Orthodontic correction of mild to moderate Class II malocclusions with the Invisalign® system may be handled both predictably and efficiently. Dr. Mazyar Moshiri generally considers the following variables below, in priority. Correction of any mesial rotation of the maxillary molars tops this list. It has been shown that up to 85% Class II patients have mesial rotation of their maxillary 1st molars.  

When correcting a unilateral or bilateral Class II dental malocclusion, it is important to carefully evaluate the etiology of the Class II relationships. One cause for displacement of the molars is mesial movement into the leeway space left during the transition from mixed to permanent dentition. This creates a loss of arch length and resultant mesial version of the remaining dentition anteriorly, creating a Class II cuspid relationship and increased overjet. Any further mesial drift from anterior crowding and/or arch constriction further exacerbates this problem. Correction of molar rotation not only helps to classify the molars into a Class I relationship, but concomitantly opens room for subsequent distalization and Class I correction of the remaining buccal dentition.

DR. MOSHIRI'S PRIORITY LIST FOR CLASS II MALOCCLUSION CORRECTION WITH INVISALIGN

1. Ask for mesial-out buccal rotation of upper 1st molars
2. Once molars are rotated, distalize as needed to achieve ideal Class I molar occlusion
3. Look for tooth size discrepancy (TSD) data to detail and finish occlusion

Here are Dr. Moshiri’s techniques for addressing Class II with Invisalign:

**Tip 1: Correct Any Mesial Rotation of Upper 1st and 2nd Molars**

Request that the buccal surfaces of the upper molars are near parallel to each other on the ClinCheck® treatment plan. The majority of Class II malocclusions have a relative maxillary transverse discrepancy, and considering the mechanics needed for Class II correction involve the maxillary molars being directed towards a wider part of the arch, the doctor should request adequate expansion during the rotational corrections.

Due to the rhomboidal shape of the upper first molars, correction of mesial rotations alone may open up to 2-3 mm of space per side for subsequent distalization of bicuspids and cuspids. The decision to use a beveled vertical attachment (beveled distal towards the direction of the force), will depend on whether additional distalization of the molars is required in combination with rotational corrections, as this decision may your change the attachment protocol. It is important to note even without attachments rotational correction of molars with aligners alone is a predictable movement.

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If correction of molar rotations is not adequate to achieve full Class I correction, sequential distalization with Class II elastics may be used in order to seat distal cusp of the maxillary first molar with the embrasure of the mandibular first and second molars. Practitioners should aim to see simultaneous distal rotation, expansion, and distalization of the molars. I do not routinely attempt more than 2 mm of total sequential distalization with aligners.

For this type of distalization, it is important to have an attachment on the maxillary second molar to initiate the movement. Ask for distalization to be delayed until attachments have been bonded on the teeth if your clinical protocols place attachments at later stages. Additional attachments may then be placed on every other tooth up to the cuspids, in order to make appliance removal amenable to the patient.

If a patient has maxillary 3rd molars present, ask for their extraction after the patient has their impressions/scan to take advantage of inflammation and space created. Once the buccal occlusion is nearly seated into full Class I on the ClinCheck treatment plan, I ask for retraction of the 2-2 segment with additional lingual root torque to achieve proper overbite and overjet.

**Tip 2: Use Elastics Early and Often**
One of the great benefits of Invisalign is the ability to initiate Class II elastics early in treatment. Elastics are critical for anchorage control and a predictable finish, especially considering that simultaneous movements are known to be the most efficient means of treatment. This means that as space is gained from correction of molar rotations, space closure mesial to the molars for distalization of the remaining buccal segment is also occurring. This space closure needs to be controlled and directed distally.

Start patients on Class II elastic as early as aligner 3, depending on what movements require anchorage control. If distalization is seen on the ClinCheck treatment plan, elastics should be in the mouth for those stages and until a superclass I relationship is observed. Dr. Moshiri prefers to run elastic from buttons on the lower molars to Precision Cut hooks milled into the upper aligner with 3/16 or 1/4, 4 oz elastics. Circumstances where a button may be placed on upper 3’s or 4’s are if anchoring directly to the teeth will aid in distally facilitating distal rotations of the teeth, or in a Class II division 2 patient where you do not want to pull the aligner off the maxillary arch due to the retroclination of the anterior teeth.

**Tip 3: For Class II Malocclusions with Minimal Overjet, a Class II Correction Simulation (Bite Jump) is Useful to Demonstrate the Projected Class II Correction. This is Represented as an Instantaneous Reduction of Overjet.**
The bite jump may be used to represent total gradual en masse movement of maxillomandibular arches from continuous Class II elastic wear during treatment. If movements are controlled in terms of anchorage, the bite jump tool can be useful in demonstrating what to expect for patient’s treatment outcomes. This tool is primarily used to simulate, in one instance, the sequential movements that are occurring over a period of time.
The bite jump is used primarily to represent dental AP correction of Class II / Class III malocclusion and autorotation closure of open bite patients, unless the treatment plan calls for orthognathic surgery, or if mandibular growth is expected for teen patients.

