Invisalign®: clear benefits for your patients

By Vicki Vlassakic BDSSc, MDSc.

Since the launch of the revolutionary Invisalign orthodontic system in 1999, the removable, computer-activated, aesthetic Invisalign® aligner has gained popularity worldwide as an alternative to traditional fixed appliances. Invisalign® provides adult and teen patients an aesthetic, non-invasive and precisely activated treatment alternative for improving smile aesthetics and occlusal requirements, from minor alignment to complex malocclusions. Currently Invisalign® is available to patients in over 60 countries, with over 5,000 clinicians trained to use the product and over 2.6 million patients treated or in treatment.

Due in part to the digital occlusal data from millions of treated patients, Align Technologies Inc. (the manufacturer of Invisalign®) has been able to continuously support rapid innovation. Some improvements include interactive ClinCheck® software features, new FDA approved aligner materials, algorithm based features such as optimized attachments, specifically engineered to the tooth's size, shape and requested movement (Figure 8), hooks and cut outs for applying Class II and Class III mechanics, power ridges for assisting expression of root torque and eruption pontics for treating late mixed dentition patients (1-3) (Figure 1).

In February 2014, the newest series of innovations “Invisalign G5” was launched, including an integrated mechanical system for treatment of dental deep bite cases. Invisalign® mechanics are well suited to dental and mild skeletal open bite cases due to the occlusal coverage and lack of detrimental extrusive vertical side effects. (1-4)

Case Report

The patient is a healthy 28 year old female with no history of previous orthodontic treatment. Her presenting complaint is “my upper front teeth are crossed and the lower right tooth is twisted” (Figure 2).

Cephalometrically, the patient has a dolichofacial, skeletal Class II relationship with partial open bites in the upper incisor region (figure 10). The OPG radiograph shows the third molars are missing, previously extracted. Root length appears normal, with no sign of pathologic resorption. The lower anterior segment displays aberrant root angulation (Figure 5).

Intra-orally, the patient displays a Class I molar and ¼ unit Class II canine relationship with mild upper and lower crowding and open bite extending from right second premolar to left first premolar region. Her overbite is deficient (2-2mm) and overjet excessive (8mm). Her arch forms are non-occluded in shape, with a narrow upper arch form due in part to palatal inclination of the upper dentition. There is generalized gingival recession with significant recession and active inflammation involving the lower left lateral incisor (Figure 4).

The treatment plan was to align and coordinate the arch forms, increase buccal crown inclination and reduce the overjet and close the anterior open bite using relative incisor extrusion (tipping back), leaving a partial curve of Spee in the lower arch due to an already “gummy smile”. Space acquisition for resolution of crowding and relative incisor extrusion would be via conservative arch expansion (buccal crown inclination rather than bodily expansion) and computer calculated interproximal reduction of anterior segments. Initial periodontal treatment of the lower left incisor segment and gingival and periodontal maintenance through treatment was prescribed. Mechanics selected was the Invisalign® system due to the desire of the patient for a high degree of aesthetics (she was married half way through treatment), excellent vertical control, accurate mechanics and ability to coordinate the arch forms and planning of movements prior to initiating mechanics and ability to maintain a high degree of oral hygiene through treatment. A 3D ClinCheck® Plan was developed, based on OPG scan and the Invisalign prescription form (Figures 5 & 6).

Treatment progressed well, with excellent compliance with prescribed 20-22 hour daily aligner wear. Each aligner was worn for a period of 2 weeks. Monitoring visits were scheduled every 6 weeks, every 5 aligners. This ensured that no more than 0.75mm of movement occurred between visits so that close monitoring of dental and periodontal response could be performed. The initial aligner series was 25 upper and lower aligners (L 125), representing 12.5 months of treatment. At aligner 24, attachments were removed and the patient assessed for refinement (Invisalign® finishing). Most of the treatment goals were fulfilled, except the complete rotation of the lower right canine. (Figures 7 & 8)

A new lower PVS was taken to capture the clinical result and 4 upper and 6 lower refinement aligners were manufactured to fulfill the occlusal goals. A new generation of custom engineered attachments was now available to complete the canine rotation (Figure 8)

Final Treatment time was 16 months, with 24 of the initial 25 aligners and 4 upper and 5 lower refinement aligners worn. The occlusal goals were satisfied as well as the patient’s chief concerns. Comparison of figures 9 and 10 show that periodontal health was not only maintained but improved throughout treatment and gingival inflammation reduced, especially in the lower left lateral incisor region (Figure 10).

For this patient, the benefits of Invisalign® ClinCheck® software planning (Table 1) with the ability to superimpose and view degree of movement and to have the ability to program small, precise activation in the aligners made treatment predictable in terms of vertical control and preserving periodontal health (1-4). In this case, the patient would not consider a surgical option and there was no obvious functional or esthetic reason for the open bite. Post treatment stability, even of open bite patients and incidence of root resorption have been found to be favorable with the Invisalign system (5-7).

Table 1: Advantages of ClinCheck® Software

3D visualization of each planned treatment, including treatment duration for clinicians and patients.

Accurate crown and generic root programming and assessment of mechanics, direction and movement.

Interactive tools to design mechanics such as attachment choice, Class II and Class III correction features.

Clinical tool for treatment monitoring and motivation enhancement.

Tooth movement animation may be used by colleagues in multi-disiplinary planning.

Summary

The Invisalign® system has many unique benefits to offer both patients and clinicians. Its distinct 3D ClinCheck® software not only provides a valuable planning tool but it directly programs the activation of the aligners, offering for the first time, aligners designed with multiple small and precise tooth activations engineered to create predictable orthodontic outcomes. The scope of related research conducted by the manufacturer as well as by the private dental and academic communities is unique to Invisalign®, and offers significant scientific value to users, with over 500 publications and case reports around the globe. As a result, the Invisalign® system has continually evolved to become a predictable orthodontic appliance applicable to all categories of malocclusion, including extraction and surgical treatments (9), depending largely on the treating doctor’s level of experience using Invisalign®.
About the author

Dr. Vicki Vlaskalic is a practicing orthodontist in Melbourne, Australia and Clinical Instructor at the University of Melbourne, Department of Orthodontics. She has worked with the Invisalign System since the initial feasibility study in 1997 at the University of the Pacific, San Francisco, working as Assistant Professor in the Department of Orthodontics under Professor Robert Boyd.