

# Phase 1 orthodontic treatment with Invisalign First clear aligners

Constricted arches with an anterior and posterior crossbite in a patient with special needs

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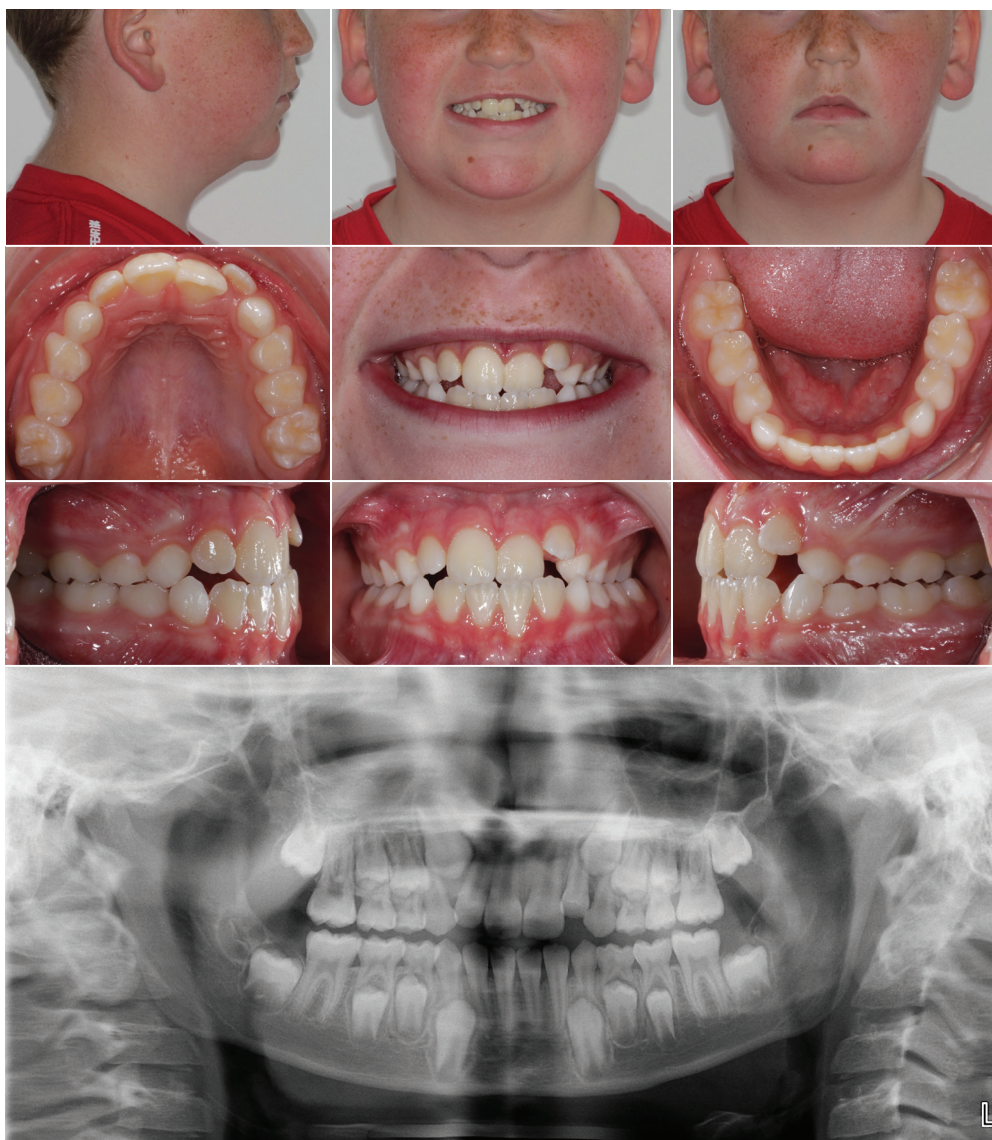
**Patient:**

**Age:** 9 year-old male with Asperger syndrome

**Chief concern:** The main concern was the patient's incisor crowding and anterior crossbite.

**Diagnosis:**

- Early mixed dentition
- Convex facial profile
- Mild Class III dental relationship on the right side, and end-on Class II molar on the left side
- Anterior dental crossbite, moderate upper arch constriction, and a posterior crossbite on the left side
- Moderate upper anterior crowding; very mild lower anterior crowding
- Minimal overbite
- Moderate gingival recession of the lower left central incisor

**Initial records:**

## Treatment goals:

1. Due to the patient's medical condition, first acclimate the patient to accepting orthodontic treatment;
2. Eliminate the anterior and posterior crossbites;
3. Non-extraction, non-IPR treatment approach;
4. Achieve positive overbite and overjet to facilitate natural retention of the crossbite correction;
5. Allow the permanent canines to erupt without interference.

