resealed, remove it from the mouth. Do not remove the flexible film; do not squeeze, bend, twist or distort the mouthguard. For stabilization of the partially polymerized nightguard, fill all internal aspects and tooth spaces in the nightguard with the bite Registration material. (Figure 9)

Figure 8. Light-curing the facial surfaces.



Figure 9. Application of the rigid bite registration material to the internal surfaces of the nightguard.



Extend the rigid silicone 4-6 mm above and beyond the edge of the nightguard. Invert the silicone-filled nightguard onto the original retained square celluloid sheet, with the bite registration material against the celluloid sheet. Wait at least 2 minutes until the bite registration material is fully set. The nightguard is now stabilized and ready for extraoral light-curing.

### **Extraoral Light-curing**

Place the stabilized nightguard onto the curing platform of the curing unit, and set the unit to the nightguard curing cycle. This cycle will cure the nightguard for 10 minutes followed by 3 minutes of cooling time. According to the manufacturer's instructions, the Triad® 2000 VLC unit can also be used with a 20-minute cure (two 10-minute cure cycles on the same side with no more than 3 minutes between cure cycles). The nightguard must be centered on the rotating table and the table height set properly for light-curing.

### **Adjusting and Polishing**

After light-curing, the nightguard material will be hot and thermally non-rigid. Do not squeeze, bend, or twist it. Allow the nightguard to completely cool down prior to handling, removal of the bite registration material, and peeling away of the flexible film, to avoid distortion. Note the accuracy of adaptation of the nightguard by viewing the tooth details seen in the bite registration material for another case. (Figure 10)

Figure 10. Accuracy and adaptation of the nightguard evident on the bite registration removed from its internal surfaces.



Disinfect the nightguard, then clean it by scrubbing with a denture brush using warm water and soap or detergent then rinsing with warm water and drying. Any gross excess and flash of material is removed using a laboratory carbide bur or abrasive wheels or bands. Rinse and dry the nightguard, then check the fit by seating the nightguard over the patient's teeth. Adjust the borders and the occlusion with an acrylic bur. Make sure that the borders are smooth, with no sharp or rough edges and that the occlusal surface does not have pronounced ridges (peaks or valleys). When the patient moves through the range of occlusal movements, a smooth gliding of the teeth over the surface should occur. When the adjustments have been completed, the nightguard can be finished and polished with laboratory carbide burs, polishing wheels, silicone and rubber polishing points and a water/pumice paste with a polishing brush or rag wheel. (Figure 11) The nightguard is inserted intraorally and the occlusion and fit checked and adjusted. (Figure 12) If the nightguard has a tight fit, evaluate the interproximal areas on the internal surface of the nightguard. If these areas appear sharp, gently round them off. The nightguard should extend to cover the incisal third of the facial surfaces. In this author's experience the patient is more comfortable if the nightguard extends onto the palatal side covering some of the soft tissue. This is more comfortable to the tongue for a patient.

Figure 11. Polishing the borders of the nightguard.



Figure 12. Checking the nightguard for occlusal adjustments.



Figure 13. Completed nightguard inserted.



### Patient Instructions

As the final step, have the patient demonstrate insertion and removal of the nightguard and instruct the patient on cleaning the appliance and storing it between wearings. The nightguard can be cleaned using most OTC denture and orthodontic cleaning solutions. The patient needs to read the instructions on the product to verify its use with the nightguard. The patient should be instructed to bring the nightguard to all recall cleaning appointments to be evaluated. The completed one visit, impressionless nightguard is well fitting, retentive and comfortable, and protects the dentition. (Figure 13) It is less expensive than a laboratory-fabricated alternative, and avoids a second visit.

### Discussion

Tooth attrition has been classified by Pindborg as either physiologic (gradual and regular loss of tooth structure as a result of natural mastication), or pathologic wear confined to a single tooth or groups of teeth caused by abnormal function, or position of teeth, or intensified wear, that is more extensive than would normally be expected.<sup>35</sup> In one study of 520 older adults, 84.2% had enamel attrition, 72.9% dentin attrition and 4.2% had severe attrition.<sup>36</sup> Schneider and Peterson reported that 15% of children demonstrate tooth wear due to bruxism.<sup>37</sup> Young adults also demonstrate tooth

wear. Pintado et al. measured attrition in 18 dental students, ages 22-30, and found an average tooth structure loss of 10.7 micrometers after one year and almost double this after two years.<sup>38</sup> Xhonga et al.<sup>39</sup>, Molnar et al.<sup>40</sup>, and Lambrechts et al.<sup>41</sup> all found almost 50 micrometers of wear over one year.

