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Scientific Editorial - Bisphosphonates, Dental Implants and BRONJ

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Abstract:

Bisphosphonates are a class of drugs that prevent the loss of bone mass, used to treat osteoporosis , osteopenia as well as in treatment of cancer. BRONJ has been reported in the patients taking oral bisphosphonates. This paper focuses on the risk involved with the Bisphosphonates , the identification of BRONJ and management.

Keywords: Bisphosphonates , BRONJ , Bisphosphonate-related osteonecrosis of the jaw

Discussion:

Among the drugs used in osteoporosis and osteopenia to prevent the loss of bone mass, Bisphosphonates are the most common. They are also used in the treatment of cancer as an important agent as they exhibit antiangiogenic properties and could be directly tumoricidal. Structurally they are made up of two phosphonate (PO₃) groups and are similar in structure to pyrophosphate. Bisphosphonates have been a major research subject among dentists due to them being involved in BRONJ or Bisphosphonate-related Osteonecrosis of the jaw . BRONJ has been described in patients taking bisphosphonates after oral surgery procedures, including the placement of dental implants.

Bisphosphonates are given both orally and by intravenous route. , it has been globally concluded by various researchers that Osteonecrosis of the jaw is more common in intravenous users of Bisphosphonates

than patients taking oral medicine. ¹ Hence low grade risk is associated with oral Bis therapy and a very high grade risk of BRONJ with IV Bisphosphonates. ²

Bisphosphonates (both oral and intravenous) are potent inhibitors of osteoclastic-mediated bone resorption. As a result , physiologic bone resorption and remodeling are severely compromised in patients receiving bisphosphonate therapy. ²

Bisphosphonate-related osteonecrosis of the jaw (BRONJ) is an area of uncovered bone in the maxillo-facial region that did not heal within 8 weeks after identification by health care provider, in a patient who was receiving or had been exposed to Bisphosphonate Therapy (BPT) without previous radiation therapy to the craniofacial region.

Ruggiero's staging has been used not only in the clinical staging but as well as the treatment planning. ³

Stage 1	Exposed/necrotic bone in patients who are asymptomatic and have no evidence of infection	oral antimicrobial rinses in combination with oral systemic antibiotic therapy - penicillin, metronidazole, quinolones, clindamycin, doxycycline, erythromycin- is indicated for Stages I and II of Ruggiero's Staging
Stage 2	Exposed/necrotic bone associated with infection as evidenced by pain and erythema in the region of the exposed bone with or without purulent drainage	a superficial debridement is indicated to relieve soft tissue irritation also in the stage II
Stage 3	Exposed/necrotic bone in patients with pain, infection, and one or more of the following: pathologic fracture, extra-oral fistula, or osteolysis extending to the inferior border	Surgical treatment, in accordance to the AAOMS Position Paper, is reserved to patients affected by Stage III of BRONJ

Extraction is the only dental procedure shown to increase the risk of BRONJ. Dental implant therapy should be used with caution in the oral bisphosphonate patient. ³

Conclusion :

Guidelines for treatment of dental patients receiving intravenous bisphosphonate treatments should be different than for patients taking the oral formulations of these medications.⁵ Discontinuation of oral bisphosphonates for a period of three

months prior to and three months following elective invasive dental surgery may lower the risk of BRONJ, with the permission of the physician. A thorough understanding of Bisphosphonates is essential for every implantologist.

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Utilization and fabrication of a hard-soft occlusal guard

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ABSTRACT:

Occlusal guards are the treatment for bruxism, clenching as well as the treatment of temporomandibular joint discomfort. Debate has ensued as to whether the occlusal guard should be hard, soft or a combination of the two consistencies. Soft materials used for occlusal guards provide a more comfortable fit but are less wear resistant than their hard counterparts. They also due to their resilient nature may increase clenching activity due to their rebound effect when the patient occludes on them. Occlusal guards constructed of hard resins offer better wear resistance, prolonging the life of the guard and eliminate the rebound effect seen with the softer materials. Unfortunately, they are not as comfortable to the patient when inserted or removed. An alternative is a hard-soft occlusal guard. These offer the benefits of the soft guard, more comfortable to wear, insert and remove with the benefits of the hard guard, better wear resistance and elimination of the rebound effect.

Key-words: maxillofacial prosthesis, Facial defects

CASE REPORT

A 44 year old female of the practice, with moderate chronic clenching and bilateral TMJ popping on opening had a 8 year history of use of a mandibular occlusal guard. Her first occlusal guard was a soft material and lasted approximately 2 years before she wore through the material when she presented to the practice on initial consult. Her complaint at that time was the “chewiness” of the guard made her feel like she had chewing gum in her mouth and was increasing the symptomology of the TMJ issues. A hard guard was fabricated and she successfully wore that for six years, until the posterior developed an occlusal crack on the right side.

