



Fixed Orthodontic Appliances Versus Clear Aligners (Invisalign): A Comparative Review

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Abstract

Orthodontic treatment has evolved significantly with the introduction of clear aligner systems such as Invisalign. While traditional fixed appliances (brackets) remain the gold standard for complex malocclusions, aligners have gained popularity due to their aesthetic appeal and patient comfort. This review compares fixed orthodontic appliances and clear aligners in terms of effectiveness, treatment outcomes, patient satisfaction, and limitations. Evidence suggests that while fixed appliances provide superior control in complex tooth movements, clear aligners are effective for mild to moderate malocclusions and offer improved aesthetics and oral hygiene.

I. Introduction

Orthodontic treatment aims to correct malocclusion, improve function, and enhance aesthetics. Conventional fixed appliances (brackets and archwires) have been widely used for decades and are considered highly effective in achieving precise tooth movement [1]. In recent years, clear aligner systems such as Invisalign have transformed orthodontic practice by providing a removable and nearly invisible alternative [2]. This review evaluates the differences between fixed appliances and clear aligners, focusing on clinical effectiveness, patient experience, and treatment limitations.

II. Fixed Orthodontic Appliances (Brackets)



Figure 1. Fixed Orthodontic Appliances (Braces)





2.1 Advantages

- High control over tooth movement
- Effective for complex malocclusions
- Suitable for severe crowding, rotations, and skeletal discrepancies
- Does not rely on patient compliance

Fixed appliances allow precise control of **torque, rotation, and vertical movement**, making them the gold standard for comprehensive orthodontic treatment [3].

2.2 Disadvantages

- Poor aesthetics
- Increased plaque accumulation and risk of caries
- Patient discomfort and soft tissue irritation
- Dietary restrictions

Studies have shown higher plaque index and gingival inflammation in patients treated with fixed appliances compared to aligners [4].

III. Clear Aligners (Invisalign)

Figure 2. Clear Aligners



3.1 Advantages

- Excellent aesthetics (nearly invisible)
- Removable → improved oral hygiene
- Greater comfort and less irritation
- Fewer dietary restrictions



Patients treated with Invisalign report higher satisfaction due to improved appearance and comfort [2].



3.2 Disadvantages

- Limited effectiveness in complex cases
- Requires high patient compliance (20–22 hours/day)
- Difficulty in achieving certain movements (e.g., extrusion, rotation)
- Higher cost in some cases

Clear aligners are less effective in controlling **root movement and complex rotations** compared to fixed appliances [5].

IV. Comparison of Treatment Effectiveness

4.1 Tooth Movement Control

- Brackets: Superior control in all planes
- Aligners: Effective in mild to moderate cases

Fixed appliances remain more reliable for achieving precise tooth positioning [3].

4.2 Treatment Duration

- Similar in simple cases
- Longer with aligners in complex cases

Some studies suggest that aligner treatment may require refinements, increasing total treatment time [5].

4.3 Oral Hygiene and Periodontal Health

- Aligners: Better oral hygiene outcomes
- Brackets: Higher plaque retention

Patients using aligners show lower risk of gingivitis and white spot lesions [4].

4.4 Patient Satisfaction

- Aligners: Higher satisfaction (aesthetics, comfort)
- Brackets: Lower satisfaction but higher effectiveness

V. Clinical Indications

Brackets (Preferred for):

- Severe crowding
- Complex malocclusion (Class II, Class III)
- Significant rotations
- Skeletal discrepancies

Clear Aligners (Preferred for):

- Mild to moderate crowding
- Spacing cases
- Relapse cases
- Adult patients seeking aesthetics

VI. Limitations and Future Perspectives

Technological advancements in digital orthodontics continue to improve aligner effectiveness. However, fixed appliances remain essential for complex orthodontic treatment. Future

developments may allow aligners to achieve movements currently limited, narrowing the gap between the two modalities [6].

VII. Conclusion

Both fixed orthodontic appliances and clear aligners are effective treatment modalities. Fixed appliances provide superior control and are ideal for complex cases, while clear aligners offer improved aesthetics, comfort, and oral hygiene for mild to moderate malocclusions. Treatment selection should be individualized based on clinical needs and patient preferences.

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