

Invisalign: Boom in New Era of Orthodontia: A Review

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Abstract

Adult patients seeking orthodontic treatment are increasingly motivated by esthetic considerations. The majority of this patients reject wearing labial fixed appliances and are looking instead to more esthetic treatment options, including lingual orthodontics and invisalign appliances. Since Align Technology introduced the invisalign appliance in 1999 in an extensive public campaign, the appliance has gained tremendous attention from adult patients and dental professionals. The transparency of the Invisalign appliance enhances its esthetic appeal for those adult patients who are averse to wearing conventional labial fixed orthodontic appliances. Although guidelines about the types of malocclusions that this technique can treat exist, few clinical studies have assessed the effectiveness of the appliance. A few recent studies have outlined some of the limitations associated with this technique that clinicians should recognize early before choosing treatment options.

Keywords: Invisalign; Clear aligners; Esthetic orthodontics.

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INTRODUCTION

In this era adults have influence of appearance in their professional as well as personal lives but also children have influence of the same. The maloccluded patient when thinks about correction of their malaligned teeth the first thought comes up in their mind is braces and wires. But from last few decades dentistry has been revolutionised so far that there are an number of options to be used for the correction of malaligned teeth. Specialist are concerned about the aesthetics and it is the major concerns among patients who takes orthodontic treatment. To undertake the increasing aesthetic insist for an alternative to conventional braces, researchers have urbanized several solutions, such as composite braces, ceramic, lingual orthodontics and clear aligners. Clear aligners is the new era for Aesthetic Orthodontic treatment. The demand for invisalign is increasing day by day due to high esthetic demand for those patients who are reluctant of wearing usual orthodontic appliances.

HISTORICAL BACKGROUND

In 1945, tooth positioning appliance introduced by Kesling was a method of refining the final stage of orthodontic finishing after debanding [1]. A positioner was a one-piece pliable rubber appliance fabricated on the idealized wax set-ups for patients whose basic treatment was complete. A positioner was a one-piece pliable rubber appliance fabricated on the idealized wax set-ups for patients whose basic treatment was complete. The practical advantage of the positioner lay in its ability to position the teeth artistically and to retain the alignment of the teeth achieved through basic treatment with conventional fixed appliances. Various minor and major tooth movements could also be accomplished with a series of positioners fabricated from sequential tooth movements on the set-up as the treatment progressed.

In 1971, Ponitz [2] introduced a similar appliance called the "invisible retainer" which was fabricated on a master model that prepositioned teeth with base-plate wax. He claimed that this appliance could produce limited tooth movement. Later Sheridan

and others [3], developed a technique that involved interproximal tooth reduction and progressive alignment using clear Essix appliances. But the drawback of this technique was excessive time consuming because as new set of impression was recorded in every visit.

Further in 1999, Align Technology prepared Kesling's proposal much additional practical. Instead of necessitating a new set-up for each new aligner, creation of an Invisalign appliance involves computer-aided-design and computer-aided-manufacturing (CAD-CAM) technology [4, 5], combined with laboratory techniques, to fabricate a series of positioners (aligners) that can move teeth in small increments of about 0.25 to 0.3 mm.

What is the Invisalign Appliance?

Invisaligners are thin transparent removable unnoticed plastic aligners for blooming movement of teeth into their required position. The Invisalign appliance involves a sequence of aligners made from a transparent, thin (typically less than 1 mm) plastic material formed with CAD-CAM laboratory techniques. These aligners looks similar like splint which covers clinical crown and marginal gingival. The main aspects of aligners are designed to move the teeth maximum of about 0.25 to 0.3 mm⁶ over a 2-week period, and is worn in a precise sequence. The Invisalign appliance is currently suggested for adults and for adolescents with completely erupted permanent teeth who meet an acceptable set of compliance. Excellent compliance is compulsory since the appliance has to be worn a minimum of 20 to 22 hours a day and each aligner should be worn 400 hours to be effective (Figure-1).