While tooth wear is typically associated with bruxism, erosion should not be ruled out. Khan et al. analyzed 104 patients with excessive tooth wear and found erosion predominated in all three groups to the virtual exclusion of attrition in the molar sextants. Only the mandibular anterior sextant had more wear due to attrition.<sup>42</sup> It would appear that while attrition may be an initial cause of tooth loss, when the wear is severe with exposed dentin, erosion becomes a more important factor. Tooth wear may be due to bruxism, abrasion, or erosion,<sup>43-45</sup> or a combination of these.<sup>46</sup> In most clinical cases, it is not a single cause and effect condition. Recent investigations have found that noncarious cervical lesions are more prevalent in patients with sleep bruxism,<sup>47-50</sup> giving the clinician an additional diagnostic tool. Occlusal surface wear has been characterized as a natural phenomenon, with continuing eruption of the posterior teeth compensating for loss of tooth substance.<sup>51,52</sup> Since tooth wear is in fact physical trauma, mineralization within the pulp chamber and root canal occur to compensate for the loss of tooth structure.<sup>53</sup> Although treatment of wear is mainly a restorative concern, it has been reported that 11.6% of 448 patients with severe attrition had either near pulpal exposures or frank pulpal exposures.<sup>54</sup>

Why do teeth wear due to bruxism and in normal function? Mair took the viewpoint of fundamental wear mechanisms.<sup>55</sup> He has described these as surface-to-surface wear, slurry wear, and corrosive wear (erosion). Surface-to-surface wear can be enamel-to-enamel in contact movements with subsequent microfractures of the enamel structure, or enamel plowing up the opposing softer dentin substrate. This mechanism of wear is usually due to bruxism. Surface-to-surface wear can be seen where the teeth interdigitate. Slurry wear (or 'three-body wear') can be characterized as an abrasive slurry between two moving tooth surfaces and the (food) substrate. Where slurry wear has occurred, the teeth do not fit together in all aspects of the tooth loss. Corrosive wear is induced by acid of non-microbial origin, usually as a result of ingesting acidic foods and beverages or from stomach acid as a result of bulimia or stomach acid reflux.<sup>56-59</sup> Clinically, the cupping of dentin on incisal edges and posterior cusps (the Class VI lesion), can be attributed to corrosive wear. In these cases, corrosive wear is diagnosed by the presence of restorations protruding above the occlusal plane of the tooth. All forms of wear should be considered during evaluation and appropriate intervention provided. Tooth wear due to bruxism requires the clinician to diagnose and treat in its earliest stages. Early, subtle changes can go unrecognized or be "watched" until the severity of wear requires a restorative intervention.

## Conclusion

Bruxism has been shown to contribute to tooth wear, fractured teeth and restorations, temporomandibular disorders and headaches. Bruxism is a significant dental occurrence that needs to be identified and diagnosed, and treatment intervention must be planned. Preventive intervention is necessary to avoid further wear and destruction of teeth and restorations. Using a nightguard, the patient can protect his or her teeth from uncontrolled wear due to bruxism. Recently, a one visit, impressionless, custom-fabricated nightguard was introduced as an alternative to the traditional laboratory-fabricated nightguard, and can be provided to the patient in one hour. While there is very little success reported in changing parafunctional habits, tooth structure can be preserved with the use of nightguard therapy.

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## Author Profile

### Howard E. Strassler, DMD, FADM, FAGD



Dr. Howard Strassler is Professor and Director of Operative Dentistry at the University of Maryland Dental School in the Department of Restorative Dentistry. He is a Fellow in the Academy of Dental Material and Academy of General Dentistry, a Member of the American Dental Association, Academy of Operative Dentistry and International Association of Dental Research. He is on the editorial board of

numerous publications. He is a consultant and clinical evaluator to over 15 dental manufacturers. Dr. Strassler has published over 400 articles in the field of restorative dentistry and innovations in dental practice and has coauthored seven chapters in texts. He has presented over 425 programs throughout the United States, Canada, and Europe. Dr. Strassler has a general practice in Baltimore, Maryland that is limited to restorative dentistry and esthetics.

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#### Acknowledgment

Nightguard fabrication clinical images are courtesy of Dr. Nels Ewoldsen.