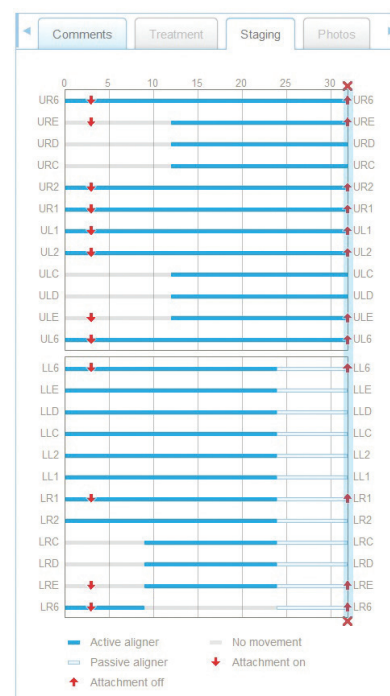
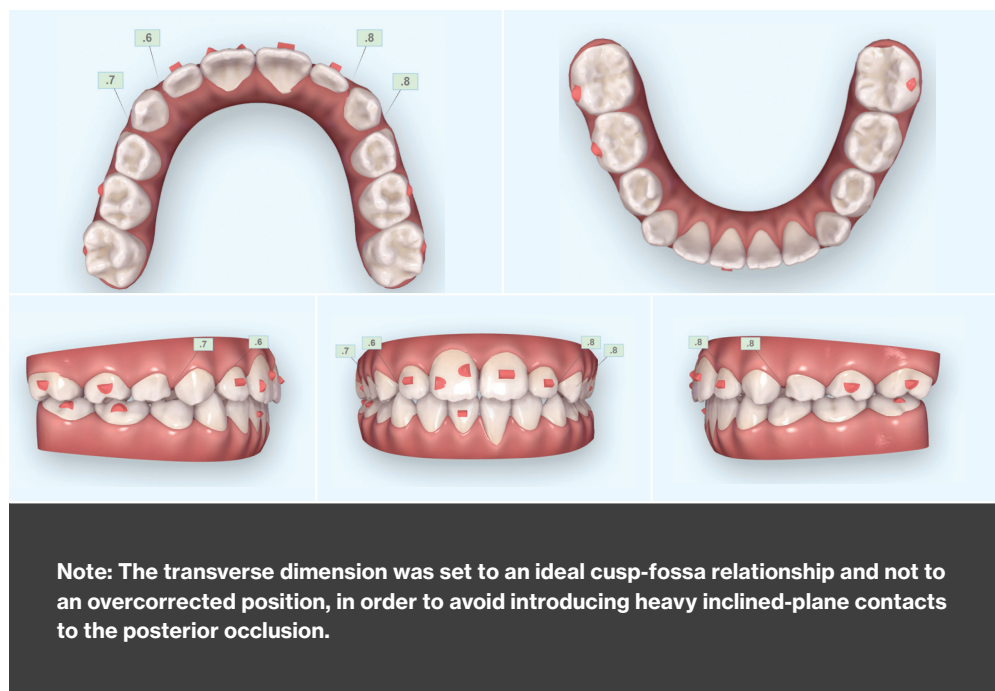
## Treatment plan:

1. **Note: this extra step is not needed in patients who do not require an acclimation phase due to the medical condition:** Pre-treatment passive appliance phase with vacuformed retainers, to evaluate the patient's acceptance of aligner wear (the patient is charged a nominal fee for these appliances).
2. If acceptance is good, proceed to Phase 1 treatment using Invisalign First aligners.
3. Widen the arches dentally to eliminate the crowding and the posterior dental crossbite. Distally rotate the upper left posterior teeth into a Class I relationship. Note: If the upper arch constriction was skeletal (as determined by the amount of radiographic overlap between the unerupted crown of the permanent canines and the roots of the permanent upper lateral incisors), we would begin Phase 1 treatment with a rapid maxillary expander (RME), followed by dental alignment immediately afterwards.
4. Procline the upper central incisors and retrocline the lower central incisors to eliminate the dental crossbite. Move the lower left incisor lingually to help stabilize the tooth periodontally.
5. Generate space mesial and distal to the upper primary canines, in order to avoid impaction of the permanent canines and balance the anticipated space deficit between the primary and secondary dentition.
6. Once positive overbite and overjet are achieved, follow with a very short retention phase and then stop appliance wear altogether, to allow for natural retention of the crossbite correction.
7. Monitor jaw development and permanent dentition eruption, and evaluate the patient for potential benefits of Phase 2 treatment.

