1/2 point CDT documented scientific credit. See Page 30.

By Shanon Torstenbo, CDT

The Implant Over-Splint:
A New Solution for Overdenture Patients

Introduction

Occlusal splints are often a remedy for dentate patients that have habitual bruxing and clenching with corresponding TMJ symptoms. Oftentimes edentulous patients experience similar pain and discomfort, and can also benefit from an occlusal splint. This becomes difficult because there is no remaining dentition to retain the occlusal splint and it is recommended that patients remove their prosthesis during sleep. It is not uncommon, however, for these patients to report pain and discomfort after removal for extended periods of time. This is often due to loss of mandibular support during that time. Carl Hansen, D.D.S., describes "the removal of the physiological support that a denture contributes to the mandible may predispose the denture wearer to symptoms associated with mandibular dysfunction." Dr. Hansen conducted a questionnaire among 200 prosthesis-wearing edentulous subjects and found that 25 percent of subjects experienced "symptoms similar to those of mandibular dysfunction when they slept without their dentures."[1] Additional concerns are present such as opposing arch trauma, particularly if a patient has one arch opposing another that has implant attachments, natural dentition, or crowns. Even though it is not recommended, it becomes common practice that a patient will choose to wear their prosthesis during sleep to help remedy these symptoms.

Wearing a prosthesis during sleep can accelerate wear and tear and can risk premature chipping. Denture teeth generally are not designed to withstand the mandibular strength of a bruxer or clencher during sleep. It is wise to protect the prosthetic teeth as one would their natural dentition. Occlusal guards can be made to be worn over the denture but this is not the ideal scenario. Some patients may not be able to tolerate the increased vertical dimension of occlusion (VDO) caused by the double prosthesis situation. If possible, removal of the prosthesis when not in use is best. There are other benefits to removing the prosthesis, particularly if it has a full coverage palatal design. It is important to let oral tissues breathe and heal during a period of time. Removal reduces the risk of developing inflammatory papillary hyperplasia which is the development of a benign lesion of the palatal mucosa mostly commonly caused by chronic denture wear. Removal also gives the patient the opportunity to soak the prosthesis for a deep cleaning of biofilm and other bacteria that adhere to the denture surface during regular use. The importance of removing during sleep is directly correlated to the longevity of the prosthesis and maintenance of healthy tissue and oral cavity.

Traditional denture patients have limited options due to the limitations with retention. Denture wearers can try to wear a splint over their denture teeth, however as mentioned, this is not always the ideal scenario. Another option is to create a duplicate or replica prosthesis that fits as their denture would, but is to be worn during sleep in place of their denture. This gives the patient the ability to clean and protect their actual prosthesis from unnecessary wear and tear while providing the therapeutic benefits of use during sleep. This unfortunately will not allow the tissues to have any rest period due to the coverage needed for retention. Dr. Carl Hansen advises an alternative oral hygiene regimen be performed for patients in this situation, "including periods of rest for the oral tissues during waking hours and additional stimulation."[1] Fortunately for overdenture patients, there is a new solution, the implant over-splint. This gives the patient most of the benefits of removal while maintaining their physiological support and provides a beneficial therapeutic design for mandibular movements during sleep.

Solution and Design

The implant over-splint is an occlusal splint that is retained by utilizing the patient's implant attachments. The implant attachment housings are processed into the clear acrylic resin. Implant overdenture patients have a comfortable treatment option that will allow them to remove their prosthesis during sleep as well as maintain their VDO and protect their implants and opposing arch from trauma. TMJ patients will be able to benefit from the TMJ therapy of an anterior guidance designed splint. Studies have shown patients that experience canine or anterior guidance with immediate posterior disclusion during excursive movements have therapeutic response to their TMJ symptoms.[2] The stability of the implant attachment retained splint gives patients a comfortable retentive fit with minimal tissue coverage. The custom-contoured intaglio surface has minimal coverage which allows the tissues to heal and breathe during sleep.

Case Study

Dr. Michael Hamel, DMD[3], Prosthodontist in Manchester, New Hampshire, treated an edentulous patient with a maxillary partial overdenture with Zest Locator Attachments opposing a mandibular partial overdenture with six PFM crowns on #22-27.[4] The patient's initial review of findings showed evidence of bruxism and severe wear patterns. Due to the patient's intraoral considerations, an occlusal guard was an essential part of the treatment. Dr. Hamel wanted to utilize the implants the patient had to retain a therapeutic occlusal splint. Shanon Torstenbo, CDT, in-house laboratory technician for Dr. Hamel, designed and fabricated the over-splint. Dr. Hamel delivered the implant over-splint after final delivery of the maxillary overdenture and the mandibular crowns and partial denture. The patient has reported back with success at the three-month hygiene recall.

