Posterior occlusal guides

Drs. Larry W. White and Kim Fretty discuss simple, inexpensive, and patient-friendly supplements to the Class II corrector armamentarium

Posterior occlusal guides Abstract

Class II malocclusions make up a large part of the difficult orthodontic maladies that clinicians must correct. Traditional techniques, such as elastics, headgears, and removable functional appliances, have recently been supplanted with so-called noncompliant appliances that are fixed in the mouth, requiring patients to use them 24 hours per day. While these fixed appliances have had remarkable success, the non-acceptance by many patients, the frequent breakage, and considerable cost have discouraged many orthodontists from routinely using them. Posterior occlusal guides (POGs) offer a simple, inexpensive, and patient-friendly supplement to the Class II corrector armamentarium.

Introduction

For several decades, European orthodontists successfully used removable functional appliances far more extensively than their American counterparts for the treatment of Class II malocclusions. This was probably due to the fixed appliances that appealed more to early leaders in American orthodontics, such as E.H. Angle and Calvin Case. Over the past 4 decades, European clinicians have endorsed fixed appliances far more than in the past.



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and then practiced in Hobbs, New Mexico, for 31 years. He was the first director of the University of Texas Health Science Center in San Antonio's orthodontic residency program. Dr. White has published more than 100 professional articles, authored several books about orthodontics, and edited numerous professional publications. He is a Diplomate of the American Board of Orthodontists and a Fellow in the American College of Dentists. Dr. White has authored over 100 clinical articles, lectured in 35 countries, and was editor of the *Journal of Clinical Orthodontics* for 17 years.

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Figure 1: Note the clear Triad occlusal overlay on the mandibular premolar that reinforces posterior anchorage during space closure



Figure 3: Posterior teeth with Triad Gel templates that advance the mandible unilaterally and correct the midline, overjet, and overbite



Figure 5: Right occlusal template removed when midline and occlusion stabilize

Although removable functional appliances have seemingly lost much of their appeal throughout the world, those of the fixed variety enjoy remarkable popularity, e.g., Herbst¹, MARA², MPA³, Forsus⁴, and so on.

The fixed functional appliances' large allure rests upon their cemented attachments that must remain in the mouth. Doctors have enjoyed using these since they obligate patients to wear them until corrections take place. Because of this feature, they have acquired the cognomen of noncompliant appliances. However, anyone who has treated orthodontic patients for a minimum of time knows that



Figure 2: Schematic of original Class II subdivision malocclusion with midline deviation



Figure 4: Left occlusal template removed to allow dentoalveolar adaptation



Figure 6: Triad Gel

a high level of compliance is needed for patient acceptance of the noncompliant mechanisms. There is nothing a clinician can put in patients' mouths that they cannot remove — one way or another.

Although many patients have used these noncompliant apparatuses successfully, there are large numbers that have refused to use them or have succeeded in developing into "serial destroyers." These latter patients break so many appliances that it finally results in doctors seeking alternate therapies.

Several features of noncompliant appliances bear responsibility for patient non-acceptance:



Figure 7: Triad leaf



Figure 8: Original Class II subdivision with a midline discrepancy





Figure 9: Class II subdivision with midline, overjet, and overbite corrected and Triad Gel added to the occlusal surfaces of the mandibular left posterior teeth



Figure 10: Completed therapy with corrected midline, overjet, overbite, and Class I occlusion on both sides



Figure 11: Typical Class II mixed dentition



Figure 12: Maxillary primary second molar removed to accommodate mandibular template



Figure 13: Maxillary primary second molar sliced to accommodate mandibular template

- the size and bulk of the appliances
- the connection that keeps the maxillary and mandibular irretrievably connected
- the interference with normal chewing for several weeks
- the unnatural and therapeutic bite it forces on the patient
- parental objections regarding the restricted movements of the appliances Even with their recent popularity among orthodontists, these Class II appliances have a number of negative

features that discourage doctors' use:cost of the appliances

- need of a laboratory procedure
- patient and parental complaints
- patient and patental complaints
 patient refusal to wear after placement
- patient relasance wear and placement
 patient breakage of the appliances
- patient breakage of the appliances
- anterior displacement of the mandibular



Figure 14: Mixed dentition malocclusion

dentition

Clearly, an alternative to the current fixed functional appliances that is more patient friendly and easier for the orthodontic clinician to apply would be welcome. As with many discoveries in life, a serendipitous development has opened new and effective possibilities for Class II corrections that can be used both unilaterally and bilaterally.

Theory, technique, and therapeutic examples

Dr. Birte Melsen and Dr. Giorgio Fiorelli⁵ were using Triad[®] Gel (Dentsply) to augment anchorage by increasing occlusal pressure on the anchor or reactive part of the orthodontic appliance (Figure 1) when Dr. Fiorelli⁶ discovered he could



Figure 15: Left side with primary molar removed and template in place $% \left({{{\rm{T}}_{\rm{T}}}} \right)$

reposition the mandible and correct slight midline deviations, overjet and overbite discrepancies along with Class II subdivisions by building up the posterior teeth with Triad Gel while holding the mandible in the new position that corrected the midline, overbite, and overjet (Figures 2-7).

