The Invisalign System provides an effective alternative to conventional braces and, in conjunction with surgery, is effective in treating Class III malocclusion and crossbites. Being removable, the Invisalign aligners enable patients to maintain proper oral hygiene and can facilitate effective healing following surgery.

**Impact on clinical practice**

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**Conclusion**

The patient, AM, was concerned with his underbite and misaligned anterior teeth, which were negatively impacting his quality of life. He was recommended for treatment with the Invisalign System. A total of 21 and 31 sets of aligners were used for the initial and refinement phases, respectively. Following treatment, the patient's facial profile improved significantly, along with achievement of a Class I occlusion. The patient was extremely happy with the treatment outcome. This case demonstrates that the Invisalign System is effective at correcting Class III malocclusion for patients who also require orthognathic surgery.

**Case Report**

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**Author disclosure**

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

**Dr. Igor Lavrin**

Igor Lavrin completed a 3 year orthodontic specialist program and was awarded the Invisalign Clinical Excellence Award in Melbourne, Australia in 2017. He is currently seeing private patients in Melbourne, Australia, in addition to being a speaker for Invisalign Future Elite. He is a fellow of the Australasian Orthodontic Society and a speaker for Invisalign Future Elite. He is a fellow of the American Association of Orthodontists. He is also a speaker for Invisalign Future Elite in New Zealand. Dr. Lavrin is a past-Federal Treasurer of the Australian Society of Orthodontists. He is an accredited member of Lingual Orthodontists. He is an accredited member of the Australasian Society of Orthodontists (ASO), and is currently serving as a Federal Councillor of the ASO. Dr. Lavrin is a past-Federal Treasurer of the Australian Society of Orthodontists. He is an accredited member of Lingual Orthodontists. He is an accredited member of the Australasian Society of Orthodontists (ASO), and is currently serving as a Federal Councillor of the ASO.
The patient, AM, was 37 years of age at the time of first presentation. The patient’s chief complaint related to his underbite and misaligned anterior teeth. He had difficulty eating due to the malocclusion and was particularly keen on being treated with the Invisalign System due to the aesthetics of the appliance and benefits of good oral hygiene.

Clinical presentation
AM presented with a Class III skeletal and dental malocclusion and mandibular asymmetry resulting in an in clase overjet and mild upper and lower crowding was evident. The traumatic anterior occlusion resulted in initial edgewise wear, particularly on the upper left lateral incisor. Calculus was evident, resulting in the need for a full Check-up and clean before starting orthodontic treatment. The panoramic radiograph showed impacted third molars.

I. Intra- and extra-oral images before treatment

Pre-Treatment

Clinical findings
• Class III malocclusion.
• Overjet of 9 mm.
• Anterior crowding.
• Upper and lower posterior crowding.
• Mild upper and lower crowding.
• Presence of calculus.

Treatment goals
• Obtain Class I occlusion.
• Correct alignment.
• Relieve upper and lower crowning.
• Correct anterior and posterior overjet and overbite.
• Correct crossbites.
• Improve facial profile.
• Long-term retention.

Treatment approach

Initial treatment phase
Pre-surgery

The patient had an iTero Element scan prior to treatment with the Invisalign Full treatment option. The initial treatment was planned in order to correct the arches and set up for orthognathic surgery.

The patient had an iTero Element scan prior to treatment with the Invisalign Full treatment option. The initial treatment was planned in order to correct the arches and set up for orthognathic surgery. The aligners were changed every 30 days to correct the occlusion, as well as for improved facial aesthetics after the orthognathic surgery. At aligner 20, self-cut button cutouts were added on the anterior teeth on the aligner in the posterior button cutout area and were planned for aligner 20 to 27. This allowed buttons to be bonded to each tooth for post-surgical appliance wear. The buttons were co-ligated with white ligature wire to prevent the risk of decompensation. The patient was advised to keep the aligners on for 24 hours a day and to only remove softened aligners during the daytime. Nickelplasticity was initially planned; however, this was not feasible, so the patient was instructed to ensure that the aligners were changed every 10 days. The anterior crowding was effectively corrected with good compensation to the occlusion, as well as for improved facial aesthetics after the orthognathic surgery. Once aligner 21 was worn, the patient was advised to remove the additional aligners to allow for further posterior settling of the occlusion for approximately 4 weeks. Conventional metal biteplates and the heavily worn incisal edge of the upper incisors were also corrected. Following this, the laboratory made clear retainers were issued. The patient returned 3 months later for Vivera retainers which provided a superior fit for long term retention.

