

Expert Opinion

Bruxism, Temporomandibular Dysfunction, Tension-Type Headache, and Migraine

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The association of bruxism and temporomandibular joint dysfunction (TMD) with primary headaches has been controversial.

CLINICAL HISTORY

A 32-year-old woman was seen for frequent migraine without aura present since she was a teenager. She reported having seen her general dentist for a cleaning who recommended a nociceptive trigeminal inhibition (NTI) bite guard to prevent migraine which he told her was US Federal Drug Administration (FDA) approved. She then went to see a temporomandibular joint (TMJ) specialist for a second opinion who told her that she had bruxism and TMD, although she was not aware of any symptoms. The specialist also recommended a splint to be worn nightly. Physical therapy was also proposed.

Questions.—What is the evidence that the NTI bite guard reduces migraine frequency? Are there adverse events associated with its use? How common is bruxism and is bruxism associated with migraine or other headaches? Can bruxism be diagnosed by a

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dentist if the patient's bed partner does not report this behavior? Is TMD associated with migraine? Can headaches be due to TMD? Should the headache specialist include a TMJ examination as part of the routine headache examination? What treatments can the non-dentist provide? When should a dental referral be made?

EXPERT COMMENTARY

Routine dental examinations include a review of the patient's medical history. Dentists are in an excellent position to evaluate conditions that patients might otherwise ignore or self-medicate, such as hypertension or migraine, and then make the appropriate referral. On evaluation, the patient may have had signs of bruxism or TMD, such as marked attrition, or elicited pain in and around the TMJs or associated musculature. Pain in the orofacial region is mediated by the trigeminal nociceptive pathway; as such, it could exacerbate and potentially trigger headaches, including migraine, in susceptible individuals. Managing the signs, even in the absence of obvious symptoms, with non-invasive and reversible treatments can contribute to the overall well-being of the patient.

What Is the Evidence That the NTI Bite Guard Reduces Migraine Frequency? Are There Adverse Events Associated With Its Use?—The NTI Clenching Suppression System (now: “Nociceptive Trigeminal Inhibition—Tension Suppression System”: NTI-tss) is an anterior bite stop approved, for marketing, by the FDA in 1998, for the use by people with

migraine and migraine-associated headaches, bruxism and TMD.¹⁻³ The small, pre-fabricated device covers either the 2 maxillary central incisors or the 2 mandibular central incisors and provides contact with only the opposing incisors. Anterior bite stops physically separate the posterior teeth. They have been used in the treatment of TMD for many years. The NTI has loyal supporters and harsh critics. Supporters tout FDA approval as proof of effect, while critics contend that the available evidence does not set forth the efficacy necessary to support its use. Claims of superiority to full coverage appliances are unsubstantiated as initial studies compared the device to the equivalent of a bleaching tray rather than a full coverage or stabilization orthotic. A bleaching tray is a very thin, flexible delivery apparatus for cosmetic purposes, and offers no support to the TMJs. Furthermore, studies have demonstrated resilient materials placed in the mouth encourage masticatory muscle activity, which would exacerbate existing myalgia.^{4,5} Additionally, patient selection, headache diagnoses and outcome criteria were not well defined.³

Current evidence does not support the NTI as an effective treatment in the management of tension-type headache or migraine, but does support the efficacy of the NTI for short-term use in management of bruxism and myogenous TMDs.¹ According to Baad-Hansen et al, insertion of the NTI-tss leads to a significant reduction in electromyography activity of jaw-closing muscles, compared to baseline.⁶ This does not necessarily correlate with a decrease in patient symptoms. The NTI is not more effective than the full coverage orthotic, nor is it without risks.⁷ The NTI has been associated with permanent bite changes, swallowing and unconfirmed aspiration. Its use is contraindicated in patients with TMJ instability, and the rotational forces that it places on the joint can be detrimental.⁸ The NTI does not provide an increase in benefit when compared to a full coverage orthotic, except in case of persistent clenching. The increased risk of NTI-associated complications requires its judicious use. An occlusal appliance (oral appliance, orthotic, biteguard, nightguard, splint, biteplate, retainer, occlusal device) may be useful as combination mechanical and behavioral therapy in the management of bruxism and TMD. The appliance may

cover all of the teeth of 1 arch (complete coverage) or some of the teeth (partial coverage). It may or may not reposition the mandible or realign the maxillary-mandibular relationship. The most common occlusal appliance is a complete coverage, non-repositioning orthotic. The use of an appliance in headache management is appropriate when masticatory myalgia or TMJ arthralgia induce or exacerbate headache symptoms.⁷

How Common Is Bruxism and Is Bruxism Associated With Migraine or Other Headaches? Can Bruxism Be Diagnosed by a Dentist if the Patient's Bed Partner Does Not Report This Behavior?—

Occlusal appliances cannot predictably prevent bruxism. Bruxism is very common, occurring frequently in approximately 5-8% of the population and occurring at some point in most (85-90%) of the population.⁹⁻¹¹ It involves the diurnal or nocturnal parafunctional activity, including clenching, bracing, gnashing, and grinding of the teeth.^{12,13} Sleep bruxism (SB) is an oromandibular sleep-related movement disorder of repetitive gnashing together of the teeth that usually occurs during sleep and is associated with arousals.^{11,12,14} It can be associated with loud noise that a bed partner may hear, but may also be silent. SB is often associated with attrition or wearing away of the teeth, especially the incisal edges and cusp tips.

