

CASE REPORT

Occlusal Guards or Not Occlusal Guard: THAT IS THE QUESTION

Balancing: Art, Science and Business of Dentistry

Case Presented By: Dr. Jeffrey Hoos



Abstract

After 45 years of clinical practice, I have learned that successful dentistry requires balancing three essential elements: clinical artistry, scientific evidence, and sound business practices. This paper examines how occlusal guards fit into modern dental practice, exploring when they are indicated, which types to use, and how digital workflows can improve both patient care and practice efficiency. Rather than advocating for a single approach, this article emphasizes the multifactorial nature of temporomandibular disorders (TMD) and the importance of individualized treatment planning.

Introduction

To succeed in dentistry, practitioners must find the optimal balance between the art, science, and business of our profession. We strive to provide beautiful, scientifically-based treatment while maintaining a profitable practice model. This raises important questions about occlusal guards:

When should we recommend them? Which types are most appropriate? How can we deliver this service efficiently and profitably?

This article does not attempt to provide a comprehensive review of occlusal theory or TMD management. Instead, it offers a practical perspective based on 45 years of clinical experience, including observations from the “TMD wars” of past decades.

I recall witnessing a heated argument between two prominent dentists at a conference in Chicago, each insisting their theory was correct: “It’s the temporalis muscle!” “No, it’s the medial pterygoid!” A third colleague had to separate them, declaring, “You’re both wrong—it’s psychological!” Later that day, a keynote speaker presented compelling evidence that occlusion might not be the primary factor at all.

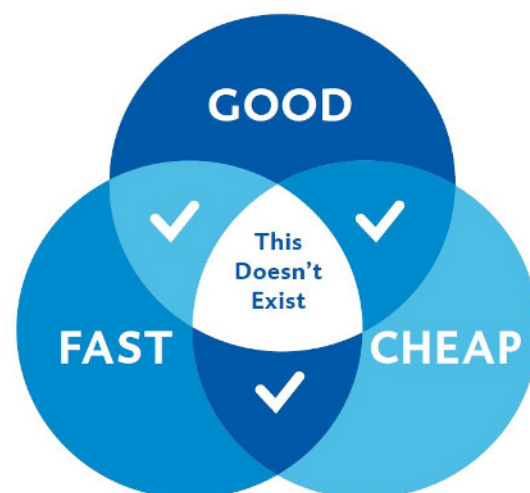
This experience taught me a crucial lesson: TMD is multifactorial, and accurate diagnosis of determining which factor is the most influential is the key to appropriate treatment. As psychologist Abraham Maslow noted, “If the only tool you have is a hammer, everything looks like a nail.”¹ In Dentistry, relying solely on one treatment approach—such as a night guard for all TMJ issues—can overlook other necessary interventions like behavioral therapy, orthodontics, or physical therapy.

The Business Triangle: Good, Fast, and Affordable

During my MBA studies, I encountered a fundamental business principle illustrated by the “good, fast, cheap” triangle. Traditional business wisdom suggests you can only choose two of these three qualities. However, I believe dentistry can achieve something better: delivering good, fast, and affordable care—where “affordable” means providing excellent value rather than simply being cheap.

For fee-for-service practices like mine, this balance is essential. We must deliver artful dentistry based on sound science at fees that provide acceptable return on investment. Digital technology, including CAD/CAM systems and 3D printing, has made this possible by appealing to time-conscious patients while improving practice efficiency.

If you want something cheap and fast, it won’t be good. And if you want it good and cheap, you’ll be waiting until I can get to it. We’ve all learned that it’s simply not possible to have all three—good, fast, and cheap—at the same time if we want to earn an acceptable return on our investments in practice.



While we may not be able to be good, fast, and cheap, I do believe it’s possible to be **good, fast, and affordable**—with “affordable” defined as delivering good value.

For a practice—especially a fee-for-service practice like mine—to deliver artful, scientifically sound dentistry at affordable fees, we must work efficiently enough to generate a fair return on investment. The advent of CAD/CAM technology and “same-day dentistry” has made it easier to appeal to patients who value convenience and, at the same time, improve profitability. Leveraging intraoral scanning and 3D printing presents the same kind of opportunity.

