Class II Distalisation Staging Comparison in Twins Using the Invisalign System

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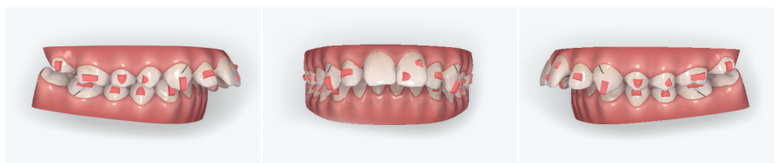
Twin brothers (Twin A and Twin B), aged 14 years and 8 months, presented with Class II malocclusions. The boys sought treatment to improve their dental aesthetics. Neither wanted to be treated with fixed orthodontic appliances or functional appliances. Hence, moderately heavy Class II elastics with aligners were recommended to correct their dental malocclusion.

I. Intra- and extra-oral images before treatment

II. Initial ClinCheck treatment plan



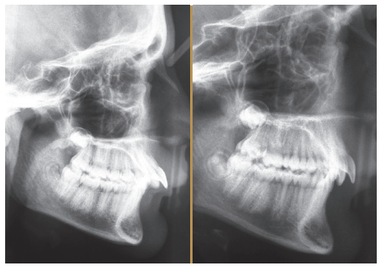
Twin A

Twin B

Clinical presentation

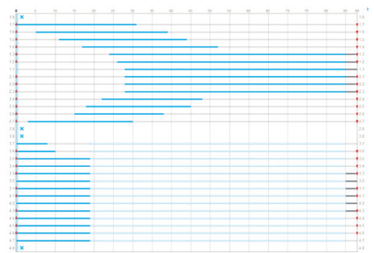
Both twins presented with large overjets, deep bites and crowding of their teeth.

III. Cephalometric radiograph before treatment

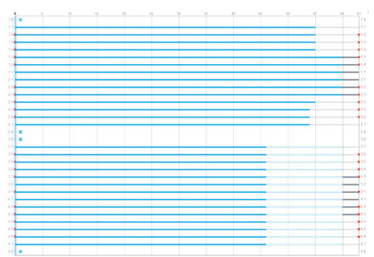


Twin A Twin B

IV. Staging patterns



Twin A – Segmental distalisation



Twin B – En-masse distalisation

Clinical findings

- Twin A presented with a Class II division 1 dental relationship accompanied with Class II buccal segments. He had an overjet of 12 mm and a deep bite with mild crowding of both arches. All his third molars remained unerupted, there was a lower lip trap at rest and a brachyfacial tendency pattern.
- Twin B presented with a Class II division 1 dental relationship accompanied with Class II buccal segments. He had an overjet of 9 mm and a deep bite with pronounced crowding. All his third molars remained unerupted, there was a lower lip trap at rest and a brachyfacial tendency pattern.

Treatment goals

- Correct large overjet.
- Obtain near Class I occlusion.
- Correct deep bite.
- Relieve crowding.

Treatment approach

Initial treatment phase

- Impressions with polyvinyl siloxane (PVS), intra-oral images and dental radiographs (orthopantomogram and lateral cephalogram) were used for developing a ClinCheck treatment plan.
- Dental expansion and incisor proclination are preferred over interproximal reduction (IPR) in teenagers. Therefore, for these patients, no IPR was planned. No additional auxiliaries, except Class II elastics, were used to treat either patient. No partially fixed appliances were used.
- The ClinCheck 3D models showed that the upper central incisors required more intrusion than the upper lateral incisors. To prevent over-intrusion of the upper lateral incisors, conventional attachments were added to them.
- The 'Tooth Movement Assessment' (TMA) showed that the anteroposterior (A-P) correction was more than 4 mm and, therefore, classified as a 'black' advanced movement on the TMA. The rotation on tooth 42 for Twin B was greater than 50º. A vertical rectangular attachment was added to improve the predictability of this movement. The ClinCheck treatment plan for Twin A revealed that teeth 31 and 41 required intrusion of greater than 3 mm. This was supported by conventional rectangular attachments on the lower premolar teeth.
- Both twins required approximately 5 mm A-P correction. Segmental distalisation was used for Twin A and en-masse distalisation for Twin B. Pre-Invisalign sagittal correctors can be used in severe cases (4+ mm); however, with close monitoring, aligners and elastics alone can also achieve the A-P correction.
- Control of the deep bite was undertaken to ensure A-P correction was not hindered. Optimised Attachments and horizontal rectangular attachments were used to extrude premolars. Overcorrection of the deep bite was built into the ClinCheck treatment plan.
- Instructions were given to wear the aligners with Class II elastics at all times during the treatment period.
- Class II elastics were attached to Precision Cuts hooks on the upper canines and on the lower first molars. Attachments were used on the lower molars to prevent the elastics from lifting the lower aligner off the teeth. The elastics were worn from the time the first aligner was prescribed. Each elastic was 1/4" 3.5 oz and after approximately 6 months of treatment, they were advanced to 3/16" 3.5 oz. Both patients were advised to use new elastics every day.

Refinement phase

New records were taken with the iTero Element Scanner for refinement treatment. The 3-month refinement phase aimed to achieve better settling of the posterior occlusion and further torque control of the upper incisors.

Treatment details

Active treatment time for both patients

- Initial treatment phase: 14 months.
- Refinement phase: 3 months

Aligners and attachments

Initial treatment phase

Composite resin attachments were bonded at the start of aligner treatment.