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## Questions

- It has been estimated that \_\_\_\_\_ in the United States exhibit the signs and symptoms of sleep bruxism and that \_\_\_\_\_ has awake bruxism.
  - over 65 million people; 20% of the population
  - over 55 million people; 15% of the population
  - over 45 million people; 20% of the population
  - none of the above
- Sleep bruxism may be associated with \_\_\_\_\_.
  - premature tooth wear
  - tooth fracture
  - restoration fracture
  - all of the above
- Patients who report tooth clenching and/or grinding have more noticeable signs of \_\_\_\_\_ than do other patients.
  - dental attrition
  - occlusal pits
  - abfractions
  - all of the above
- Worn incisal edges, wear facets, and a history of stress are found in patients with \_\_\_\_\_.
  - sleep bruxism
  - awake bruxism
  - terminal bruxism
  - a and b
- Worn anterior teeth \_\_\_\_\_.
  - appear wider
  - give the appearance of an older smile
  - are of no consequence
  - a and b
- Pharmacotherapeutics may be required to treat bruxism if the patient is \_\_\_\_\_.
  - experiencing acute symptoms
  - experiencing hallucinations
  - overweight
  - none of the above
- The management of bruxism can be defined as \_\_\_\_\_.
  - acute and chronic
  - chronic
  - acute
  - acute, chronic, and preventive
- There is sufficient evidence that a nightguard \_\_\_\_\_.
  - can reduce sleep bruxism
  - can reduce tooth wear
  - can reduce obesity
  - none of the above
- A primary preventive approach using occlusal nightguard therapy is indicated \_\_\_\_\_.
  - when a diagnosis of bruxism has been made and tooth wear necessitates restorative intervention
  - when a diagnosis of bruxism has been made and tooth wear may not necessitate restorative intervention
  - when a diagnosis of bruxism has been made and teeth present with fractures
  - none of the above
- Preventive intervention options for bruxism include \_\_\_\_\_.
  - OTC nightguards
  - custom-fabricated nightguards
  - implant therapy
  - a and b
- Traditional laboratory-fabricated nightguards \_\_\_\_\_.
  - can be constructed of hard, plastic resin
  - can be constructed of resilient material
  - require at least two office visits
  - all of the above
- Teeth and restorations with fractures or caries must be treated \_\_\_\_\_ preventive intervention therapy with a nightguard.
  - before
  - during
  - after
  - anytime
- Laboratory-fabricated nightguards can be \_\_\_\_\_.
  - heat cured
  - light cured
  - vacuum formed
  - all of the above
- If a custom-fabricated nightguard is too tight, \_\_\_\_\_.
  - the external aspects should be checked for any ridged areas that may need adjusting
  - the internal aspects should be checked for any ridged areas that may need adjusting
  - the external and internal aspects should be checked for any ridged areas that may need adjusting
  - none of the above
- \_\_\_\_\_ will influence the chairside time required for adjustments to laboratory-fabricated nightguards.
  - Interim tooth movement that occurred after the first visit
  - Clinical inaccuracies
  - Laboratory inaccuracies
  - all of the above
- Daily cleaning of nightguards should be carried out using \_\_\_\_\_, and followed by thorough rinsing.
  - a toothbrush
  - water or denture cleanser
  - soap
  - a and b
- Over-the-counter (OTC) nightguards are available as \_\_\_\_\_ nightguards.
  - "boil-and-bite" and hybrid
  - hybrid and patient-ready
  - "boil-and-bite" and patient-ready
  - "boil-and-bite," hybrid, and patient-ready
- OTC nightguards offer \_\_\_\_\_ provision for occlusal adjustment.
  - no
  - some
  - a great deal of
  - none of the above
- Chairside nightguard fabrication \_\_\_\_\_.
  - eliminates the need for impressions, bite registration, and casts
  - eliminates the need for adjustments
  - enables preventive intervention from the first visit
  - a and c
- Chairside-fabricated nightguards are available as \_\_\_\_\_.
  - dual-purpose designs
  - single-use, individual arch forms
  - reusable arch forms
  - none of the above
- Tooth wear due to bruxism \_\_\_\_\_.
  - requires no intervention
  - should be watched until at least moderate wear is present
  - requires a clinician's diagnosis and treatment in its earliest stages
  - none of the above
- Maeda et al. found that there were significant improvements in patient comfort, breathing, and swallowing with mouthguards trimmed \_\_\_\_\_.
  - in a horseshoe shape and with palatal soft tissue coverage
  - in a horseshoe shape and with no palatal soft tissue coverage
  - in a horseshoe shape and with labial soft tissue coverage
  - all of the above
- There is a need to restore teeth and restorations with fractures or caries prior to \_\_\_\_\_.
  - chairside nightguard fabrication
  - laboratory-fabricated nightguards
  - examination
  - a and b
- Before chairside fabrication of nightguards, required steps include: \_\_\_\_\_.
  - having the patient see his or her physician for a full physical examination
  - scaling, root planing, and polishing the teeth
  - blocking out any severe undercuts and notches
  - b and c
- If the dimensions of the arch form selected for a chairside-fabricated nightguard need to be adjusted, \_\_\_\_\_ can be used.
  - slight finger pressure
  - scissors
  - scalpels
  - a or b
- Chairside-fabricated nightguards require \_\_\_\_\_.
  - intra-oral light curing
  - a bite registration
  - extra-oral light curing
  - a and c
- Having the patient rehearse protrusive and lateral protrusive positions on the flexible film covering the arch form \_\_\_\_\_.
  - will make fabrication easier for the patient and clinician
  - will create a passively generated impression on the nightguard surface
  - will create a functionally generated occlusal path on the nightguard surface
  - a and c
- Tooth attrition has been classified by \_\_\_\_\_ as either physiologic or pathologic wear.
  - Maeda
  - Pindborg
  - Black
  - none of the above
- While tooth wear is typically associated with bruxism, \_\_\_\_\_ should not be ruled out.
  - caries
  - erosion
  - periodontal disease
  - all of the above
- While there is \_\_\_\_\_ reported in changing parafunctional habits, tooth structure \_\_\_\_\_ with the use of nightguard therapy.
  - great success; can be preserved
  - very little success; can be reshaped
  - very little success; can be preserved
  - none of the above

