

Two phase treatment of a class III malocclusion

Dr Graham Gardner describes a class III correction using the Invisalign system in a patient that presented with a mandibular shift and myo-facial pain

The use of the Invisalign system to treat mild to moderate crowding and spacing cases has been shown to be very effective^{1,2}. Since the launch of the SmartForce features in Invisalign G3, Invisalign G4 and now Invisalign G5, more complex cases that would ordinarily be treated with fixed appliances can now be predictably treated using Invisalign. This article describes a two phase treatment plan of a class III malocclusion complicated by a mandibular shift and myo-facial pain utilising initial bite plate therapy to de-program the mandible followed by Invisalign and the use of elastics to align the dentitions and seat the occlusion into the new de-programmed mandibular position.



Figure 1: Pre-treatment photographs

Case presentation

SP presented with a main complaint of 'a bite that was uncomfortable and felt that her jaw was being pushed to the left.' The patient also complained of neck, back and occasional pain around the ear on the right side. She also suffered from regular headaches in the temporal region and regularly visited a chiropractor. Normal range of mandibular movement was noted and TMJ examination elicited no clicks or crepitus with no

tenderness on palpation or on applied pressure of the temporomandibular joints (TMJs) on both sides.

Dental history

The patient was treated with an upper removal expansion appliance approximately 25 years ago which had resulted in an over-expanded upper arch, with associated gingival recession present on the upper buccal segments especially UR3/4.

Comprehensive exam

A comprehensive exam revealed missing LL8 and LR8. The UR8 was unerupted and the UL8 had over-erupted. The patient had a few restorations, all of which were sound and stable. Mild crowding existed in the upper and lower arches with an asymmetric upper arch form, rotated upper first premolars and class III canine and molar relationships were noted on both sides, along with the presence of an anterior crossbite and centerline discrepancy due to a mandibular deviation

to the left as the result of occlusal interferences (Figure 1). The patient was a mild skeletal class III with an ANB angle of -1° as noted on the cephalometric analysis.

Aims of treatment

1. De-program the mandible and locate the patient's neutral bite, to assess whether the patient's myo-facial pain symptoms improved.
2. Align both upper and lower arches in the neutral and decompensated bite position.
3. Create a class I canine relationship on both sides.
4. Resolve the mild crowding present on both arches.
5. Correct the anterior crossbite, creating a positive overjet and overbite.

Treatment overview

The crux of this treatment was to locate the patient's neutral bite utilising lower bite plate therapy in order to assess if this alleviated her myo-facial pain. If this stage was not successful then the



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concern was that instituting orthodontic treatment with no clear indication where her natural bite position is could result in intensifying the chronic pain that the patient already suffered. Therefore the initial phase utilised a full lower bite plate carefully adjusted to create full and balanced occlusal interdigitation with the upper arch and correct canine and premolar guidance into a deprogrammed mandibular position determined with the initial use of an Aqualizer.

The patient was fitted with a lower bite plate for a period of approximately two months with regular adjustments of the occlusion on a two weekly basis until the patient found it comfortable to wear on a 24-hour basis including eating. After four weeks, the patient reported that she was symptom free and after two months, she also reported that when she ate, the 'lower jaw stayed in the same place.' At that stage, an edge-to-edge anterior bite was noted and although I would normally continue with the bite plate for a minimum of six months the patient was very keen to progress onto orthodontic treatment (Figure 2).

Invisalign was chosen as the appliance system of choice because the unique advantage that the Clincheck software programme offers is that the bite can be set according to the de-programmed and neutral bite achieved with the bite plate therapy. The teeth could then be virtually aligned and the arches coordinated to the new bite relationship plus, importantly, the bio-mechanics necessary to achieve the result could be clearly assessed on the Clincheck treatment plan. The resultant Clincheck demonstrated that the lower incisors could be retracted, the anterior crossbite corrected and a class I posterior occlusion achieved with lower IPR and class III elastics without the need for lower extractions. The second important advantage of the Clincheck relates to informed consent. I was able to demonstrate the movements required, the need for class III elastics and also discuss the possible risk of the class III elastics in creating pressure on the TMJ's with resultant return to the myo-facial pain. If this did



Figure 2: Photos after bite plane treatment (pre-Invisalign)

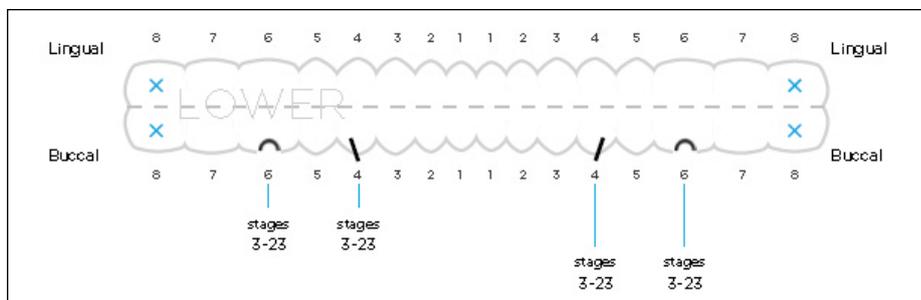
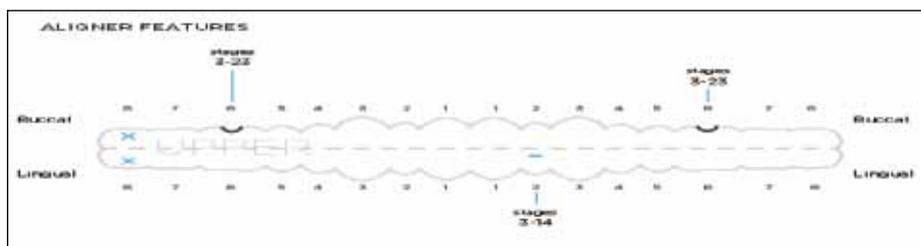


Figure 3: Precision cuts – hooks on lower 4s and button cutouts on upper 6 and lower 6s

become an issue then it was agreed that lower extractions would then need to be considered but as the patient was not keen on extractions she was willing to try the class III elastics with IPR. Interestingly, the Clincheck also demonstrated that retaining the rotated position of the upper first premolars allowed these teeth to occupy more space and therefore decreased the amount of IPR required in the lower arch.

