A Strategy for Nonextraction Class II Treatment

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Class II nonextraction treatment, which commonly includes distal movement of the maxillary molars to correct the molar relationship, most often can be successful when treatment is started in the late-mixed dentition stage of development. At least two factors contribute to this success. One is that the molars can be distalized routinely at this age. The second is that the "E" space is available and can be used either to help correct the molar relationship or to resolve any crowding that may exist. This article describes and illustrates the treatment of a late mixed-dentition patient with this type of Class II nonextraction treatment that includes distal movement of the maxillary molars with a 100 g NiTi coil system and the maintenance of the "E" space with a lip bumper. (Semin Orthod 1998;4:26-32.)

A number of nonextraction strategies are available to resolve Class II malocclusions. One is to move the maxillary molars distally in the initial stages of treatment to convert the malocclusion to a Class I spacing problem. The molars then are held in position while the spaces are closed by retracting the premolars, canines, and incisors.

The ability to correct molar relationships by distalizing the maxillary molars may be associated with the timing of treatment. For example, Armstrong ligated headgears in Class II malocclusion patients in the mixed-dentition stage of development and routinely changed the Class II molar relationship to a Class I in 4 to 5 months. On the other hand, when the same force system was placed in individuals in the early permanent dentition, he cautioned that the "clinical response . . . did not justify the use of continuous extra oral force."

This assessment suggests that an opportune time to start nonextraction treatment that relies on distal movement of the maxillary molars is the late-mixed dentition stage of development. The late-mixed dentition also is a favorable time to start treatment because the "E" space in the lower arch is available. If the malocclusion is not complicated by crowding, the lower molars can be moved mesially into the "E" space, reducing the amount of distal movement of the maxillary molars necessary to correct the molar relationships. If crowding is present, the "E" space can provide, in most instances, the space necessary to correct most of the crowding.

This article describes and illustrates an example of Class II nonextraction treatment that includes distal movement of the maxillary molars starting treatment in the late mixed dentition stage of development after the eruption of the first premolars (Fig 1). The Class II malocclusion was accompanied by approximately 3 mm to 4 mm of lower arch crowding. For this reason, a lip bumper was placed in the lower arch to maintain the "E" space during the eruption of the remaining premolars and canines.

The maxillary molars were moved distally to correct the molar relationship with the use of a 100 g NiTi coil system for 7 months, supported by a modified Nance appliance (Fig 2). This system is attractive because it does not rely on patient compliance and applies a continuously acting force that moves teeth faster than an intermittent force. Anchorage loss, however, usually increases the overjet. An estimate of tolerable anchorage loss is an increase in overjet of up to 2 mm. If the anchorage loss exceeds 2 mm, 100 g Class II elastics are placed to support the incisor position. In this patient, the overjet increase was less than 2 mm.

When an appliance such as a NiTi coil is used to distalize molars, there are at least two reasons to...
Figure 1. Pretreatment records (A-F) of a patient with a Class II division 1 malocclusion complicated by lower arch crowding in the late mixed dentition stage of development.

overcorrect the molar relationship. First, anchorage loss invariably will occur during the retraction of the premolars, canines and incisors, and the overcorrection serves to compensate for this anchorage loss. In a sense, the overcorrection is "prepared anchorage." Second, these procedures tip the molar crowns distally. After overcorrection, the subsequent forward movement of the molars to the Class I position aids in uprighting the molars because the crowns move more mesially than the roots as the molars move anteriorly.

Once the molars were in an overcorrected position, they were stabilized with a high-pull headgear to
Figure 2. NiTi coil supported by a modified Nance appliance to move the maxillary molars distally. (A) 1 month after insertion. (B) 3 months after insertion. (C, D) 6 months after insertion. The left molar already had been moved to an overcorrected position and was maintained in position with an inactive closed coil while the right molar moved further distally.