During discussion with the patient regarding the need for a new occlusal guard, she expressed that she felt that the hard guard she had been utilizing had eliminated her increased chewing that was present with her soft guard. But the hard guard was difficult at times to insert and remove and she felt that it was pressing on the teeth when worn. It was determined that a hard-soft occlusal guard would meet the patients desires and clinical needs.

We will outline the equipment and materials utilized in this patients occlusal guard fabrication and a step-by-step guide for the dental staff to follow to fabricate similar guards for their patients.

Erkoformer RVE unit and Erkoloc-pro dual laminate occlusal guard:

Standard vacuform units are a challenge when using thicker plastic sheet materials and can be a greater challenge when utilizing a dual laminate plastic. Some manufacturers of the dual layer plastics used to fabricate occlusal guards recommend placing the material in the unit to heat it with the soft side facing the heating element. After a period of time the user is then required to flip the heated material over and continue heating the hard layer facing the heating element before forming it on the cast. This contributes a lot of guess work to the user as to when the material is sufficiently heated and can be flipped over to finish the heating. These units also tend to be weak in the vacuum (negative pressure) available during the forming portion of the technique. At the other end of the spectrum with regard to units for vacuforming are the pressure units. These pressure units require an airline be hooked to the unit and use positive pressure to form the plastics to the cast. They tend to be more complex and technique sensitive to fabricate occlusal guards and as with the standard vacuform units, the user has to guess as to the temperature and time required for ideal use of the plastic material.

The Erkoformer (Glidewell Labs, Newport Beach, CA) is a self contained computerized "sudden vacuum" precharged chamber former that does not require an airline for operation. (figure 1) This unit has a computer touch screen which is preprogrammed for the various materials available to use in the unit. After inserting the appropriate plastic into the holder, the

user selects which material and plastic thickness is being used and the unit sets the appropriate temperature and heating time, instructing the user when each step should be performed. The vacuum is activated automatically before the programmed temperature and time are reached and the unit indicates to the user when it is ready to form the occlusal guard. The benefit with the Erkoformer, is dual laminate plastics do not have to be flipped part way through the heating process and it is heated to the optimum temperature and time needed for precision forming on the cast.

Erkoloc-pro is a dual laminate plastic with a hard co-polyester outer layer and a non-rebound soft polyurethane bottom layer. This material is available in 2, 3, 4 and 5mm thicknesses with the soft layer provided in a 1.0mm thickness and the hard layer providing the remainder of the thickness of the material.



Figure 1: Erkoformer computerized "Sudden Vacuum" pre-charged pump chamber former from Glidewell Labs.

Fabrication of a hard-soft occlusal guard inoffice:

A study model is fabricated and the base is trimmed to eliminate any land areas at the vestibule. In the case of a lower cast it is not

necessary to eliminate the tongue area to create a “U” shaped case. The cast is placed into the base of the Erkoformer and pressed into the metal shot, covering the base of the cast leaving only the portion of the cast to be captured exposed. (figure 2) A sheet of block-out material (granule cover template) is placed over the shot beyond the cast to prevent the shot from sticking to the heated plastic during the forming process. (figure 3) The Erkoloc-pro material is placed into the holder with the soft side facing down. Each piece of Erkoloc-pro comes with a printed sheet of film covering the material, which is left on the piece until the forming is completed.

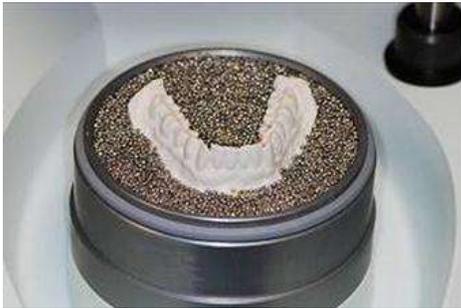


Figure 2: The model to be treated is placed in the base filled with metal shot and the shot is placed to only expose the area that will be captured in the material.



Figure 3: A sheet of premade blockout is placed over the cast to cover the shot beyond the model.

The unit is set for Erkoloc-pro in the thickness being used and the process is initiated. (figure 4) When the unit indicates the material has reached its optimum temperature and time the holder is swung over the cast and lightly pressed down. (figure 5) The unit will go into cooling mode and after appropriate time a signal is emitted indicating the occlusal guard is ready for removal from the unit and the finishing process can be started.



Figure 4: The user selects the Erko material being used and the Erkoform unit sets the correct temperature and time and instructs the user on the steps as they occur.



