

## Review Article

### **Invisalign: A Transparent Braces**

Kislaya Kumar<sup>1</sup>, Shivani Bhardwaj<sup>2</sup>, Vishal Garg<sup>3</sup>

<sup>1</sup>Intern, Teerthanker Mahaveer Dental College and Research Centre, Uttar Pradesh, India

<sup>2</sup>Associate Dental Surgeon, Delhi, India

<sup>3</sup>Intern, Maulana azad Institute Of Dental Science, Delhi, India

#### **ABSTRACT:**

In current scenario not only adults have Influence of appearance in their professional and personal lives but also children have influence of the same. Appearance does count at any age. The face and the teeth have also come to play a part in his presentation to the outside world. To enhance this desire, attention has been given to correct malformations of teeth. In earlier times this was done by crude methods. And then evolved the concept of braces; fixed on the labial surfaces. Esthetic requirements repels adult patient from accepting traditional metallic look orthodontic appliance. Tooth colored brackets and wires gained popularity for a few decades but gradually declined owing to its own disadvantages. Orthodontists have given a new dimension by shifting from the labial to the lingual so as to give rise to the concept of Invisible braces or Lingual Orthodontics.

**Key words:** Clear Aligner, Esthetic Brackets, Invisalign, Lingual Orthodontics.

Received: 20 February 2018

Revised: 22 March 2018

Accepted: 24 March 2018

**Corresponding Author:** Dr. Kislaya Kumar, Intern, Teerthanker Mahaveer Dental College and Research Centre, Uttar Pradesh, India

**This article may be cited as:** Kumar K, Bhardwaj S, Garg V. Invisalign: A Transparent Braces. J Adv Med Dent Scie Res 2018;6(7):144-147.

#### **INTRODUCTION**

Now a days, not only adults have Influence of appearance in their professional and personal lives but also children have influence of the same. The maloccluded patients when think about the correction of their malaligned teeth, the first thing that come to their mind are braces and wires. However, according to the demands and needs of the patients, dentistry has been revolutionised. Dentists are concerned about the aesthetics and it is the major concerns among patients who take orthodontic treatment. To tackle the increasing aesthetic insist for an alternative to conventional braces, researchers have developed several solutions, such as composite braces, ceramic, lingual orthodontics and clear aligners. Clear aligners are the new age Aesthetic Orthodontic treatment. The demand of invisalign is increasing now a days due to its esthetic demand for those patients who are indisposed of wearing usual orthodontic appliances. Invisaligners are thin transparent removable unobserved plastic aligners for successful moving of teeth into their required position. In the late 1990s, Invisalign was introduced by Align Technology Inc. Impression are taken to allow the

construction of accurate cast which can be scanned to produce a virtual 3D model. This 3-D model can then be manipulated by the dentist and malocclusion is nearly treated using proprietary software. Then it can be used to produce a series of clear plastic aligners that steadily correct the malocclusion. The patient is instructed to wear such aligner for approximately 20 hours per day and is supposed to change approximately every two weeks. Each aligner will shift the teeth around 0.25 to 0.3mm.<sup>1</sup> In current years, the figure of teenager patients looking for orthodontic treatment has increased, so the aesthetics of the orthodontic appliance has become a topic of interest. The orthodontic patient today demands a beautiful smile at the end of treatment, but is equally concerned with appearance during the treatment. To meet this need for an attractive bracket, the manufacturers also started doing work by first decreasing the size and profile of metal brackets, they further introduce a tooth coloured ceramic brackets and 'Invisible' or 'lingual' brackets. Due to increasing esthetic demands of adolescent patients and clinical simplification in customising lingual

appliances, the indication of lingual orthodontics today is extended to adolescents apart from young patients.<sup>2</sup>

### INDICATIONS

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

### ADVANTAGES

- The trays are aesthetic as it is clear and also comfortable as no metal brackets or wires are there which lead to laceration of mouth
- Clear aligners are invisible and it gives confidence to patient to smile.
- Technically much easier than lingual appliances
- Better oral hygiene as compared to fixed because
- Ideal for retreatment
- Shorter dental appointments..
- More precise 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

- removable in nature.
- patient motivation required.
- it should be worn 22 hrs/ day.
- devices should be removed during meals.
- poor patient compliance
- missed appointments, deprived oral hygiene and excessive bone enlargement lengthen treatment time and affect quality results.<sup>1</sup>
- increase in price.

### New Straight Wire Technique

The new lingual straight-wire (LSW) technique in 1995<sup>16</sup> was developed by Takemoto and Scuzzo on Mushroom shaped arch wires as it requires inset bends and vertical steps between canines and premolars so requiring complicated wire bending. A new light lingual system was introduced in 2009 which is narrower mesiodistally than the previous one which increases the interbracket distance and thus reduces both the force transmitted by the arch wire and resistance to sliding mechanics. The thinner bracket pad, places the bracket slots much closer to the lingual tooth surfaces, further increasing the interbracket distance.<sup>2</sup>

The new gingival-offset slot position reduces in-out thickness, avoiding occlusal trauma from the opposing teeth and thus enhancing patient comfort .

New LSW appliance works on sliding techniques and uses a planar arch form to make arch coordination less difficult. It eliminates the requirement for inset bends between canines and 1st premolars.

With a round Sentalloy® NiTi wire, Passive function is achieved as it freely slides for efficient leveling and alignment.