Figure 3. Incisor intrusion for bite opening by means of sectional mechanics. (A,B) tip-backs in base arch wire, (C) base wire ligated to sectional wire in the incisor brackets. The intrusive force exerted by the base wire was approximately 100 g (25 g/tooth). The tip-back in the base arch wire prevents mesial drift of the molar. Note distal drift of the premolars and canines.
 upright the roots, and the premolars, and canines were allowed to drift for 5 to 6 months. During this interval, the deep bite was corrected by intruding the maxillary incisors as described by Burstone. This movement involved placing a sectional arch in the incisor segment and an auxiliary base arch with molar tip backs that brought the anterior part of the wire into the labial fold. The wire then was ligated to the sectional arch to apply approximately 25 g per tooth of intrusive force (Fig 3). An important feature of this system is that the tip backs in the auxiliary arch also help maintain molar position.

While the incisors were intruded, the premolars and canines drifted toward a Class I relationship (Fig 4). After the bite was opened, molar position was maintained with the headgear and a tip-back in the arch wire for another 2 months, until premolar drift was complete (Fig 5). Final space closure, including incisor retraction, was uncomplicated, particularly as the buccal segments were corrected with essentially no anchorage strain (Fig 6). In the lower arch, the crowding mostly resolved spontaneously as the premolars and canines erupted, while molar position was maintained with the lip bumper (Fig 7). In this patient, the lip bumper was used as a lingual-arch type appliance because the “E” space provided adequate space to resolve the crowding. Because no attempt was made to gain arch perimeter with the lip bumper, it was placed approximately 2 mm anterior to the incisors and was never activated. If the “E” spaces were insufficient for alignment and the space deficit, including the “E” space, did not exceed 2 mm to 3 mm, the lip bumper would be placed 3 mm to 4 mm from the incisors and activated once or twice. The
intent in this instance, is to gain no more than 1 mm of arch length. The reason for limiting the arch length increase to no more than 1 mm is that the most lower arch instability seen in any group of patients by Little et al occurred when the arch length had been increased by more than 1 mm. Treatment of the patient was completed in 28 months (Fig 8).

Many appliances are available to move molars distally. In the example cited in this article, the choice was a constant-acting intra-arch fixed system that required essentially no patient cooperation. When used before the eruption of the second molars, experience indicates that the molar relationship can be corrected with a high degree of success (empirical estimate—greater than 90%), and anchorage loss can be kept within the acceptable 2 mm limit in the majority of patients. After the eruption of the second molars, anchorage loss often exceeds 2 mm and additional anchorage control, such as the use of Class II elastics, may be necessary. These observations support the view that a favorable time to move molars distally is the late mixed dentition. They also reinforce Armstrong’s opinion, expressed previously, that the clinical response to continuously applied extraoral force in the permanent dentition does not justify its use.

Another treatment option is the use of a headgear to move the molars posteriorly, where the reaction force or anchorage is extraoral. A disadvantage in the latter is that patient cooperation is necessary. In addition, the ability to convert a Class II molar relationship to a Class I with headgear treatment in the mixed dentition stage of development is less than ideal. The success rate recorded in a recent prospective study was only 81%. In an effort to combine the best of both cooperation-based and noncooperation-based appliance systems, some practitioners prefer to start most patients in the mixed dentition with a headgear, because it is successful at least 80% of the time, and there is no anchorage concern. If progress is inadequate, they convert to a fixed intraoral appliance and increase their success rate to approach 100%.

In summary, Class II nonextraction treatment, which includes distal movement of the maxillary molars to correct the molar relationship, is usually successful when treatment is started in the late-mixed dentition stage of development. At least two factors contribute to this success: the molars can be distalized routinely at this age, and the “E” space is available and can be used either to help correct the molar relationship or to resolve any crowding that may exist.

In Figure 6, space closure essentially completed.

Figure 7. Pre (left) and midtreatment (right) lower arch models. In the midtreatment model, note that ample space is available in the arch for alignment after the “E’s” have exfoliated.
Figure 8. Posttreatment records (A-G). The cephalograph (B) and models (C-G) indicate a Class I occlusion with an interincisal angle of 129°. Treatment time was 28 months.
References