Fig-1: Invisalign Appliance

Indications for Invisalign Appliance

- Malaligned and Mild crowded teeth (1-5 mm)
- Spacing problems (1-5 mm)
- Deep overbite (Class II div 2 cases)
- Tip molar distally
- Narrow arches.
- Lower incisor extraction for severe crowding cases.

Contraindications

- Skeletal anterior-posterior discrepancies of more than 2 mm (as measured by discrepancies in cuspid relationships)
- Crowding and spacing over 5 mm
- Severely rotated teeth (more than 20 degrees)
- Centric-relation and centric-occlusion discrepancies
- Extrusion of teeth

- Open bites (anterior and posterior) that need to be closed
- Teeth with short clinical crowns
- Severely tipped teeth (more than 45 degrees)
- Arches with multiple missing teeth.

Advantages

- Esthetic trays are used which are clear and comfortable as no metal brackets or wires are there which lead to laceration of mouth. Clear aligners are transparent hence are invisible which gives confidence to patient to smile.
- Technically much easier and simpler compared to lingual appliances
- Patient can maintain better oral hygiene as compared to fixed because
- Ideal for retreatment
- Shorter dental appointments.
- More précised treatment duration than braces
- Avoiding extractions of premolars by creating interdental space via interproximal reduction
- Less frequent trips to the dental chair by allowing the patients to replace their aligners on their own every few weeks

Disadvantages

- It can be removed by patient (removal).
- Patient needs to be motivated.
- It is supposed be worn 22 hrs/ day.
- Appliance should be removed during meals.
- Poor patient compliance
- Missed appointments, deprived oral hygiene and excessive bone enlargement lengthen treatment time and affect quality results [6].
- Increase in price.

CASE SELECTION & RECORDS

Cases for orthodontic treatment with the Invisalign System should have fully erupted permanent teeth, with growth completed. There is no age requisite, but the ability to comply with the treatment regimen of nearly full-time wear is mandatory. Once a patient is determined to be a good candidate for Invisalign treatment, the usual orthodontic records are taken, e.g., panoramic and lateral cephalometric radiographs, bite registration, photos and polyvinyl siloxane impressions including study casts.

Steps Involved in Fabrication of Invisaligner from Start to End

First step involved in fabrication of aligners is preparation of study models with the help of polyvinyl material because it yields highly accurate impressions that remain stable for as long as three weeks and allow multiple pours, impression is done and bite is recorded and then it is sent to Invisalign office. A well developed technology is used, with the help of

highly sophisticated software and 3D scan technology, a virtual patient is created. Also other software like 'Tooth shaper' & 'Autobite tool' is used to identify the shape of the teeth and put them in centric relation [7]. With the help of other software like ClinCheck set-up, diagnosis and treatment planning is done which is also used to evaluate the need for IPR, extraction, expansion, distalization and proclination. It also show treatment limits to patient as it evaluates the anchorage with superimposition or surgical simulation tools. Aligners other than Invisalign are Clear path aligners, Inman aligners, Nuvola and Fantasmio System, ClearPath Aligners are USFDA approved. Dental aligners are a modern alternative to braces, for teeth that are in need of straightening [6]. To align front teeth quickly and safely for cosmetic purpose, the Inman Aligner is used which has Nickel Titanium coil springs that influence two aligner bows that gently resist each other, guiding the teeth into their new site [6].

CONCLUSION

The Invisalign System has opened up a new era of adult orthodontics the esthetic of patients wearing invisalign increases due to its transparent nature low discomfort and removable nature of the appliance. This serves better for the patients who may not want conventional fixed appliances or for whom traditional removable appliances may be unsuccessful. Patients should be thoroughly educated about the advantages and disadvantages of clear aligner therapy. Therefore in today's date invisalign appliance provide an excellent esthetic during treatment, comfort of wear, ease of use, and superior oral hygiene.

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