The CC treatment plan included U17/ L20 number of aligners. Optimised attachments were placed on six teeth at aligner 3 and consisted of various types – optimised extrusion attachment on UR1, optimised multi-plane attachment on the UL2, optimised rotation attachments on LL5 and LR5, and optimised root

control attachments on LL3 and LR3.

IPR was prescribed from LL5 to LR6 and varied between 0.3 – 0.4mm per interproximal contact. Buttons were placed on upper first molars and hooks were placed on the lower first premolars to run Class III elastics (because the lower canines had optimised attachments)(Figure 3).

Clincheck screenshots pre-Invisalign and expected post-Invisalign results are shown in Figure 4. The course of treatment progressed as planned and no problems occurred with the class III elastics (1/4” 3.5 ounce) and the anterior crossbite was successfully corrected together with a full class I buccal occlusion with correction of the mandibular shift. One course of refinement was required to fully correct the

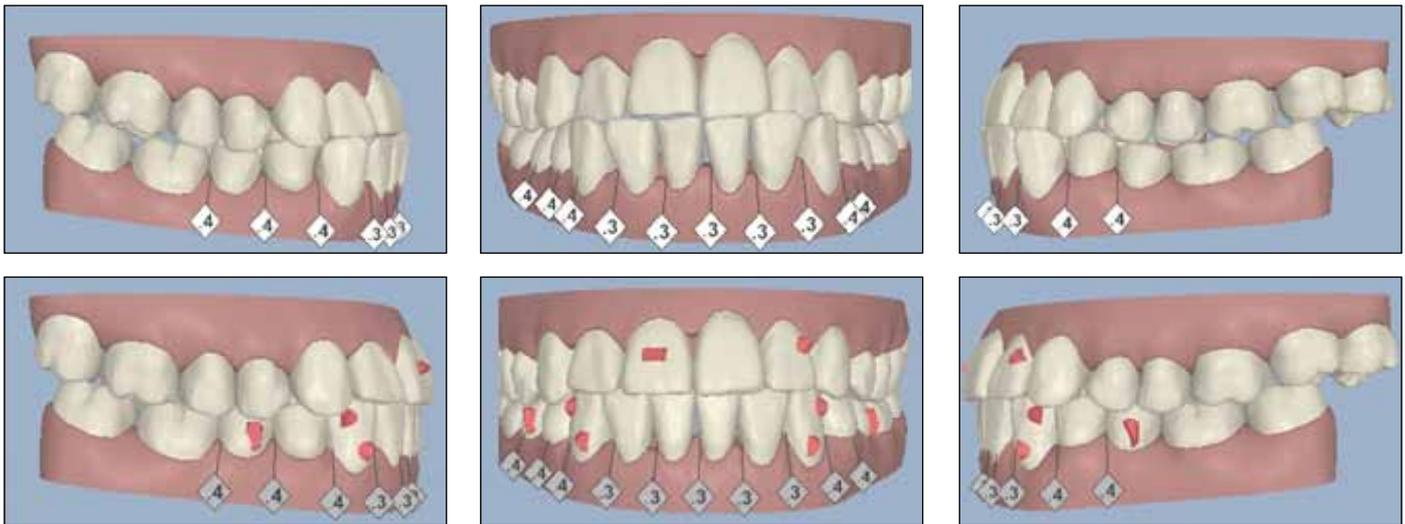


Figure 4: CC screenshots before tx (above) and expected post treatment (below)

overjet/overbite and seat in the posterior occlusion (Figure 5). Initial retention included upper and lower night time Essix retainers and the patient is scheduled to have a lower bite plate retainer made.

Conclusion

I think that this case demonstrates the incredible advantage that the Clincheck program offers practitioners in diagnosing, setting up and finalising the movements and bio-mechanics necessary. It allows a thorough understanding of the case and the possibility (if required) to assess more than one treatment option. Secondly it is an incredibly powerful tool for patient education and informed consent to the treatment plan.

In this case specifically, the decision for IPR with the use of CIII mechanics offered a comfortable, aesthetic alternative for this patient that presented with a CIII occlusion that was complicated by a mandibular shift. The use of CIII elastics for additional anchorage was vital in this case as it allowed for the correction of the canines into a class I canine relationship and created a positive overjet and overbite without the need for extractions. It also prevented the development of lateral open bites, which is sometimes seen in mild skeletal class III patients treated with Invisalign. The Invisalign system allows the practitioners to prescribe hooks or button cutouts to facilitate the use of elastics thus negating the need for the practitioner to trim each aligner in the practice. The latest innovations introduced by Align Technology have not only increased the



Figure 5: Final photos

scope of what can be treated with Invisalign, but has also increased the predictability of achieving the desired treatment outcomes.

References

1. Boyd, R.L.; Miller, R.J.; and Vlaskalic, V.: The Invisalign system in adult orthodontics: Mild crowding and space closure cases, *J. Clin. Orthod.* 34:203-212, 2000.
2. Vlaskalic, V. and Boyd, R.L.: Orthodontic treatment of a mildly crowded malocclusion using the Invisalign system, *Austral. Orthod. J.* 17:41-46, 2001.