During surgery, the patient was advised to keep the aligners on for 2-3 days and to only remove softened aligners during the daytime. He was also advised to remove the aligners to ensure a normal and healthy gingival and dentin. The patient returned for follow-up 2 weeks after surgery whilst continuing treatment with the Class III retention appliances. At this stage, the patient was fully complied with both the Class III malocclusion, but also exhibited a bilaterally open bite. He was immediately treated with posterior root control elastics from the upper and lower canines to molars (Optimised Elastics 4 mm or elastics, AM). Around 8 weeks following surgery, all the attachments and buttons, except on the canines and first molars, were removed for another iTero Element scan for additional aligners to refine the occlusion post-surgery (Figure III).

Retention phase
Aligner 29 was worn along with the palatal box elastics at night while waiting for the additional aligners to arrive. An additional 20 aligners were used without buttons and elastics to further correct the occlusion and alignment. The aligners were changed every 10 days. Once aligner 31 was worn, the patient was advised to cut the buttons to allow for further posterior settling of the occlusion for approximately 4 weeks. Conventional metal biteplates and the heavily worn incisal edge of the upper incisors were also corrected. Following this, the laboratory made clear retainers were issued. The patient returned 3 months later for Vivera retainers which provided a superior fit for long term retention.

Treatment details

Active treatment time
Initial treatment phase: 6 months.
Retreatment phase: 10 months.
Aligners used
• 21 + 31 upper aligners.
• 21 + 31 lower aligners.

Attachments
Initial treatment phase
Optimised Rotation Attachments on teeth 11, 13, 16, 23, 24 and 27.
Optimised Deep Bite Attachment on teeth 46.
Conventional torquable root control attachments (4 mm) on teeth 10, 11, 20, 21, 30 and 31.
Conventional torquable root control attachments (6 mm) on teeth 16, 26 and 27.

Retention
Vivera retainers were used.

II. Panoramic radiograph before treatment

Refinement phase
Post-Treatment

III. Cephalometric radiograph

Pre-surgery

Initial treatment phase
• Class III malocclusion.
• Overjet of -2 mm.
• Skeletal and dental asymmetry.
• Mandibular asymmetry.
• Mandibular retrognathia.
• Upper right second premolar was extruded.
• A full check-up and clean before surgery. The initial treatment plan with the Invisalign aligners was to decompensate the arches and set up for orthognathic surgery.

Undergoing treatment with surgery, and the Invisalign aligners should allow Full treatment option (retention treatment option) resulted in AM being able to achieve a Class I occlusion along with correction of his crossbites. The patient’s facial profile significantly improved. A reduction genioplasty was not needed, although initially considered by the surgeon. The mandibular asymmetry was also improved. The small malocclusion built up to the upper left lateral incisor proceeded on exceptionally well-balanced soft tissue. The patient was satisfied with the treatment outcome.

Clinical tips
• Orthognathic surgery is a viable option alongside treatment with the Invisalign System for Class III malocclusion and crossbites.
• If a patient needs to orthognathic surgery, the patient should be referred to an Oral and Maxillofacial Surgeon with expertise in the Invisalign System. It is important that the Oral and Maxillofacial Surgeon is supportive and understands the treatment option alongside treatment with the Invisalign System to correct Class III malocclusion and crossbites.

Following surgery, the patient was advised to keep the aligners on for 2-3 days and to only remove softened aligners during the daytime. He was also advised to remove the aligners to ensure a normal and healthy gingival and dentin. The patient returned for follow-up 2 weeks after surgery whilst continuing treatment with the Class III retention appliances. At this stage, the patient was fully complied with both the Class III malocclusion, but also exhibited a bilaterally open bite. He was immediately treated with posterior root control elastics from the upper and lower canines to molars (Optimised Elastics 4 mm or elastics, AM). Around 8 weeks following surgery, all the attachments and buttons, except on the canines and first molars, were removed for another iTero Element scan for additional aligners to refine the occlusion post-surgery (Figure III).

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IV. Extra-oral images before surgery

The panoramic radiograph showed impacted third molars. The panoramic radiograph showed impacted third molars. The panoramic radiograph showed impacted third molars.