Light-cure Triad Gel is supplied in a tube with a variety of colors, but many who use this technique prefer a more viscous product. Other clinicians express a preference for the Triad material that comes as a sheet and is commonly used to make Hawley retainers or splints. The sheet's viscosity prevents it from spreading uncontrolled and gives the operator more time to review its placement before curing with the light. Either of these Triad materials



Figure 16: Occlusal view of clear Triad Gel templates



Figure 17: Maxillary occlusal view showing sliced primary molar

POG technique and application

The following Class II subdivision patient will illustrate one technique for applying POGs (Figures 18-21).



Figure 18: Self-etching sealant used for a shallow etch. A deep etch makes the removal of Triad more difficult



Figure 19: Self-etching sealant mixture for application to the occlusal surfaces of the mandibular posterior teeth



Figure 20: Curing of Triad Gel. Note the anterior incisal wax bite to hold corrected bite steady during the light cure



Figure 21: Cured Triad Gel on the mandibular molar occlusal surface. Note the maxillary molar indentations of the altered bite



Figure 22: Patient with a Class II subdivision malocclusion and an anterior crossbite of tooth 2.2 $\,$



Figure 23:. Before treatment, cephalometric tracing and the Visualized Treatment Objective (VTO) illustrates the needed incisor positioning (cross-hatched teeth). Maxillary incisors are exactly on the A Line and need only slight torquing to achieve an ideal position and a slight extrusion. The mandibular incisors need a slight protraction and intrusion for ideal incisal position

will form a useful occlusal guide, and the selection will depend on the clinician's experience and choice. Other materials, such as bonding composites, glass ionomer cements, and others, can also serve successfully for POGs.

The posterior occlusal guides, which Dr. Fiorelli fortuitously developed, act somewhat akin to fixed functional appliances that can cause temporomandibular fossae and dentoalveolar remodeling⁷⁻⁹. He reveals this strategy with the following images of patient therapy (Figures 8-10). Interestingly, a colleague of Dr. Fiorelli, Dr. Paola Merlo⁶, expanded on this idea of posterior occlusal guides and came up with a brilliant idea for intercepting Class II malocclusions in the mixed dentition. She either removes or slices the distal portion of the maxillary second primary molar, which allows her to build up a template of Triad Gel on the lower dentition that encourages the mandible to slide forward. Figures 11-17 illustrate how she guides these patients into Class I occlusion.

Patient therapy

The images shown in this article display a sequence of photos during the orthodontic therapy for a Class II subdivision patient using Posterior Occlusal Guides (POGs). The patient's models display a firm Class I occlusion on the right side, a Class II occlusion on the left side, a lingually displaced maxillary left lateral incisor in crossbite, and a maxillary midline deviation to the left. The patient used .022 Insignia[™] brackets supplied by Ormco[™]. Ostensibly, the Insignia formula builds first, second, and third order



Figure 24: Models of Class II subdivision patient

Figure 25: Patient at treatment initiation with Triad POGs







Figure 26: Patient with POGs after 1 month of therapy









Figure 27: Patient with POGs after 2 months of therapy



Figure 29: Patient with POGs after 4 months of therapy. No elastics have been used

movements within the brackets and also supplies customized arch wires for the patient.

Figure 28: Patient with POGs after 3 months of therapy

Figure 22 illustrates the original malocclusion, while Figure 23 displays the initial cephalometric tracing combined with the Visualized Treatment Objective (VTO). The VTO shows that the maxillary incisors lie exactly on the A Line¹⁰ and need no facial or lingual movement with only a slight amount of torque to correctly position the roots and crowns; and they need only slight extrusion. The lips have contours that closely conform to the Holdaway ideals.^{11,12} The mandibular incisors can move facially a slight amount with minimum intrusion.

Figures 24-31 show a series of photos from the initiation of treatment through completion of therapy. It took 4 months for the Class II side to correct into a Class I. No typical Class II mechanics, e.g., elastics,

functional appliances, or headgears were used during this first phase of treatment. The patient used light Class II elastics on the left side for a couple of months near the end of therapy, but no other Class II mechanics were used at any point.

Figures 32A and 32B illustrate the after cephalometric tracing and the superimposition of the before treatment and after treatment cephalometric tracings. The superimpositions were made by superimposing on the line S-N at the most anterior part of the sella turcica as suggested by Melsen.⁵ Some mandibular terminal growth is expressed by a downward and forward movement. The maxillary incisors extruded and essentially stayed in place anteriorly-posteriorly. The mandibular incisors intruded but stayed in place anteriorly-posteriorly. The maxillary molars moved forward slightly but did

not extrude, while the mandibular molars showed little movement at all. Although the maxillary and mandibular incisors moved more than the VTO forecast, the extrusion and position of the maxillary incisors were the movements indicated by the prediction as was the slight amount of crown inclination. The mandibular incisors did not display the slight forward movement forecast by the VTO, but they did intrude as needed. The lips remained essentially unchanged and conform to the Holdaway norms for Caucasian females.

Discussion and conclusion

These therapies show the potential and effectiveness of posterior occlusal guides, and their ease of application should soon result in their adaptation by many orthodontic clinicians. Compared with any of the available functional Class II correctors