So, we must ask ourselves: when a patient presents to our office, who actually needs a splint? When looking at the examples below, the real question becomes: which of them truly needs a dental splint or bite guard?

I pose this question without the benefit of a clinical exam—relying solely on photographs. And the answer might surprise you.

The dilemma we often face as dentists is this: What treatment do I provide for my patients? It seems straightforward when someone breaks a tooth—or is it? Do we place a filling, and if so, what material? Should we do an onlay or a crown? Or perhaps no treatment at all—because the patient doesn’t want any.

The more clinical experience and continuing education we gain, the more we realize there's a wide spectrum of treatment options—and that not everything is a nail. We must consider and present the Benefits, Risks, Alternatives, and the option of No Treatment for each case. If you follow the BRAN model, everything tends to come out okay.

This is the foundation of informed consent. Patients must understand the potential benefits of treatment, as well as the risks. We also need to avoid a narrow-minded approach by always presenting alternatives—and at the same time, accepting that the patient may ultimately choose no treatment at all.

Patients present with a whole host of problems which can be chronic or acute. Being up all night with a toothache or having a swelling is very different treatment and then a patient upon clinical exam has findings with no signs or symptoms.

We've all had patients present with a wide range of interesting problems, and we ask the familiar question: "Does this hurt?"—only to be surprised when they say no. How can that be?

In my experience, one of the greatest clinical and management mistakes is proceeding with treatment when the patient doesn't understand or perceive a need for it. You cannot force someone into treatment—that would be assault. However, you are ethically and legally obligated to present your findings and inform the patient of the potential consequences of not pursuing treatment.

"The principles of treatment are universal; all the functional factors are interrelated." That line brought me back to an important lecture that emphasized:

"TMD treatment is multifactorial."

And because it is multi-factorial, where the dominate factor varies from patient to patient, occlusal splints alone often won't solve the entire problem.



Figure 1 - Smile: Pinterest by Fredeicka Saperstein



Figure 2 - Pinterest: Keine Gesundheits -und
Schonheitspflege



Figure 3 - Tooth wear with attrition (Pocket Dentistry –
Tooth Wear in Older Adults – Jan 2015)



Figure 4 - Dentition of patient with erosive tooth wear



Figure 5 - Tooth wear heavy occlusal contacts
(abfraction) (Courtesy of Dr. F. Burke)

Patient Presentations and Treatment Decisions

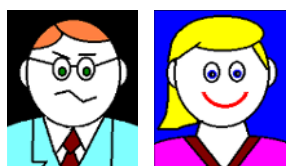
Dr. James Boyd has described three common clinical situations that illustrate the complexity of occlusal therapy, as the dominate influential factor that determines symptoms is different in each case:

- 1 Symptomatic with Poor Occlusion:** Patients with severely worn teeth experiencing pain and dysfunction. These cases are straightforward, we provide an occlusal guard, manage pain, and plan restorative treatment.
- 2 Asymptomatic with Poor Occlusion:** Patients with significant wear but no symptoms. These cases challenge us to explain the need for treatment when patients feel fine and may be unconcerned about appearance.
- 3 Symptomatic with Good Occlusion:** Patients with excellent natural dentition suffering from pain or migraines. These cases frustrate dentists because traditional occlusal therapy may not resolve the symptoms.

Our training often tells us that when a patient has perfect natural teeth and no signs or symptoms, we should assume everything is fine—after all, their teeth are “perfect” and look the way they’re supposed to. And if they don’t, or if they’re interested in cosmetic dentistry, we say: “We’ll make them look prettier and perfect.”

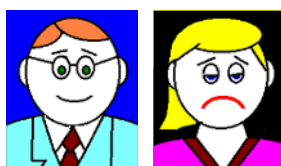
As dentists, we often feel the need to fix something—especially the occlusion—because working with teeth is what we do. .