Exploration of Case

Figures 1-2
The patient currently wears full coverage palate maxillary partial overdenture with three Zest Locator Attachments and one circumferential clasp on the molar.

Figure 3
The master impression boxed and poured with locator analogs.

Figures 4a-c
The patient is wearing a maxillary over partial clasping the one remaining molar. The mandibular arch is a partial overdenture with six PFM crowns from #22-27.

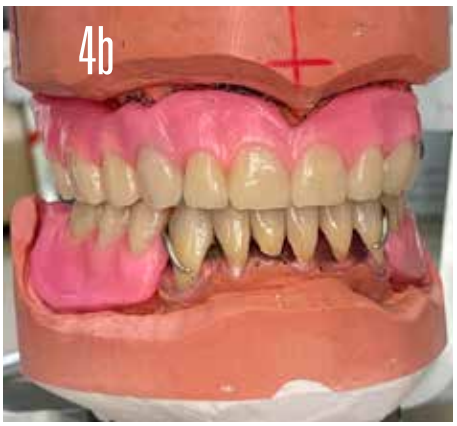
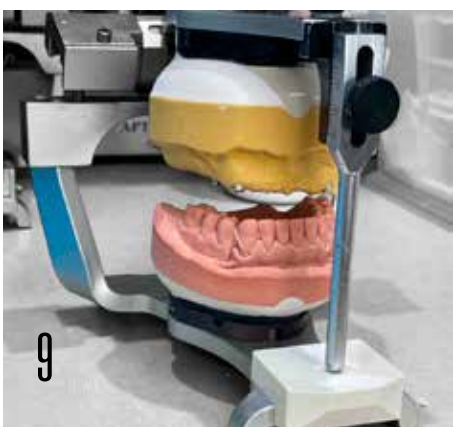


Figure 5
The master casts are fabricated from Type 4 Vel-Mix Die stone.

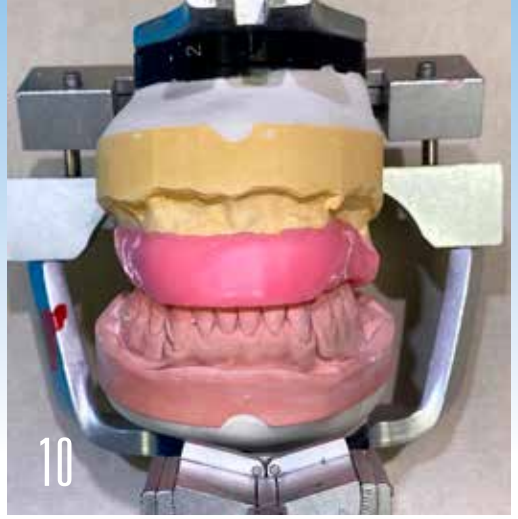
Figure 7
The master cast is surveyed, designed, and blocked out. The cast is then duplicated to fabricate a working cast.

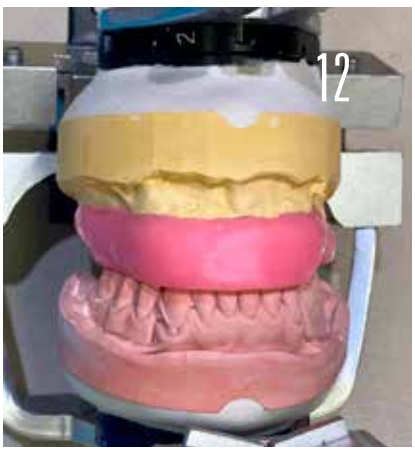
Figure 6
The master casts are mounted on the Denar semi-adjustable articulator.



Figures 8-9
The duplicate working cast is mounted to the Denar semi-adjustable articulator.