With the introduction of a full-size Resolve® Beta-Ti wire, full control is provided by active function which enables full expression of the bracket's torque and achievement of the required result.<sup>3</sup>

Dentaurum has come up with the World's first: Nickel free Lingual Brackets called Magic®. Due to the magic® bracket's sole geometrical form, arch wires can be inserted occlusally. The innovative combination of occlusal and horizontal slot guidelines enables the arch wire to be automatically pressed into the slot.

### Clear Aligners

Another development to the Invisible orthodontic treatment is the Clear Aligner Therapy. Clear aligner treatment falls into two basic categories. The 1<sup>st</sup> category consists of thermoformed appliances, sometimes known as Essix Retainers (Raintree Essix, Dentsply Corp., York, PA), that are made by making adjustments to the tooth positions on models and fabricate one or more aligners to treat a minor malocclusion. Now there are other commercially available aligners as well, CA® CLEAR-ALIGNER technique 29 (SCHEU-DENTAL) and CLEARPATH (ClearPath Orthodontics ®).<sup>2</sup>

### Current Technique

Fixed orthodontic appliances have been the principle fibre of orthodontic biomechanical procedure. However the unwillingness to wear buccal braces as it has pitiable aesthetic lead to the invention of alternative treatment options for the adult population. Essix retainers,, lingual orthodontics, Truain retainers and Invisalign appliances are some of the current treatment options.

Because of their detachable nature, Truain retainers and Essix retainers are indicated for mild nonskeletal malocclusions. Essix appliances have usually been used as anterior retainers from cuspid to cuspid. They are made from vacuformed plastic sheets which extends into gingival undercuts. With minor changes, it can achieve small tooth movements, and provide as temporary bridges and bite planes.<sup>3</sup>

### What is the Invisalign Appliance?

The Invisalign is made up of a transparent, thin plastic material formed with CAD-CAM laboratory techniques. The aligners are analogous to the splints that cover the clinical crowns as well as the marginal gingiva. Each aligner is planned to move the teeth a maximum of about 0.25 to 0.3 mm over a 2-week period. Excellent observance is mandatory as 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.

### Clinician Involvement

Although diagnostic preparation for treatment with the Invisalign appliance is similar to that for treatment with conventional fixed orthodontic appliances, clinicians play a more limited role during treatment with the Invisalign appliance. Preparation includes initial assessment, diagnosis, treatment planning and completion of pretreatment records (e.g., panoramic and lateral cephalometric radiographs, bite registration, photos and

polyvinyl siloxane impressions), all of which must be sent to Align Technology in California where simulated virtual treatment is formulated by proprietary 3-dimensional CAD-CAM technology. Clinicians then download the virtual treatment set-up from the Internet to evaluate the proposed final positioning of the teeth. Clinicians can request modifications at this time, but once the aligners are made, they cannot alter the appliance during the treatment.<sup>4</sup>

**Extraction Cases**

Patients following premolar extractions is not suitable for Invisalign appliance because it cannot keep the teeth upright during space closure and also leads to limited movements due to Bonded restorative attachments.<sup>4</sup>

**Occlusion**

It has been suggested that removable appliances have limited potential to correct buccal malocclusion. The lack of interarch mechanics may describe this limitation. In 2003, Clements and others<sup>10</sup> demonstrated that correcting buccal occlusions with appliances similar to the Invisalign appliance was least successful; for some patients, their buccal occlusions were worse after treatment. Djeu and others<sup>12</sup> found that fixed appliances were superior to the Invisalign appliance for treating buccolingual crown inclinations, occlusal contacts, occlusal relationships, and overjet. Only 20.9% of their patients treated with the Invisalign appliance met the predetermined passing standard, compared with the 47% of those who had fixed appliances.

**Intermaxillary Appliances**

The removable clear Invisalign appliance around the teeth decreases the use of interarch mechanics (e.g., Class II and Class III elastics). Some practitioners are using elastics on buttons bonded to the buccal surfaces as adjuncts to tooth movement.

**Treatment Time**

The treatment duration is prolonged as the treatment plan must include the chronological movements for every tooth from starting to end of the treatment.

If changes are required once the treatment starts, significant additional span and documentation are required to alter the treatment plan. In addition, the lag time between formulating a treatment plan and inserting the appliance can be up to 2 months.<sup>3</sup>

**CLINICAL METHOD**

Study models are prepared preclinically. With the help of polyvinyl material, 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.<sup>2</sup>

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 shows 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.<sup>1</sup> 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.<sup>1</sup>

**CONCLUSION**

Now a days, not only adults have influence of facade in their professional and personal lives but also children have the same. The esthetic of patients wearing invisalign increases due to its transparent nature. Patients should be well educated about the advantages and disadvantages of clear aligner therapy. The Invisalign appliance can provide an excellent esthetic during treatment, comfort of wear, ease of use, and superior oral hygiene.



**REFERENCES**

1. Thukral R, Gupta A. Invisalign: Invisible Orthodontic Treatment- A Review. Journal of Advanced Medical and Dental Sciences Research. 2015;3(5): S42-S44.
2. Jaiswal RK, Bhagchandani J, Agarwal S, Mehrotra R, Chaudhari A. Invisible Orthodontics. Journal of dental facial sciences., 2014; 3(3): 47-53.
3. Phan X, Ling PH. Clinical Limitations of Invisalign. JCDA. 2007; 73(3): 263-266.
4. Rossini G; Parrini S; Castroflorio T; Deregibus A; Debernardi CL. Efficacy of clear aligners in controlling orthodontic tooth movement: A systematic review. Angle Orthodontist. 2015; 85(5): 881-889.

**Source of support:** Nil **Conflict of interest:** None declared  
 This work is licensed under CC BY: **Creative Commons Attribution 3.0 License.**