Summary of a personal communication with Dr. James Boyd:



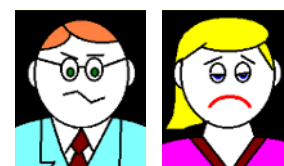
Terrible Occlusion...
...Patient Feels Fine

If the patient has terrible occlusion but feels fine, the dentist feels a little guilty or uncomfortable—because he/she knows something will eventually go wrong.



Fabulous Occlusion...
...Patient Feels Terrible

If the patient has excellent occlusion but feels terrible, the dentist often feels no guilt—because it can’t be the occlusion, right? So, he/she is off the hook.



Terrible Occlusion...
...Patient Feels Terrible

If the patient has terrible occlusion and feels terrible, the dentist knows that sometimes no matter how much the dentist tries to perfect the bite, the patient continues to feel terrible. He/she just doesn’t know which patient it’s going to be.

In all of these examples, the dominate determinate factor in symptomatic presentation is the chronic intensity of the degree of elevation during parafunctional occluding, ie, the clenching component of bruxism. Before there can be any occlusion, before there can be bruxism or grinding, the mandible must be raised by the elevators to occlude (i.e., clench) the teeth. Then, once the teeth are occluded, the varying combinations of these four factors plays the influential role on symptomatic presentation:

1

Duration of occluding.
How long does the event last?

2

Frequency of occluding.
How often does it occur?

3

Intensity of occluding. This is the most important. It wouldn't matter if someone's teeth were *barely* touching each other most of the time (maximum duration and frequency), their teeth would look normal and they'd feel fine. On the other end of the spectrum, when clenching is at maximum intensity, the teeth also look normal (as lateral pterygoids have no ability to move the mandible to grind the teeth) while the patient feels terrible.

4

Position of the mandible and occluding scheme. The final influential factor on symptomatic presentation is position of the mandible and occluding scheme during the events. Centered, excursive, and protrusive positions during clenching events all have specific symptomatic presentations.

So how does all of this relate to occlusal appliances or splints— and more importantly, what types of splints should we be making, and what workflow should we use to fabricate them?

There are many types of splints, and below are some examples commonly used in practice.



Figure 6 - Reference End - Note 8

1. Stabilization (Flat Plane) Splint

- Covers all the upper teeth with a flat occlusal surface where all teeth make contact
- Reduces the resistance to the lateral pterygoids during excursive movements jaw muscles and evenly distribute bite forces when properly adjusted
- Useful for bruxism or muscle-related TMD, but it will not prevent clenching
- There is no defined “occlusion” on the splint; it is usually worn at night

2. Anterior Bite Plane

- Fits on the upper jaw and contacts only the lower front teeth, including canines
- Prevents the back teeth from touching; useful for managing grinding and clenching
- Typically worn only at night
- The extreme clencher's symptoms may still remain unchanged, as canine contact allows for near-maximum clenching



Figure 7 - Reference End - Note 8



Figure 8 - Glidewell Web Site

3. NTITSS® (Trigeminal Inhibition Device)

- Originally designed as a partial-coverage splint for the front teeth only, to replicate natural masticatory incisal biting.
- Can be fabricated for either the upper or lower teeth—whichever allows for the lowest vertical opening. Minimal vertical opening translates to minimal condylar rotation during the event. During natural mastication, the crushing of the bolus occurs with only a few millimeters between the molars with a seated and minimally rotated condyle.
- Very effective for managing tension and migraine headaches
- Can also be made with full-coverage material and a defined point stop
- Must be fabricated so that the canines do not contact during lateral



Figure 9 - Glidewell Web Site

4. Soft Pliable Guard

- Used for tooth protection in sports; can be custom-made or purchased over the counter
- Should not be used for occlusal correction or nighttime wear, as it may actually increase clenching and muscle activity ("resiliency encourages activity")



