

## Management of Protrusion with the Invisalign Appliance: Case Report

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### Case Report

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**Abstract:** This report describes the treatment of a 21-year-old woman who had severe bimaxillary dentoalveolar protrusion. The patient wanted to avoid the use of conventional appliances. In order to do that she was treated by expansion and proximal reduction with invisalign appliance which is a new treatment method using computer virtual treatments to create a series of clear, removable, esthetic appliance.

**Keywords:** Invisalign appliance, Adult orthodontics, Protrusion, Invisible orthodontics.

### INTRODUCTION

In recent years, increasing numbers of adult patients have sought orthodontic treatment and expressed a desire for esthetic and comfortable alternatives to conventional fixed appliances for esthetic, social or professional reasons.

Currently, the technological advances and new materials are providing to patient an orthodontic treatment with aesthetic devices discrete or totally invisible like aligner [1].

The invisalign appliance (align technology, Santa Clara, California) consists of a series of computer designed clear plastic shells that fit closely over the teeth to straighten them. The invisalign technique was initially proposed to treat mild orthodontic cases.

Nonetheless, there are reports of complex orthodontics cases treated with the invisalign appliance in the literature.

This system has evolved over the last 16 years, and various strategies have been developed to better manage complex malocclusion. Align technology recently developed new treatment options including specially designed attachments. Which are buttons attached to the labial surfaces of the teeth to assist with tooth movement [2].

Specifically, these attachments increase retention, transmit desirable force to the teeth, and support auxiliary function such as placement of elastic.

Recently, it has been used successfully in more complex cases, such as those involving extractions,

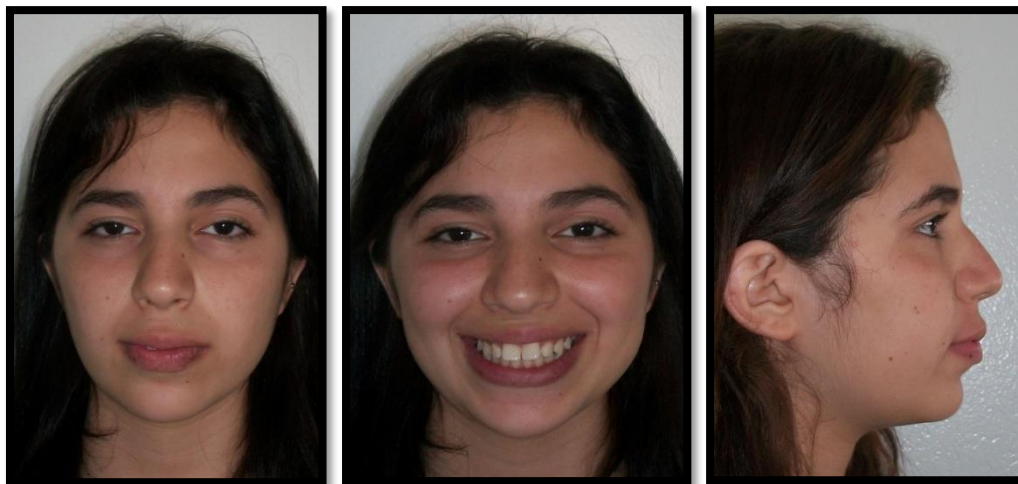
open bite, Class II malocclusion, and severe protrusion [3].

### CASE REPORT

A 21-year old female. Her chief complaint was, "I want to get appliance because my front teeth are protruding." Her medical history was unremarkable, and temporomandibular joint function was normal [4]. There was no history of dental trauma or oral habits. The patient had a good oral hygiene.

### Extraoral examination

The pretreatment facial photographs showed severely convex facial profile and potentially incompetent lips, Symmetrical face, normally leveled occlusal plane, she had procumbent and everted upper and lower lips, a deep mentolabial sulcus, excessive lip strain on closure and wide smile (Figure-1).



**Fig-1: Pretreatment extraoral photographs**

**Intraoral examination**

The pretreatment intraoral photographs demonstrated a class I molars and canines relationship

bilaterally and severely proclined upper and lower anterior dento alveolar segments, 4mm of overjet, 2 mm of overbite, and coincident midlines (Figure-2).

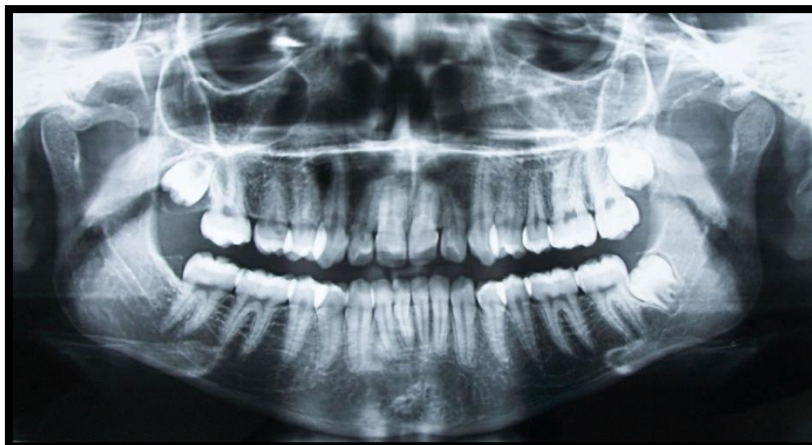


**Fig-2: Pretreatment intraoral photographs**

**Radiographic examination**

The panoramic radiograph showed no evidence of bony pathology, the upper right first molar and the third right molar were missing (Figure-3).