If segmental mechanics are being used, as in tooth-by-tooth distalization mechanics, then a bite jump is not indicated. In this case, the practitioner would find it useful to evaluate the particular stage of movement indicated on the ClinCheck treatment plan against the actual clinical outcome occurring with the patient’s dentition to properly track treatment success.

**Tip 4: Use a Tooth Size Discrepancy (TSD) Analysis for First Molar to First Molar (6-6)**

Undiagnosed tooth size discrepancies (TSD) may be a significant cause of occlusal instability and poor treatment outcomes. This information may be attained via the Bolton analysis for tooth size discrepancies. Any known TSD is important knowledge to have for detailing the occlusion and increasing the opportunity for treatment success. Given your patients’ anterior esthetics (i.e. small upper laterals), buccal occlusion, depth of bite, etc., any existing tooth size discrepancy may be used to the clinicians’ advantage to further treat a Class II malocclusion predictably.

For example, if at the end of the ClinCheck treatment plan the patient is still Class II in the premolar and canine areas and a maxillary excess is indicated on the TSD analysis, then this may be used to create any further space needed for distalization or reduction of overjet. In another scenario, if a mandibular excess is noted, IPR may be used for mesialization of the lower dentition with Class II elastics to further aid in Class I molar correction.

**Tips for Predictable Finishes**

The above methodology has proven very valuable in Dr. Moshiri’s practice in evaluating and treating Class II patients with Invisalign. Here are some additional suggestions to further enhance treatment outcomes for Class II patients:

1. **Request Adequate Expansion for Class II Correction:** Ask for 2 mm of buccal overjet on all teeth and avoid a “socked-in” occlusion at the end of the ClinCheck treatment plan. The reasoning behind this preference is that the amount of expansion indicated on the ClinCheck treatment plan may not express clinically, especially when using a lot of Class II elastic wear which has a constrictive force on the maxillary arch. Dr. Moshiri believes expansion needs to be “over-engineered” in the ClinCheck treatment plan for proper treatment of Class II patients as the software cannot predict the constrictive force Class II elastic wear. Otherwise, interocclusal interferences may prevent proper occlusion.

2. **Anticipate Enough Anterior Torque for Proper Anterior Centric Contacts:** Anterior lingual root torque is another movement that should be over-prescribed (by about 20%) for the movement to occur clinically. First, diagnose how much torque is required off cephalometric measurements, and then instruct your technician to add this amount into the ClinCheck treatment plan. For example, if the upper incisors require 10 degrees of lingual root torque, ask the technician to add 12 degrees of lingual root torque. This is very important as lack of anterior root torque will distalize the mandible from heavy centric contacts, creating a Class II bite and a mild posterior open bite.

   Bite ramps (bite turbos) lingual to the upper incisors further increase the predictability of this movement. The lingual force from the lower incisors against the bite ramp, facilitated by the propulsive movement of the mandible forward from Class II elastics, helps to seat the aligner anteriorly while providing a counter moment to the Power Ridge on the buccal of the aligner. If the patient is Class II division 2, ask for the technician to push the teeth out first before placing bite ramps to allow for better for application of force relative to the center of resistance for the maxillary teeth.

3. **Use Aligner Chewies Daily:** Instruct patients to use Aligner Chewies on a daily basis to promote settling of the dentition into the aligner. Ask patients to bite straight down (not side-to-side like chewing gum) and to apply average pressure for 5 seconds at a time, walking the Chewie around the mouth, focusing on areas where the majority of their movements are occurring. Have patients use Chewies 2-3 times a day for 10-15 minutes per exercise.
DR. MAZYAR MOSHIRI

Dr. Moshiri obtained his Doctorate, Masters in Oral Biology, and Certificate of Advanced Training in Orthodontics from the University of Louisville. Upon graduation from dental school, Dr. Moshiri was honored with the American Association of Orthodontists student award, two International College of Dentists awards for both Leadership and Professionalism, the Oral Biology Research award, the Omicron Kappa Delta award for Outstanding Graduating Senior, and honorary induction into the prestigious academic society of Omicron Kappa Upsilon. He currently practices orthodontics as part of Moshiri Orthodontics with three locations in the St Louis and Springfield, MO areas.

Disclosure: Dr. Mazyar Moshiri was provided an honorarium from Align for his presentation. The statements, views and opinions expressed in this presentation are those of the author, and do not necessarily reflect the views and opinions of Align Technology, Inc.