Figure 10 - Reference End - Note 8

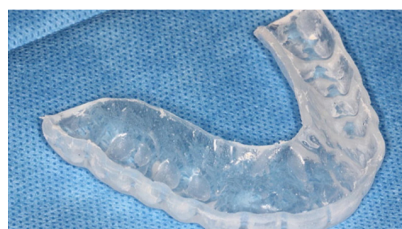


Figure 11 - Reference End - Note 8



Figure 12 - Image from Dicks Sporting Goods web site



Figure 13 - Reference End - Note 8



Figure 14 - Reference End - Note 8

5. MORA (Mandibular Orthopedic Repositioning Appliance)

- Designed to reposition the lower jaw forward or backward to recapture a displaced TMJ disc
- Typically fabricated for the lower arch, with no coverage on the anterior teeth
- The GELB appliance is one example, utilizing a metal bar behind the lower anterior teeth
- Intended for short-term use, as prolonged nighttime wear may cause tooth intrusion
- The prescription of the device assumes that the intensity of clenching is non-influential.

6. Mandibular Advancement Device (MAD)

- Commonly used to treat sleep apnea by advancing the mandible forward to open the airway
- Sometimes also used in TMD cases to help recapture the displaced TMJ disc



Figure 15 - Reference End - Note 8



Figure 16 - Reference End - Note 8

Summary of Splint Types and Uses

Type	Coverage	Key Benefits	Considerations
Stabilization Splint	Full upper arch	Lateral pterygoid relief; grinding protection	Doesn't prevent clenching
Anterior Bite Plane	Forward lower teeth	Blocks grinding but may not reduce clenching	Risk of tooth movement if worn long-term
NTI TSS Device	Incisor teeth only	Minimizes clenching intensity	Requires close monitoring; partial fit
Repositioning Splint	Full arch	May alleviate joint clicking/displacement	Short-term use only
Soft Splint	Flexible material	Comfortable, economical	Less durable; may aggravate bruxism
MAD (Sleep Apnea Device)	Mandibular arch	Opens airway; may relieve joint stress	Primarily for sleep apnea regulation

When trying to decide if, when, and why to make a dental splint, the answer often depends on a combination of training, experience, and the outcomes—both successes and failures—that shape our clinical decisions. Most of us have experimented with different types of splints. But in the end, the biggest determining factor is **patient acceptance** and their understanding of the reason why a splint is important and necessary.

Bruxism (teeth grinding and clenching) is a large group of patients and it has been shown that 30% of all athletes clench their teeth. Go into a gym and watch weightlifters clench their teeth.

The studies have found that the prevalence of bruxism among athletes can be higher than in the general population. While the general population sees prevalence rates of 8-20% for bruxism, athletes show a higher prevalence ranging from 15% to 70%, with a pooled estimate around 38%. Specifically, combat sports and weightlifting exhibit the highest rates, at 58% and 50% respectively.

Tooth protection is often a reason for use of a splint and will prevent wear, fracture, and shifting. BUT unless adjusted correctly will increase clenching.

Chronic facial pain, tension headaches, and migraines are also important reasons to prescribe a protective splint—and studies have clearly demonstrated their effectiveness. NTI (Nociceptive Trigeminal Inhibition) devices, such as the NTI-tss Plus and NTI OmniSplint, are FDA-cleared dental appliances specifically designed to prevent migraine and tension-type headaches. They work by reducing the intensity of clenching and grinding (bruxism), preventing contact between the back teeth and canines during sleep.

NTI splints have shown particular effectiveness in managing **TMD disorders**, where they appear to offer the greatest benefit in reducing pain.



30%

of all athletes
clench their teeth

Now that we understand some of the reasons for making splints, the next question is: how do we integrate them into our office workflow in a way that is both effective and profitable?