Twin A

- 85 active upper aligners, 19 active and 66 passive lower aligners plus 3 virtual c-chain aligners were planned. However, not all aligners were used prior to refinement. Aligners were changed every 5 days.
- Optimised Attachments, conventional attachments, Precision Cuts hooks and button cutouts were used.

Twin B

- 60 active upper aligners, 46 active

V. Intra- and extra-oral images after treatment

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VI. Final ClinCheck treatment plan

Twin A

Twin B

and 16 passive lower aligners plus 3 virtual c-chain aligners were planned. However, not all aligners were used prior to refinement. Aligners were changed weekly.

- Optimised Attachments, conventional attachments, Power Ridge features, Precision Cuts hooks and button cutouts were used.
- Deep bite pressure area for intrusion on teeth 12–22 and 33–43.

Refinement phase

Twin A

- 14 upper and lower additional aligners. The aligners were changed weekly.
- Optimised Attachments, a conventional attachment, Precision Cuts hooks and button cutouts were used.

Twin B

- 13 upper and lower additional aligners. The aligners were changed weekly.
- Optimised Attachments, conventional attachments, Precision Cuts hooks and button cutouts were used.

Treatment outcome

- The comparison of pre-treatment and post-treatment results indicated that the large overjet, deep bite and crowding were fully corrected in both boys. In addition, they both achieved near Class I buccal segments and significant improvement in the Class II dental relationship.
- The A-P was successfully corrected in both cases with en-masse distalisation for Twin A and segmental distalisation for Twin B.
- Further settling of the posterior teeth was required. The patients chose to be treated with bonded lingual retainers, which would help with the settling of the posterior occlusion over time.

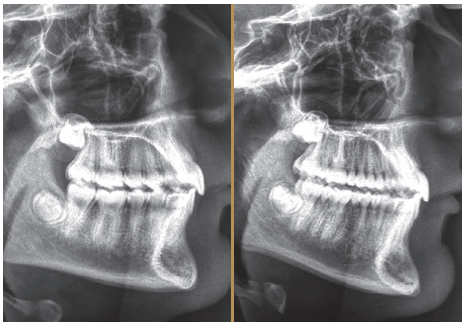
Clinical tips

- The twins presented for orthodontic treatment at the age of 14 years and 8 months. Ideally, orthodontic treatment should have commenced approximately 2 years earlier to ensure continued growth over the treatment period.
- A clinician's choice of either elastic hooks or buttons for anchorage of the elastics is unlikely to affect the magnitude of the A-P correction. Elastic hooks can cause the aligners to lift off the teeth and some patients may find it difficult to re-attach the elastics. The alternative use of buttons are subject to bond failure, but can ease placing of the elastics.
- Both en-masse and segmental distalisation, supported by Class II elastics, resulted in significant A-P correction with similar outcomes for both patients. Significant A-P correction was achieved with only the aligners and Class II elastics.
- Class II malocclusions can be successfully treated with Invisalign aligners when the deep bite is controlled from the start of treatment.

Impact on clinical practice

The results for both twins compare favourably with what would have been obtained with the use of fixed appliances and Class II correctors. The results are also comparable with what would have been obtained with two phase orthodontic treatment, where a functional appliance is used for the first phase. The treatment time in both cases was equivalent or less than that achievable with fixed appliances or two-phase treatment. With regard to treatment methods, the use of en-masse or segmental distalisation with Class II elastics, for growing patients, will likely yield equivalent results . Invisalign treatment with Mandibular Advancement and the new Precision Wings

VII. Cephalometric radiograph after treatment



Twin A Twin B

features could have been used for these cases, but were not available at the time. The benefit of using these features would have been that Class II elastics would not have been required, increasing the predictability of the outcome by eliminating the compliance factor associated with wearing elastics.

Conclusion

Twin brothers (Twin A and Twin B) aged 14 years and 8 months presented with Class II malocclusions. Their overjets measured 12 mm and 9 mm, respectively, and the buccal segments required A-P correction of approximately 5 mm. In addition, both cases had deep bites, which required careful control for the correction of Class II malocclusions. Treatment involved the use of Invisalign aligners and Class II elastics; no Class II correctors or other auxillaries were used. Total treatment duration was 17 months, which included one refinement phase. Clinical photos reveal correction of the overjet and deep bite, and the buccal segments finished in a near Class I relationship. Invisalign treatment with distalisation and Class II elastics resulted in a favourable outcome for both twins with severe Class II malocclusions.

Author disclosure

Dr Mike Anderson was provided an honorarium from Align Technology, Inc., for his contribution towards the creation of this case report.

Dr Mike Anderson

Mike Anderson graduated with a Bachelor of Dental Science with Honours at the University of Queensland, where he went on to also complete his Master of Dental Science (Orthodontics). Upon graduating, Dr Anderson worked at two major public hospitals and was a visiting lecturer at the University of Queensland Dental School.

Dr Anderson has Australian Orthodontic Board certification and lives in Brisbane, where he runs three busy single-provider practices. He has treated close to 1,000 Invisalign cases and is a Diamond Tier Provider.

Dr Anderson was selected to be a moderator at the 2016 Asia Pacific Invisalign Summit and has presented to Australian and New Zealand orthodontists on the Invisalign System in several online education sessions in 2017. Dr Anderson was chosen as a moderator at the EMEA Invisalign Summit 2017.