# Preventive Intervention For Bruxism

Name: \_\_\_\_\_ Title: \_\_\_\_\_ Specialty: \_\_\_\_\_

Address: \_\_\_\_\_ E-mail: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ ZIP: \_\_\_\_\_ Country: \_\_\_\_\_

Telephone: Home (     ) \_\_\_\_\_ Office (     ) \_\_\_\_\_

Requirements for successful completion of the course and to obtain dental continuing education credits: 1) Read the entire course. 2) Complete all information above. 3) Complete answer sheets in either pen or pencil. 4) Mark only one answer for each question. 5) A score of 70% on this test will earn you 2 CE credits. 6) Complete the Course Evaluation below. 7) Make check payable to PennWell Corp.

## Educational Objectives

- List the signs and symptoms that lead to a diagnosis of bruxism and describe the differences between awake and sleep bruxism
- List treatment approaches to bruxism
- List the differences between a traditional laboratory-fabricated and a chairside- fabricated nightguard
- Describe the technique for fabricating a chairside nightguard with visible light curing material.

## Course Evaluation

Please evaluate this course by responding to the following statements, using a scale of Excellent = 5 to Poor = 0.

1. Were the individual course objectives met?	Objective #1: Yes No	Objective #3: Yes No
	Objective #2: Yes No	Objective #4: Yes No
2. To what extent were the course objectives accomplished overall?	5 4 3 2 1 0	
3. Please rate your personal mastery of the course objectives.	5 4 3 2 1 0	
4. How would you rate the objectives and educational methods?	5 4 3 2 1 0	
5. How do you rate the author's grasp of the topic?	5 4 3 2 1 0	
6. Please rate the instructor's effectiveness.	5 4 3 2 1 0	
7. Was the overall administration of the course effective?	5 4 3 2 1 0	
8. Do you feel that the references were adequate?	Yes No	
9. Would you participate in a similar program on a different topic?	Yes No	
10. If any of the continuing education questions were unclear or ambiguous, please list them.		

11. Was there any subject matter you found confusing? Please describe.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

12. What additional continuing dental education topics would you like to see?

\_\_\_\_\_

\_\_\_\_\_

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**(Checks and credit cards are accepted.)**

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Acct. Number: \_\_\_\_\_

Exp. Date: \_\_\_\_\_

**Charges on your statement will show up as PennWell**

- |                                                                                                     |                                                                                                     |
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| 1. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D  | 16. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |
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| 10. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 25. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |
| 11. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 26. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |
| 12. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 27. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |
| 13. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 28. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |
| 14. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 29. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |
| 15. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 30. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |

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