Cephalometric analysis (Table) showed a skeletal Class I relationship (ANB :4°) with a high mandibular plane angle (FMA:31°); protrusive incisors maxillary and mandibular (I/F:120°, IMPA:100°) (Figure-4).



**Fig-3: Panoramic radiograph**



**Fig-4: Lateral cephalometric radiograph**

**Table-1: Cephalometric value Pretreatment**

Value	Normal	patient
SNA	82	77
SNB	80	73
ANB	2	4
AoBo	2	1
FMA	25	31
FMIA	68	57
IMPA	87	100
I/F	107	120
Z	78	64

### Diagnosis

The patient was diagnosed with Class I bidentoalveolar protrusion and mild mandibular anterior crowding. She and her parents requested full retraction of the maxillary and mandibular anterior teeth by using the Invisalign appliance.

### Treatment and follow up

The treatment objectives were to reduce the severe dentoalveolar protrusion, achieve a more normal

axial inclination of the incisors, resolve lower crowding, and decrease lip protrusion by expanding arches and interproximal reduction.

This information had to be put into treatment-planning forms that were sent to Align Technology, which also required to take polyvinylsiloxane impressions and to send photos and a copy of the panoramic and lateral cephalometric radiographs (Figure-5).



Fig-5: Polyvinylsiloxane impression

Align Technology in California where simulated virtual treatment is formulated by proprietary 3-dimensional CAD-CAM technology.

Once the case was acceptable, it was made into a smaller image called Clincheck that can be sent over the Internet for viewing by the orthodontist (Figure-6).



Fig-6: ClinCheck\* treatment goals (in blue): Showing retracting of both anterior segment to obtain an appropriate overjet and overbite.

Once treatment is approved, Align Technology fabricates a set of clear plastic aligners. Which are sent

with the template to the orthodontist who delivers them to the patient with instructions for use (Figure-8)



**Fig-7: Attachments bonded to all upper and lower teeth using templates**



**Fig-8: Insertion of maxillary and mandibular Invisalign aligners**

#### **Treatment results**

After 18 months of treatment, a significant retraction of her upper and lower lips was achieved. Her lip eversion and dentoalveolar protrusion were improved. In addition, as the upper and lower lip were retracted, mentalis strain was reduced.

The posttreatment intraoral photographs (Figure-9) showed good alignment and occlusion, with

retracted incisors and ideal overbite and overjet, and treatment class I relationship was maintained.

The posttreatment facial photographs (Figure-10) showed great improvement of facial esthetic and correction of the incompetent lips.



Fig-9: Posttreatment intraoral photographs



Fig-10: Posttreatment facial photographs

## DISCUSSION

The Invisalign System now makes it possible for orthodontists to offer adult patients requiring orthodontic treatment an esthetically agreeable solution. It is generally more comfortable to wear, and it is removable, allowing better oral hygiene.

Invisalign involves a series of aligners made from a thermoplastic material uniquely developed for Invisalign treatment: Polyurethane from methylene. It is shown to be biocompatible to use for human use in the oral cavity and is a highly elastic new aligner material that delivers gentle, more constant force [5].

The second characteristic of thermoplastic tray is the thickness. Various studies have shown that for the same thermoplastic material the force delivered by the thin tray (0.5mm) is greater than that given by a thicker tray (1mm). In conclusion, the fine gutter is more effective, although it is less resistant to deterioration.

These aligners are similar to the splints that cover the clinical crowns and the marginal gingiva.

Each aligner is designed to move the teeth a maximum of about 0.25 to 0.3 mm over a 2-week period, and is worn in a specific sequence. The Invisalign appliance is currently recommended for adults and for adolescents with fully erupted permanent teeth who meet an acceptable standard of compliance. Excellent compliance is mandatory since the appliance has to be worn a minimum of 20 to 22 hours.

As shown in this case report, some complex malocclusions, such as flared teeth with labial biprotrusion, can be successfully treated using Invisalign.

Previous studies of Invisalign showed significant limitations for more complex orthodontic treatment including correction of class II, flared teeth, open bite and deep overbite, although a few recent case

reports have shown successfully completed moderate to difficult orthodontic malocclusions.

One reason for the discrepancy is that the earlier studies were done during the first four years of the appliance development, when significant problems existed with accomplishing bodily movement, torquing of roots, extrusions, and rotations of premolars and canines [6].

## **CONCLUSION**

The Invisalign System has opened up a new area of adult orthodontics, serving patients who may not want conventional fixed appliances or for whom traditional removable appliances may be unsuccessful(3). It can provide an excellent esthetic during treatment, ease of use, comfort of wear, and superior oral hygiene.5 Additional research and refinement of the design should allow further development of this worthwhile treatment. (4)

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