

Case Reports

Esthetic Smile Enhancement of an Overcrowded Dentition using the Invisalign System and a Single Indirect Porcelain Veneer

by Emil Hawary, DDS, FAACD, FAGD, DICOI

Abstract

The Invisalign appliance is increasing in popularity as an alternative orthodontic treatment option for adult patients because of its capability to simplify the treatment plan in multidisciplinary complex cases. The aim of this report is to show the importance of planning a minimally invasive, multidisciplinary approach to attain the esthetic goals of an adult patient with severe anterior dentition crowding.

The case discussed is typical of many patients who present to dental practices, and serves to show how this approach can

be used to achieve predictable cosmetic results that have a positive impact on the patients' lives.

Introduction

Esthetic correction of anterior crowding can be highly challenging. Treatment options include orthodontics, veneers, orthodontics combined with veneers, and full-mouth rehabilitation with crowns. In many cases, combining orthodontics with veneers can provide a conservative path to the desired esthetic outcome by avoiding the aggressive tooth preparation that would be needed if veneers were to be used alone.

Many adult patients who desire cosmetic enhancement of their crowded dentition are reluctant to wear traditional metal braces. Removable, comfortable, and nearly invisible, Invisalign clear aligners (Align Technology, Santa Clara, Calif.) offer these patients an alternative method to orthodontically move teeth.

The case study presented reviews the use of technology in treating a crowded anterior dentition. Orthodontic aligners created using 3-dimensional computer imaging, followed by an indirect feldspathic porcelain veneer and then soft tissue recontouring using a diode laser, were utilized to achieve a conservative yet esthetic result.

Case study

A 31-year-old male patient presented to the office seeking to improve the appearance of his teeth and enhance his smile. His chief complaint was maxillary and mandibular anterior crowding. The patient was particularly unhappy that tooth #10 was in linguoversion, resulting in an unpleasing smile (**Figures 1-2**). He wanted a symmetrical, attractive smile; however, he wished to be treated conservatively and to maintain the natural look of his teeth.



Dr. Emil Hawary practices cosmetic and restorative dentistry in Irvine, California. He is an accredited fellow of the AACD, a fellow of the Academy of General Dentistry, and a diplomate of the International Congress of Implantology. Dr. Hawary has taken hundreds of hours of continuing

education, including UCLA's Esthetic Continuums I and II. He has published numerous articles in the *Journal of Cosmetic Dentistry*, the *Journal of the California Dental Association*, the *American Journal of Esthetic Dentistry*, the *e-Journal of Dentistry*, and *Inside Dentistry*. Dr. Hawary combines Invisalign with other restorative and cosmetic procedures, such as implants and veneers, to provide a multidisciplinary approach to achieve the best possible results.

He is the founder and director of the Art of Dentistry Institute, a private general dental practice in Irvine, California, with an emphasis on cosmetic and reconstructive dentistry.

Email: emilhawary@yahoo.com



Figure 1: pre-treatment; full smile, frontal view. The patient's smile was not esthetically pleasing and violated a number of ideal smile design principles.



Figure 2: pre-treatment; retracted frontal view.



Figure 3: pre-treatment; retracted left lateral view. Note the linguoversion of tooth #10.



Figure 4: pre-treatment; occlusal view, maxilla. Note the constricted anterior segment.



Figure 5: pre-treatment; occlusal view, mandible. Note the anterior crowding.

Clinical examination and diagnosis

A comprehensive examination was performed, which included full-mouth radiographs, hard- and soft-tissue charting, mounted diagnostic models, and photographs.

The clinical exam revealed that the patient had severe upper anterior crowding, with his lateral incisor #10 in linguoversion because of a constricted anterior segment (**Figures 3-4**). He also had mild lower anterior crowding (**Figure 5**). The tissue heights of the upper incisors were uneven, resulting in the appearance of disproportional teeth sizes. He had a Class III dental and skeletal malocclusion and bilateral crossbite. The patient also had multiple old, leaking amalgam fillings. The assessment of the temporomandibular joints revealed no signs and/or symptoms of TMD.

Facial and smile analysis revealed that the patient's smile was not esthetically pleasing and violated a number of the principles of ideal smile design, as follows:

- Linguoversion of tooth #10
- Narrow smile
- Reverse smile line
- Inadequate display of upper anterior teeth
- Too much display of lower anterior teeth
- Shift of the midline to the patient's left side
- Inadequate buccal corridors

Treatment planning

Different treatment options were presented to the patient, including orthognathic surgery, fixed orthodontic treatment, and removable Invisalign aligners. In this practitioner's view, the ideal treatment plan would have begun with orthognathic surgery to correct the skeletal Class III malocclusion before any orthodontic movement was attempted. However, the patient opted instead to improve his smile using more conservative methods. He chose to correct his anterior crowding with Invisalign aligners, to veneer tooth #10, and to even out its gingival level with tooth #7 by gingival contouring using a Biolase laser (Biolase Technology, San Clemente, Calif.). He also chose to replace his amalgam fillings with all-ceramic onlays.

The patient was happy with the natural look of his teeth and wanted the new restoration to mimic their natural characteristics.

As the patient's main complaint was esthetic, the aim of the accepted treatment plan was not to achieve ideal Class I occlusion, which would have required invasive surgical intervention. Instead, we planned to enhance his smile esthetically by using conservative modalities to expand the patient's upper arch and place his left lateral incisor in proper alignment.