Often, patients are asymptomatic when attrition is noted on a routine dental examination. In these cases, a full coverage orthotic may be indicated to reduce the destructive wear of the teeth, although the process leading to the effect seen may have occurred long before the discovery. Electromyographic recordings of activity of the masticatory muscles and polysomnogram recordings are additional diagnostic tools, but provide only a snapshot of SB activity that fluctuates over time.⁹ SB is modified by various neurotransmitters, smoking, caffeine, alcohol, medications and other drugs and is affected by multiple factors, including genetics, disease, and trauma.⁹ SB may also be associated with masticatory myalgia, TMJ arthralgia and headache, although these symptoms do not usually occur and a causal relationship does not exist.

Is TMD Associated With Migraine? Can Headaches Be Due to TMD?—Temporomandibular joint dysfunction is a collective term, including musculosk-

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1 etal disorders of the masticatory muscles and/or the
2 TMJ. Biological, behavioral, environmental, social,
3 and cognitive factors contribute to the development
4 of TMD.^{13,15} Approximately 75% of the non-patient
5 population has at least 1 sign of TMD and 33% have
6 at least 1 symptom.^{13,16} TMD can be broadly divided
7 into disorders primarily involving the joints and, more
8 commonly, disorders primarily involving the mastica-
9 tory musculature. Individuals with myogenous TMD
10 are more likely to have headache; the prevalence
11 of TMD in migraine and tension-type headache is
12 higher than in a non-headache population.¹⁷ Accord-
13 ing to Glaros et al, individuals with chronic headache
14 were more likely to meet criteria for Research Diag-
15 nostic Criteria for Temporomandibular Disorder
16 (RDC/TMD) diagnosis of myofascial pain than non-
17 headache controls.¹⁸ It is important to remember,
18 though, that the RDC/TMD provided a system for
19 the standardization of the diagnostic criteria for 8
20 common myogenous and arthrogenous forms of
21 TMD and not a guideline for treatment.¹⁹ TMD may
22 be a cause of headaches. The International Classifica-
23 tion of Headache Disorders (ICDH-II) identified
24 headache or facial pain attributed to TMJ disorders,
25 11.7, as a secondary disorder.²⁰ TMD may also exac-
26 erbate headache symptoms, or a primary headache
27 disorder may cause pain to be perceived in the mas-
28 tatory muscles or TMJ.^{1,16} In myogenous TMD,
29 peripheral and central mechanisms are likely
30 involved.²¹ TMD may increase central sensitization,
31 inducing or exacerbating headache in susceptible
32 patients. Cutaneous allodynia is a clinical manifesta-
33 tion of sensitization of the nociceptive neurons in the
34 trigeminal nucleus caudalis and is associated and may
35 be a predictor for migraine chronification.²² The high
36 prevalence and overlapping symptoms of TMD and
37 primary headache lead to difficulty in proper diag-
38 noses and establishment of causality. The mechanisms
39 leading to overlap may also include shared environ-
40 mental and genetic factors involving abnormal pain
41 processing and trigeminal sensitization from nocicep-
42 tive input. There is a clear association between TMD
43 and migraine and perhaps migraine progression.
44 Further investigation is needed to assess causality.

45 **Should the Headache Specialist Include a TMJ**
46 **Examination as Part of the Routine Headache**

Examination? What Treatments Can the Non-Dentist
Provide? When Should a Dental Referral Be
Made?—The headache specialist should include a
TMJ screening evaluation as part of the routine head-
ache examination. Patients should be questioned
about pain in and around the TMJ and pain or fatigue
associated with chewing. Mandibular range of
motion, pattern of opening, and joint sounds should
be assessed and any correlation with pain noted. This,
along with extraoral palpation of the masseter and
temporalis muscles, and palpation of the TMJ with
jaw opening and closing can be accomplished quickly
and easily. TMD symptoms can often be managed
through non-dental means. Patients should be
instructed to rest the area as they would other injured
joints. They should maintain a soft diet and avoid
habits that may increase the painful symptoms
(singing, wide yawning, gum chewing, etc.). Heat or
ice, massage and gentle range of motion exercises
may also help decrease symptoms. Pharmacologic
agents including analgesics, non-steroidal anti-
inflammatories, corticosteroids, muscle relaxants, and
benzodiazepines have been used in addition to non-
pharmacologic modalities, in the short-term manage-
ment of TMDs, and low-dose tricyclic antidepressants
may be beneficial for chronic symptoms if pain is
centralized.²³ If the pain or restricted opening is
severe, if there is a history of TMJ sticking or locking,
or if symptoms worsen or fail to improve quickly, the
patient should be referred to a dentist who is trained
to manage orofacial pain and TMD.

Despite a lack of a clear causal association
between headache disorders and TMD, there is a
clear overlapping of symptoms and patients with
co-morbid primary headache and TMD may find that
either disorder may trigger or exacerbate the other.

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