

REVIEW ARTICLE

INVISALIGN: INVISIBLE ORTHODONTIC TREATMENT- A REVIEW

Rakesh Thukral, Amit Gupta

Department of Orthodontics, Modern Dental College and Research Centre, Indore, M.P.

ABSTRACT:

Influence of appearance in personal and professional lives have led to a considerable interest among the adult population seeking orthodontic treatment in the last few years. Invisalign or clear aligners are the new age Aesthetic Orthodontic treatment methods developed especially for adults who are very self conscious of how they appear. This article aims to discuss pros and cons of this device as it has the tendency to transform the smile without interfering with the daily life of patients.

Keywords: Clear Aligners; Aesthetics; Invisalign; Removable appliances

Corresponding author Dr. Rakesh Thukral, Professor, Department of Orthodontics, Modern Dental College and Research Centre, Indore, M.P.

This article may be cited as: Thukral R, Gupta A. Invisalign: Invisible Orthodontic Treatment- A Review. J Adv Med Dent Scie Res 2015;3(5):S42-S44.

INTRODUCTION

When patients think about correction of malaligned teeth, braces and wires are the first thing that spring to mind. However, orthodontics has revolutionised according to the demands and needs of the patients.

Orthodontists are concerned about the aesthetics and it is one of the major concerns among patients who seek orthodontic treatment. To address the increasing aesthetic demand for an alternative to conventional braces, investigators have developed several solutions, such as ceramic or composite braces, lingual orthodontics, and clear aligners.¹

Clear aligners are the new age Aesthetic Orthodontic treatment methods developed especially for adults who are very self conscious of how they appear. Invisaligners are a series of clear, custom-made, thin, removable plastic aligners, nearly undetected and created to effectively move teeth into their desired position.²

Invisalign was introduced in the late 1990s by Align Technology Inc, and due to advanced technology allowed a much simpler approach to this type of treatment. Accurate impression are taken to allow the construction of precision casts which can be scanned to produce a virtual 3D model. This 3-D model can then be manipulated by the orthodontist and malocclusion is virtually corrected using proprietary software. This information can then be used to produce a series of clear plastic aligners that gradually correct the malocclusion towards the clinician's goal. Such

aligner is worn for approximately 20 hours per day and is changed approximately every two weeks. Each aligner will move the teeth around 0.25 to 0.3 mm.^{3,4}

INDICATIONS FOR INVISALIGN APPLIANCES²

- Mild crowded and malaligned problems (1-5 mm)
- Spacing problems (1-5 mm)
- Deep overbite (Class II div 2 cases)
- Narrow arches that can be expanded without tipping the teeth too much.
- Absolute intrusion (1 or 2 teeth)
- Lower incisor extraction for severe crowding cases.
- Tip molar distally

ADVANTAGES^{5,6}

- The trays are clear, aesthetic, comfortable - no metal brackets or wires to cause mouth irritation or lacerations.
- Clear aligners are often not visible, allowing patients to smile with greater confidence
- Better oral hygiene than fixed. Unlike traditional braces, the trays can be removed for brushing, flossing, and eating.
- Shorter dental appointments.
- Retention facilitated.
- Ideal for retreatment.
- Decreased occlusal abrasion from parafunctional habits during treatment.

- Disarticulation of the teeth may be advantageous for patients with TMJ problems.
- Technically much easier than lingual appliances.
- Approximating the treatment duration a little more precisely 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
- Healthier periodontal tissue and less risk of enamel decalcification by avoiding brackets

The Invisalign system also boasts improved hygiene over traditional braces. Because the clear retainers are removable, patients can brush and floss as they normally would, reducing the chances of possible staining and decay that often occurs with traditional braces. Food and drink choices are less restrictive, as well. If patients wish to eat sticky candy or drink soda, they may do so after removing their clear Invisalign retainer.²

DISADVANTAGES

Since these devices are removable, they require more patient motivation and self-discipline to achieve the desired results, to be effective, in fact, these devices must be worn 22 hours a day. These must be removed during meals, when drinking hot drinks that could spot or cause deformation, sugary drinks and during the oral hygiene at home.⁷ Treatment time may exceed estimates due to poor patient compliance to dentist's instructions, not wearing aligners the required number of hours per day, missed appointments, excessive bone growth, poor oral hygiene and broken appliances can lengthen treatment time, increase the cost, and thus can affect the quality of the end results.⁸