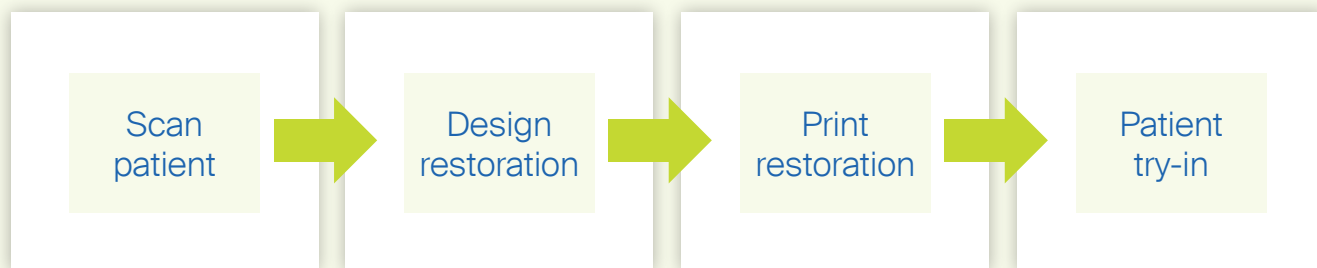
Patients who present with muscle pain or migraines are typically highly motivated to proceed with treatment. Others may become motivated when they experience a sensitive tooth, cracked tooth, or a chipped front tooth—because they can see or feel a problem.

Then there are patients with worn teeth who show no motivation for treatment. In these cases, when a patient is pursuing a cosmetic result, a splint can be essential in protecting their investment.

So Why 3D Printing?

It's very clear that 3D printing saves both time and money. When you're printing models to build on, it significantly reduces errors. In the traditional process, we have to take an impression (often gagging the patient and getting material all over their face), pour the model (hoping there are no bubbles or breaks when removing it from the tray), then send it to the lab (crossing our fingers it doesn't get lost in transit). Next comes designing the product (hoping it's accurate), shipping it back to the office (hoping it arrives on time), and finally the patient try-in. That's a lot of steps—and a lot of chances for mistakes. Mistakes cost money and cause frustration for both the dentist and the patient.

With digital dentistry and 3D printing, those steps are dramatically reduced. You scan the patient, design the splint using computer software, print it, and then move straight to try-in and delivery. And if the patient loses the appliance? It's easy to make another one.



Reference Dr. Jeffrey Hoos: DMG article

We're living in a time when technology is truly transforming our practices. Who remembers dipping films before digital X-rays? Or mixing alginate and using impression guns before digital scanning became the norm?

When you think about it, how did we manage to deliver great dentistry before all this technology? It was certainly possible—but now, it's easier for us and far more comfortable and efficient for the patient.

When a patient accepts treatment and financial arrangements are made, there's no better time to begin. The key is: how quickly can we deliver—and how easily can we make it happen?

How to “make it happen”?

To successfully implement new technology, you must have staff buy-in—or it won’t work. You can’t simply buy a piece of equipment and force it into your office. Your team needs to understand it, embrace it, and recognize how it makes their work easier and more efficient. We all tend to get comfortable with the “old way” because it’s familiar and has worked for us.

I first realized the power of this when I purchased our first digital X-ray sensor. The moment that image popped up on the screen, I was sold—not because of what I saw, but because of what the patient saw. That “wow” moment, when you show patients new technology and explain why you’ve adopted it, goes a long way toward building confidence in your practice.

I’m not a tech geek, so I chose a manufacturer-installed system—and it turned out to be a great decision. The most important step was staff training, and I’ll admit, that wasn’t something I wanted to handle myself. I’m busy doing dentistry, and I need help with this kind of implementation. It’s just not my strength.

Another key decision was assigning one person in the practice to be fully responsible for the 3D printing process. I firmly believe in delegating to my team as much as possible. My job is to be chairside, connecting with patients. All of our patients are scanned by staff—but only after it’s been discussed with me and I’ve explained to the patient what we’re doing and why. I tell them someone else will be scanning because they’re better at it than I am. 3D printing is also fully handled by my team.

That said, change is always challenging. It’s essential for the dentist to be the enthusiastic cheerleader every time a new technology is introduced. In our 4-dentist, 25-staff practice, we always designate one team member to be the “champion” of any new tech—whether it’s going paperless or adding 3D navigation for implant placement with X-NAV.

New technology is wonderful—but don’t overlook the opportunity to **internally market its benefits** to your patients. You can really “wow” them, especially if you highlight how much more comfortable digital scanning is. Giving patients a copy of their 3D model to take home is a great conversation starter and a powerful way to get them talking about your practice.