The treatment plan recommended:

1. Invisalign clear aligners to achieve these goals:
 - Expand the upper arch and align tooth #10 with the dental arch form.
 - Expand the premolars for a better buccal corridor.
 - Extrude teeth #7, 8, 9, and 10 for a better smile line.
 - Correct the right and left crossbites by distalizing the lower arch with the use of elastics.
 - Correct the crowding of the lower incisors, primarily by Interproximal Reduction (IPR).
 - Align the lower midline to the upper midline.
 - Correct the canine guidance and improve the anterior guidance by extruding the upper incisors and intruding the lower incisors.
2. Feldspathic porcelain veneers on tooth #10
3. Gingival margin recontouring for tooth #10 to match that of its right contralateral, using a Biolase laser
4. Replacement of the old, leaking amalgam fillings with all-ceramic onlays
5. In-office bleaching using the Zoom 2 whitening system (Discus Dental, Culver City, Calif.)

Treatment

Invisalign treatment

Patient compliance was high throughout treatment, and excellent oral hygiene was maintained.

A total of 38 aligners, corresponding to approximately 19 months of treatment, were created to achieve the Invisalign treatment goals. The patient wore each set of aligners for a 2-week period. He was instructed to wear the aligners all the time, except during eating, drinking, and brushing. The patient presented to the office every 4 to 6 weeks for IPR and follow-up on the case. IPR allows the clinician to create room in an otherwise constricted area of the mouth, so that there is adequate space for the necessary tooth rotations.

During orthodontic treatment of both routine and difficult cases, it is important to establish the desired characteristics of tooth display in rest position, normal conversation, and full smile. Since parallelism of the maxillary incisal curve to the inner contour of the lower lip is the "normal" case in untreated persons, it is usually chosen as a goal for objective beauty in all



Figure 6: post-orthodontic treatment; full smile. Note the good alignment of maxillary anterior teeth after using Invisalign aligners.



Figure 7: post-orthodontic treatment; retracted frontal view. Note the improved alignment of teeth.



Figure 8: post-orthodontic treatment; maxillary occlusal view. Note the proper alignment of teeth after maxillary expansion and extrusion of tooth #10 using Invisalign aligners.



Figure 9: post-orthodontic treatment; mandibular occlusal view. Note the proper alignment of teeth after mandibular expansion using Invisalign aligners.



Figure 10: post-restorative treatment; full smile. Completed treatment reflects a more symmetrical and pleasing smile.



Figure 11: post-restorative treatment; retracted frontal view. Final restoration shows even gingival architecture and symmetrically shaped and sized incisors.

kinds of esthetic oral rehabilitations, including orthodontic and orthodontic-prosthetic treatment.

The post-Invisalign treatment outcomes can be seen in **Figures 6-9**. The patient's periodontal health remained good and showed no deterioration from baseline. The lower and upper anterior crowding and rotations were completely resolved. The maxillary lateral incisor was also extruded successfully into proper alignment using the aligners. Though this case may have initially looked complicated because of the severity of crowding in the maxillary arch, the misalignment was easily corrected within a very reasonable time, and the patient was pleased with the results.

Porcelain veneer

After orthodontic therapy was completed, there was a significant improvement in tooth alignment, especially with tooth #10. However, the tooth's color, size, and shape still needed esthetic enhancement; this was accomplished by means of a porcelain veneer.

The tooth was prepared in such a manner as to give the laboratory 2 mm of incisal and 1.5 mm of facial room to develop subtle internal characterization with the porcelain. The gingival proximal area extended lingually at the crest of the papilla to provide adequate porcelain to eliminate black triangles. Stump shades were chosen and photographs were taken of the

preparations, with stump guides in view, for the laboratory's use. A final impression was taken, and the provisional restoration was made and cemented. It was shaped with proper contours and margins to evoke good gingival and papillary response.

Photographs were taken of the provisional as well, to facilitate laboratory communication. A few days later, the patient came in and his teeth were bleached with the Zoom 2 whitening system. Shade selection was made a few days later at another appointment, in which color maps were drawn, photographs were taken along with the shade guide, and all images were sent to the lab.

The patient came back 2 weeks after the preparation appointment. The veneer for tooth #10 was seated and checked, and interproximal contacts were adjusted. The patient was happy with the final esthetic outcome. Retention was accomplished with the use of upper and lower Vivera clear thermoplastic retainers.

The veneer restorations look natural because the multilayer technique used allows natural intrinsic and extrinsic light effects. This is a unique feature of veneers constructed using feldspathic porcelain over pressed ceramic.

Post-treatment views (**Figures 10-11**) show improved alignment of the anterior teeth and midlines; symmetrical right and left centrals, laterals and canines; and improved gum level of maxillary anterior teeth.

Conclusion

The case presented demonstrates how art and science are combined to successfully treat a case of anterior crowding, utilizing a conservative, multidisciplinary approach. The patient was pleased that he enhanced his smile in a relatively short time with invisible aligners and without using brackets or fixed prosthesis. Also, the veneer preparation in this case was very conservative, since the tooth had already been aligned into the proper position. ■

References

- Javaheri DS. Orthodontics, veneers, or both. Treatment planning the crowded anterior dentition. *Dent Today*. 2003;22(6):78-82.
- Mack MR. Vertical dimension: a dynamic concept based on facial form and oropharyngeal function. *J Prosth Dent*. 1991 Oct;66(4):478-85.
- Maier JA. Minimally invasive and non-invasive ceramic veneers: the benefits of a multi-layer technique. *J Cosmet Dent*. 2012;28(1):100-110.
- Miller RJ, Derakhshan M. Three-dimensional technology improves the range of orthodontic treatment with esthetic and removable aligners. *World J Orthod*. 2004 Fall;5(3):242-249.
- Nedwed V, Miethke RR. Motivation, acceptance and problems of Invisalign patients. *J Orofac Orthop*. 2005 Mar;66(2):162-173.
- Peck S, Peck L, Kataja M. Some vertical lineaments of lip position. *Am J Orthod Dentofacial Orthop*. 1992 Jun;101(6):519-524.