Figure 5: The Erkoloc-pro occlusal guard following forming as it goes through the cool down cycle.

The formed guard and cast are removed from the unit. (figure 6) An electric knife may be used to outline the guard and remove the gross plastic and allow separation of the guard from the cast.

(figure 7) An alternative method is use of an acrylic bur or disk to make the preliminary cut. As it is common to damage the cast during removal of the guard from the cast, it is recommended that a duplicate cast be available. (figure 8) Using a Sharpie marker a line is made indicating where the flanges should terminate. (figure 9).

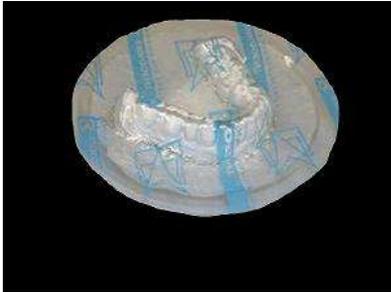


Figure 6: The Erkoloc-pro occlusal guard and cast after removal from the Erkoform unit. (alternate pics shown)



Figure 7: An electric knife is useful for making the initial cut on the cast. (alternate pics shown)



Figure 8: Typically the cast will be damaged upon removal of the Erkoloc-pro occlusal

guard, so it is suggested that a duplicate cast be made prior to fabrication of the guard.

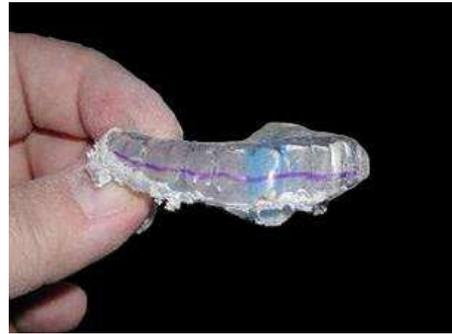


Figure 9: A sharpie marker is used to outline the extent of the flanges and is an aid during trimming the excess material.

An acrylic bur (Brasseler USA, Savannah, GA) is used to trim back the flanges to the indicated line. The printed film is removed from the guard. This is followed by contouring the flange edges with reticulated brushes (Dentsply Raintree Essix, Metairie, LA) sequentially progressing from coarse to fine. The reticulated brushes are used with very light pressure moving them with the edge of the flange to round the edges and eliminate any plastic fibers. A rubber point (Brasseler USA, Savannah, GA) is used for final polishing. A goat hair chamois brush (Brasseler USA, Savannah, GA) can be used as an adjunct for final polishing and is useful on any areas that require occlusal adjustment. This is used with very light pressure. (figure 10).

The guard is tried in on the duplicate case and fit and retention verified. (figure 11) The hard-soft guard is now ready for delivery to the patient and occlusal adjustment if needed. (figure 12 and 13) As the material is a thermoplastic the patient should be advised not to place the guard in

hot water as this will cause distortion of the guard. The guard may be cleaned with traditional denture cleaners or scrubbed with a toothbrush and nonabrasive toothpaste with cold water.



Figure 10: Items I use to trim the Erkoloc-pro occlusal guard material and polish it. The reticulated brushes are well suited to remove the softer liner portion of the Erkoloc-pro and to smooth rough sharp areas. They will also provide a good general polish. Light pressure is recommended to achieve a smooth surface. The rubber point removes any scratches that may remain from the reticulated brushes. Final polish is performed with a goat hair chamois brush that is also used with very light pressure.

CONCLUSION

It is generally agreed that patients with parafunctional habits such as clenching and bruxing do benefit from occlusal guard therapy. But if the occlusal guard is uncomfortable then the patients compliance will be poor. Additionally, durability of the guard is also important to its long term usage.

The Erkoformer RVE unit combined with the Erkoloc-pro dual laminate occlusal guard material permits quick and easy fabrication of a hard-soft occlusal guard in the dental office. The technique outlined can be accomplished by trained dental auxiliaries at minimal cost and time.

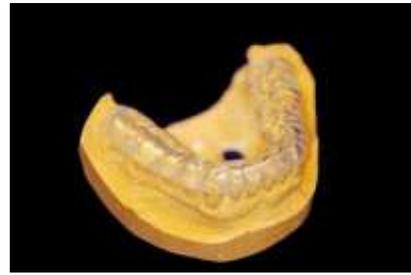


Figure 11: The final Erkoloc-pro hard soft occlusal guard on the duplicate cast.



Figure 12: Interior view of the Erkoloc-pro hard soft occlusal guard.



Figure 13: Exterior of the finished and polished Erkoloc-pro occlusal guard.