We weren’t taught much about business in dental school—and certainly not about ROI (return on investment)—but making smart investment decisions is critical to practice success. I’ve walked into many offices and spotted equipment that was bought and never used. I’ve fallen into that trap myself—just ask me about my hard tissue laser. When you think about ROI, it’s important to start with an analysis of your fee structure.

Having a 3D printer can definitely save you both time and money. From a business standpoint, the key question is: do you increase your profit margin, or do you pass the savings on to your patients?

What’s often overlooked in this calculation is an intangible but critical factor: **patient perception**. A 3D printer demonstrates that you run an efficient, modern practice—something patients notice. It builds trust and increases the likelihood they will stay with you and refer others. When you provide value in both time and cost, you strengthen patient loyalty.

How did I choose my printer?

I didn't choose my printer based on price—because taking the cheap route is usually not the best option. This was especially true here, as DMG has developed an integrated suite of products that truly justify a premium price.

The DMG **3Demax** features radio-frequency identification, which makes it easy to automatically recognize the material you're about to use—helping eliminate the possibility of misapplication. The integrated 3D printing suite includes the **3Dewash** washer, which uses pre-set programs to systematically clean off any remaining non-polymerized resin from the dental model. The third and final component is the **3Decure** curing unit, which provides 360-degree illumination and pre-set curing programs that lock in the printed device's mechanical properties—ensuring the cure is consistent with the resin's specific requirements. All three hardware components are very well made, highly durable, and have a small footprint.



Figure 17 - DMG 3Demax, DMG 3Dewash and DMG 3Decure

I started using **Netfabb** when we first got our printer. It allowed us to print models, save them, and fabricate appliances directly on those models. Now, we've taken it a step further—we're printing our splints directly, without having to make a model at all.

The DentaMile Splint Workflow SHOW THEM — DON'T JUST TELL THEM.

After scanning, the data is uploaded to **DentaMile connect**, a cloud-based design platform that allows seamless design collaboration between the dental office and the lab. The lab can review the scan in real time and request corrections before fabrication begins—improving accuracy and efficiency.

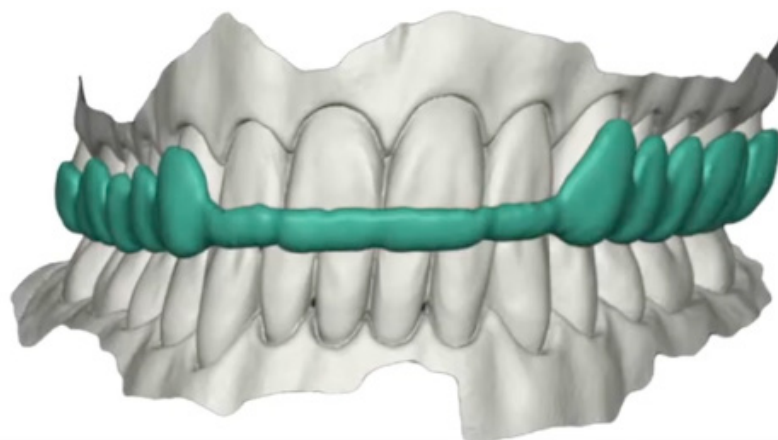


Figure 18 - Example of a splint design using the DMG DentaMile connect software

Next, the splint is designed using specialized **DentaMile connect software**. The dental technician or clinician creates a custom fit directly on the 3D model—no printed model required. This is a huge time saver and ensures the appliance is tailored precisely to the patient's needs.

Once finalized, the design is sent to the 3D printer and fabricated using biocompatible resin. The process is highly accurate and repeatable—perfect for quick turnaround and easy reprints (especially for patients who misplace their guards). I've even sent splints to patients on vacation—quickly and easily.

After printing, the appliance goes through post-processing: cleaning, curing, and polishing. These steps are essential for producing a splint that's durable, hygienic, and comfortable. The final finish matters—it impacts how well the patient wears it and whether they comply with treatment.