CLINICAL METHOD

Pretreatment study models are prepared. In addition, it is important to prepare high precision impressions by using polyvinyl material. The bite is also recorded, and the impressions are sent to the Invisalign office. Highly sophisticated softwares are used, which through a 3D scan technology create a virtual patient. Other specific softwares include 'Tooth shaper' & 'Autobite tool' which identify the shape of the teeth and occlude them in centric relation.²

Nelson⁹ in his paper described the aligner software named the ClinCheck set-up that can be used for diagnosis and treatment planning and can also be used to evaluate the need for IPR, expansion, extraction, distalization, or proclination. This software can also be used to verify the performed modifications made by technician, as a consultation device to show treatment limits to patient, to verify

that the aligner is tracking and to evaluating anchorage with the superimposition or surgical simulation tools and staging.

Aligners other than Invisalign are Clear path aligners, Inman aligners, Nuvola And Fantasmino System.

ClearPath Aligners are USFDA approved, removable medical grade plastic appliances which patient wears instead of brackets and wires to correct malocclusion. Dental aligners are a modern alternative to braces, for teeth that are in need of straightening.¹⁰

The Inman Aligner is a simple removable appliance used to align front teeth quickly and safely. It's ideal as a standalone treatment or to prealign teeth prior to further cosmetic options such as bonding or minimal veneers. The Inman Aligner has Nickel Titanium coil springs that power two aligner bows that gently oppose each other, guiding the teeth into their new position. These gentle forces are active over a very large range of movement, due to it shows fast results. Patients have to wear it 16-20 hours a day.¹¹

Fantasmino® aligners are made of poly-vinyl chloride (PVC), a material with elastic characteristics following a plastic deformation when exposed to moderate loads. This characteristic allows reducing the optimal wear time to 14 h per day: the deformations subdued by the aligner when worn generate a force that is transferred to the teeth. The thickness of the PVC aligners varies with the desired type of tooth movement but never exceeds 1 mm.¹²

Nuvola® aligners are made of polyethylene terephthalate glycol (PETG), a light, resistant, and very clear material. It is resistant to time and wear, and its elasticity allows for a gradual tooth movement. PETG aligners have a thickness that changes throughout the different treatment phases: 0.75 mm at the beginning of treatment, 0.85 mm during the intermediate phase, and 1 mm at the end of treatment. This system requires an optimal wear time of 22 h.¹²

Fetouh O¹³ conducted a study with 67 patients (34 fixed, 33 Invisalign) using 3 categories (crowding, overbite, and overjet) to assess discrepancy index, and other categories were reported to be within normal ranges. Seven OGS criteria were graded on posttreatment models: alignment, marginal ridges, buccolingual inclination, occlusal contacts, occlusal relationships, overjet, and interproximal contacts. Mean points lost were 19.15 points for the Invisalign group and 25.5 points for the braces group, which indicated that the Invisalign group resulted in better treatment out.

In a study conducted by Nedwed et al¹⁴ over 54 patients it was found that the majority of patients

who underwent this treatment is female (78%) and this is probably related to the greater attention to the aesthetic aspect.

CONCLUSION

Influence of appearance in personal and professional lives have led to a considerable interest among the adult population seeking orthodontic treatment in the last few years. The transparency of the Invisalign appliance enhances its esthetic appeal for those adult patients who are averse to wearing conventional labial fixed orthodontic appliances.

Educating patients on the advantages and disadvantages of clear aligner therapy or clear braces significantly depends on patient's expectations and compliance. First, as a provider, orthodontist must rule out conventional braces by having a clear communication with the patient. If the patient desires no treatment responsibilities, is compliant in visiting the office monthly, and wishes to have all of the treatment performed by the dentist, then conventional braces is the only treatment to recommend. Clear aligner therapy can be ruled out immediately. However, if patients desire the benefits of clear aligner therapy, the pros and cons must be presented to them. First, the patient must understand their compliance and responsibilities. They need to consistently wear the aligners 22 to 23 hours per day and only remove them to eat. One of the benefits of the aligner systems is the opportunity to see the end result of straight teeth and the progression of tooth movement during the multitude of stages.⁶ It is essential to continuously motivate each patient during treatment to properly wear aligners to avail benefits of the treatment, ensure patient compliance as well as patient self discipline.

Source of support: Nil

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Conflict of interest: None declared