## Invisalign First aligner features used:

- Optimized extrusion and retention attachments;
- "Molars move first" staging pattern for dentoalveolar expansion.

## ClinCheck® set-up and staging:





**Treatment results:****Progress**

The patient after the initial series of U:32, L:24 Invisalign First aligners (6.5 months of treatment).

**Final records**

Final results after U:28, L:28 additional aligners (Total Phase 1 treatment time: 13 months).



**Post-treatment monitoring:**

The patient in the transitional dentition 4 months post-Phase 1. The anterior and posterior arch coordination and the eruption of the permanent dentition remained within normal limits.

**Ready for Phase 2 treatment:**

The patient was ready for Phase 2 treatment 12 months post-Phase 1. The goals for Phase 2 are to close the remaining lower spaces, extrude the upper left canine, and derotate the premolars while maintaining a Class 1 bite relationship.

## Treatment summary:

- After U:32+28 and L:24+28 Invisalign First aligners, the anterior crossbite, posterior crossbite, narrow upper arch, and crowding were all corrected. Adequate space prepared for the permanent upper canines, and the gingival health around the lower left central incisor was stabilized. Good aligner wear compliance and oral hygiene were maintained throughout Phase 1 treatment.
- The Phase 1 treatment time was 13 months, not including the pre-treatment eruption monitoring and passive vacuformed appliance phase. **Note: this extra step is not needed in patients who do not require an acclimation phase due to the medical condition.**
- The number of pre-treatment visits to evaluate patient acceptance: 4
  1. Patient exam, photos, panoramic radiograph. Emphasized the importance of good oral hygiene.
  2. Reviewed treatment records with the patient and checked the patient's oral hygiene. Intraoral scan for clear vacuformed retainers from 3-D prints to acclimate the patient to orthodontic appliances.
  3. Delivered 2 sets of vacuformed retainers (2-week changes each).
  4. Checked the fit of the vacuformed retainers and ordered Invisalign First aligners from the intraoral scan when the patient was ready, willing, and able to move forward.
- Phase 1 treatment: 9 visits in 13 months (from initial aligner delivery to attachment removal appointment, including 1 unplanned visit to reduce attachment prominence in the upper arch).
  1. Initial aligner delivery (Box 1: #1-12, 2-week changes #1-3, 7 d changes #4+).
  2. Bonded attachments after aligner #3 worn.
  3. (unplanned) Reduced upper attachment prominence.
  4. Aligner delivery (Box 2: #13-24, 5 d changes).
  5. Aligner delivery (Box 3: #25-32 upper only, 5 d changes).
  6. New intraoral scan and photos for additional aligners.
  7. Deliver additional aligners (Box 1 and 2: #1-24, 5 d changes except 7 d for aligner #1), remove old attachments and add new ones.
  8. Deliver additional aligners (Box 3: #25-28, 5 d changes).
  9. Removed attachments and used the last aligner as retainers until the erupting teeth prevented adequate aligner fit. Final photos.
  10. (not counted as a Phase 1 treatment visit) Post-Phase 1 treatment monitoring visit. Post-treatment photos.