Finally, the splint is delivered to the dental practice for fitting. The dentist places it in the patient's mouth, checks the fit, and makes any necessary adjustments to ensure optimal comfort and function. The occlusion—and whatever the appliance is designed to do—must be doing what it was designed for. You don't want to create a malocclusion or jaw strain. It's essential to think with the end in mind, as that helps guide the evaluation and selection of the best design.

With the new DentaMile connect software, we're able to print whatever design we need—quickly and easily. This technology upgrade has significantly improved our workflow in the office.

Conclusion

Every dentist should have a mission statement. This is mine:



To provide the highest quality of care, for the greatest number of patients, while maintaining a balance between the art, science, and business of dentistry.

If you can win the ongoing battle to maintain that balance—with the right mission, the right team, and the right technology—success in private practice will be yours.

End Notes

1. Maslow, Abraham Harold. *The Psychology of Science: A Reconnaissance*. No
2. Schenker, Y., & Meisel, A. "Informed Consent in Clinical Care: Practical Considerations in the Effort to Achieve Ethical Goals." *Journal of the American Medical Association*, vol. 305, no. 11, Mar. 16, 2011, pp. 1130–1131.
3. Bramson, R.M. *Coping with Difficult People*.
4. Iwari, Bhawana, Komal Ladha, Aaruti Lalit, & B. Dwarakananda Naik. "Occlusal Concepts in Full Mouth Rehabilitation: An Overview." *Journal of Indian Prosthodontic Society*, vol. 14, no. 4, Jun. 25, 2014, pp. 344–351.
5. Nasciment, Alka Daby, et al. "Prevalence of Bruxism in Athletes: A Systematic Review and Meta-Analysis." *Journal of Oral Rehabilitation*, Jun. 2, 2025.
6. Blumenfeld, Andrew M., & James P. Boyd. "Adjunctive Treatment of Chronic Migraine Using an Oral Dental Device: Overview and Results of a Randomized Placebo-Controlled Crossover Study." *Journal of the American Dental Association*, vol
7. The Journal of the American Dental Association. "The Effectiveness of Splint Therapy in Patients with Temporomandibular Disorders: A Systematic Review and Meta-Analysis." vol. 143, no. 8, Aug. 2012, pp. 847–857.
8. Albagieh, Hamad, Ibrahim Alomran, Abdulrahman Binakresh, Nawaf Alhatarisha, Meteb Almeteb, Yousef Khalaf, Abdulrahman Alqublan, & Mohammad Alqahatany. "Occlusal Splints—Types and Effectiveness in Temporomandibular Disorder Management." *The Saudi Dental Journal*,

Bibliography

- American Academy of Orofacial Pain (AAOP). (2016). *Guidelines for Assessment, Diagnosis, and Management*. Quintessence Publishing.
- Klasser, G. D., & Greene, C. S. (2009). Oral appliances in the management of temporomandibular disorders. *Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology*, 107(2), 212–223.
- Lavigne, G. J., Khoury, S., Abe, S., Yamaguchi, T., & Raphael, K. (2008). Bruxism physiology and pathology: An overview for clinicians. *Journal of Oral Rehabilitation*, 35(7), 476–494.
- Lobbezoo, F., Ahlberg, J., Glaros, AG, Kato, T., Koyano, K., Lavigne, GJ, ... & Winocur, E. (2008). Bruxism defined and graded: An international consensus. *Journal of Oral Rehabilitation*, 35(7), 491–494.
- Manfredini, D., Winocur, E., Guarda-Nardini, L., Paesani, D., & Lobbezoo, F. (2013). Epidemiology of bruxism in adults: A systematic review of the literature. *Journal of Orofacial Pain*, 27(2), 99–110.
- Okeson, J. P. (2013). *Management of Temporomandibular Disorders and Occlusion*(7t
- Zhang, Z., Li, X., Ma, Y., & Song, J. (2021). 3D printing applications in dental night guards: A review. *Journal of Prosthetic Dentistry*, 126(6), 731–736.