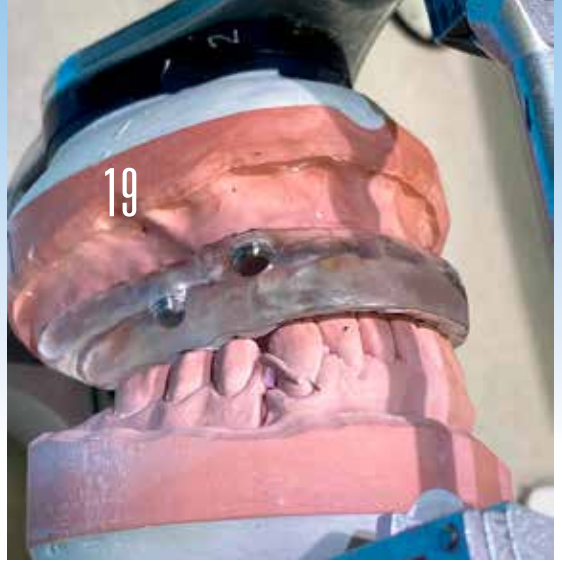
Figures 10-14
The case is waxed to prescribed VDO with anterior guidance and posterior disclusion in excursive and protrusive mandibular movements. It is ideal to design with minimal tissue contact to help the surrounding tissue rest during sleep. If a replica traditional denture is being made, the occlusal surfaces can be modified to have point contacts with anterior guidance.





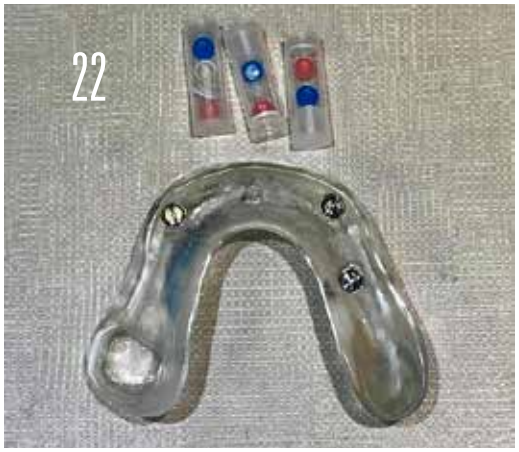
Figures 15-16
The over-splint is flasked and prepared for Ivoclar Ivocap heat injection processing. The necessary areas under locator housings are blocked out to prevent acrylic from flowing underneath during the injection.

Figures 17-18
The case is prepared for Ivocap heat injected clear acrylic resin.



Figures 19-20
The case is seated to the master cast and remounted to perform post-process equilibration.

Figure 21
The over-splint is finished down and polished after processing.



Figures 22-23
The black processing inserts are removed and replaced with the final nylon retentive sleeves. Blue light retention is a good starting point for the patient and can easily be changed out for higher retention levels if needed.

References

1. Hansen, C.A.: Incidence of mandibular dysfunction symptoms in individuals who remove their complete dentures during sleep. Journal of Prosthetic Dentistry 51:18, 1984.
2. Williamson, E.H.:Anterior guidance: Its effect on electromyographic activity of the temporal and masseter muscles. Journal of Prosthetic Dentistry 49:816, 1983.
3. Michael R. Hamel, D.M.D, Prosthodontist, Manchester NH diagnosis and treatment of patient for crowns, overdentures, and implant occlusal splint. Photo credit: Figures 1, 4a, and 24
4. PFM crowns fabricated by RST Dental Laboratory, Merrimack NH owner and ceramist Robert Turner.

QUIZ

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Figure 24
Pictured is an intraoral photo of an implant over-splint and a happy patient. The clear acrylic resin allows for delivery with ease. The doctor can visually confirm seating and see if any areas are impinging the tissue through the transparent resin.

About the Author

Shanon Torstenbo, CDT, started her dental laboratory journey while attending school at Middlesex Community College in Lowell, Mass. in 2012. She graduated with an associate degree in dental laboratory technology in 2014. While in school, she started as an in-house technician at a general dentistry practice working directly with the doctor and patient. Here she expanded her skills while working with state-of-the-art equipment and high-quality materials. In 2017, she earned her CDT designation in the specialty of complete dentures. In 2021, she joined an elite prosthodontist's team as their in-house technician. Here she has been able to work on complex and advanced cases and learn directly under a highly experienced, quality prosthodontist. In 2022, she and her husband began the laboratory ownership journey opening their own lab, The Lab Dental Studio LLC, Concord, N.H., specializing in high-end removable prosthetics, implant overdentures, and hybrid implant dentures. Torstenbo is always striving to learn more and become a better technician. **JDT**