## Clinical notes:

1. Attachment placement was planned for aligner stage #3, which kept the first aligner delivery appointment short and simple, and enabled an easier introduction to the extra difficulty of coping with increased appliance retention from the attachments. Since optimized Invisalign attachments are shaped based on the specific tooth movements planned, we tend to use whatever is proposed in the set-up. However, if no attachments are present on the 6's, we will add horizontal rectangular attachments to them just in case additional appliance retention is needed.
2. Beginning with aligner #13 (Box 2), the aligners were changed every 5 days. We did this to take advantage of the rapid dental development at this young age and to minimize any plaque build-up in the aligners.
3. No special features were used to assist in the anterior and posterior crossbite correction, as it was felt that the disclusion provided by the thickness from the aligner plastic would be adequate to overcome the shallow initial overbite.
4. The transverse dimension was set to an ideal cusp-fossa relationship and not to an overcorrected position, in order to avoid introducing heavy inclined-plane contacts to the posterior occlusion.
5. A secondary aim of the arch development was to plan for the transition from the primary to the secondary dentition. From Moyers et al. (Michigan Growth Study, 1976), extra arch length is required to accommodate the transition from the mixed to the permanent dentition. We accomplished this through dentoalveolar arch expansion, and also by building interproximal spaces around the upper deciduous canines.
6. For retainers, the patient used the last aligner until they no longer fit over the erupting teeth. Separate retainer appliances were not fabricated since multiple permanent teeth were already starting to erupt at the end of Phase 1 treatment.
7. If this case had been treated using fixed appliances instead, maintaining good oral hygiene would have been more challenging, and separate clinical steps would have been required to disclude the dentition during the correction of the anterior and posterior crossbites. Problems with appliance breakage would have been a bigger issue with fixed appliances. With Invisalign First aligners, we were able to precisely coordinate the dental movements between the arches and efficiently retract the lower incisors while rounding out the upper arch at the same time. This would have been considerably more difficult with fixed appliances.

## Lessons learned from this treatment:

1. Treating younger children with Invisalign First aligners can be efficient and easy, particularly when the focus is on dentoalveolar changes.
2. Periodontal defects due to malpositioned teeth may be reversible if the teeth are orthodontically repositioned early enough into a healthier arrangement to allow for recovery.
3. The Invisalign First appliances were very esthetic and well-tolerated, and the ability to take them out for eating and brushing was appreciated by the patient and his parents.
4. Staying laser-focused on addressing the patient or parent's primary concern helped maintain the discipline needed for good aligner wear compliance and oral hygiene habits.
5. Due to the patient's medical issues, extra time was initially required to gain his confidence and cooperation before active treatment started.
6. The use of the iTero intraoral scanner (and thus the avoidance of PVS impressions) was of great benefit. For Phase 1 treatments, we try to keep the interval between the iTero scan and aligner delivery very short by not fussing too much with the initial set-up, since additional aligners are likely to be used anyways.
7. Arch expansion without any IPR is our preferred way to eliminate crowding in Phase 1 aligner treatments, unless the leeway space is needed to treat moderate to severe crowding situations.

## Dental management of patients with Autism and Asperger Syndrome

Asperger syndrome is part of the Autistic Spectrum Disorder (ASD). Patients with autism spectrum disorder do not demonstrate a higher prevalence of dental caries when compared with the healthy population, and caries rates may actually be lower. However, most medications commonly used to treat depression and anxiety in patients with autism list xerostomia as a side effect, so patients taking such medications may need to rinse with water more regularly as part of their aligner treatment. Doctors should pay close attention to the patient's enamel health, and watch out for signs of inadequate brushing after eating or the consumption of sugared beverages with the aligners on.

Short, well-organized appointments are recommended, where the waiting time does not exceed 10 to 15 minutes, as these patients often have very limited attention span and may get upset easily. Invisalign First aligner treatment can consist of short, routine appointments once the treatment plan has been established.

Consider using visual prompts so that the patient knows what is going to happen during the appointment. Always show the patients the aligners before inserting them, and consider using the ClinCheck® 3-D treatment plan to visually communicate the story of where their treatment is heading. Same day starts for patients with these particular special needs is probably not a good idea, because they tend to do better if acclimated to their environment first. Testing the patient's acceptance of aligner treatment with passive vacuformed appliances made in-office or by a local lab can be an effective way to acclimate these patients before starting (**Note: this extra step is not needed in patients who do not require an acclimation phase due to the patient's medical condition**).

Avoid overstimulating the patient's senses. Making direct eye contact may also be uncomfortable for an individual with autism spectrum disorder. Bright lights and colors in the dental operator may be problematic, as can be certain smells, the taste of the mouthrinse, the feeling of cold instruments in the mouth, and the noise of dental equipment. As such, the use of protective glasses with dark lenses may be helpful. Technologies such as iTero® intraoral scanning may be preferred over the use of impression material. Minimizing the use of interproximal reduction (IPR) may also be preferred.

If you have Invisalign treatment results from your practice that you would be interested in sharing with your peers, please submit your cases at the Invisalign Gallery:

 [submit.InvisalignGallery.com](https://submit.invisaligngallery.com)

## References

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Experiences, results and opinions in this article are those of the doctor in his orthodontic practice and not necessarily of Align Technology, Inc. The doctor was paid an honorarium by Align Technology, Inc. for his time to develop this article.