



# Treatment Efficacies of Clear Aligners vs. Conventional Brackets for Class II Division 2 Malocclusion: A Comprehensive Review

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## Abstract

**Objective:** This review aims to critically evaluate and compare the treatment efficacies of clear aligner therapy and conventional fixed appliances in managing Class II Division 2 malocclusion, a challenging orthodontic condition characterized by retroclined maxillary incisors and increased overbite.

**Materials and Methods:** A comprehensive literature search was conducted across multiple electronic databases (PubMed, Scopus, Web of Science) to identify relevant studies published up to August 2023. Randomized controlled trials, prospective and retrospective studies comparing the outcomes of clear aligner treatment and conventional fixed appliance therapy for Class II Division 2 cases were included. Data regarding treatment duration, efficacy in incisor proclination, overbite reduction, and overall occlusal outcomes were extracted and synthesized.

**Results:** The existing evidence suggests that both clear aligners and fixed appliances can effectively manage mild to moderate Class II Division 2 malocclusions, albeit with varying degrees of efficacy. Conventional fixed appliances demonstrated superior control over incisor proclination and overbite reduction, particularly in severe cases. Clear aligners exhibited comparable outcomes in milder cases but were less efficient in complex movements involving severe incisor retroclination and deep overbites.

**Conclusions:** While clear aligner therapy offers a more esthetic and comfortable alternative, conventional fixed appliances remain the gold standard for comprehensive treatment of severe Class II Division 2 malocclusions. The choice of appliance should be based on the severity of the malocclusion, treatment goals, and patient compliance. Further high-quality research is warranted to establish evidence-based guidelines for optimizing outcomes with each treatment modality.

## Introduction:

Class II Division 2 malocclusion, characterized by increased overjet, deep overbite, and retroclined maxillary incisors, poses a significant challenge in orthodontic treatment. Traditionally, this malocclusion has been managed using conventional fixed appliances, such as brackets and archwires, which allow precise three-dimensional control over tooth movements. However, with the increasing demand for esthetic alternatives, clear aligner therapy (CAT) has gained popularity in recent years. This review aims to provide a comprehensive evaluation of the treatment efficacies of clear aligners and conventional brackets in correcting Class II Division 2 malocclusion.

### Conventional Fixed Appliances:

Conventional fixed appliances, consisting of brackets and archwires, have long been the gold standard for treating various types of malocclusions, including Class II Division 2. These appliances offer several advantages in managing the complexities associated with this malocclusion.

#### 1. Overjet Correction:

Fixed appliances are highly effective in reducing increased overjet, a hallmark feature of Class II Division 2 malocclusion. The use of Class II mechanics, such as intermaxillary elastics, allows for the distal movement of maxillary teeth and/or the mesial movement of mandibular teeth, leading to a significant improvement in overjet [1,2].

#### 2. Overbite Correction:

Deep overbite, another characteristic of Class II Division 2 malocclusion, can be effectively addressed with fixed appliances. Techniques like anterior bite planes, reverse curve archwires, and intrusion mechanics help in overbite reduction by controlling the vertical position of the maxillary and mandibular incisors [3,4].

#### 3. Incisor Inclination Control:

Fixed appliances provide superior control over incisor inclination, which is crucial in correcting the retroclined maxillary incisors associated with Class II Division 2 malocclusion. The use of torquing auxiliaries, such as rectangular archwires and root-torquing moments, allows for precise adjustment of incisor angulation [5,6].

#### 4. Anchorage Management:

Anchorage control is essential in Class II Division 2 treatment, as various tooth movements are required simultaneously. Fixed appliances offer various anchorage reinforcement options, such as headgear, transpalatal arches, and temporary anchorage devices (TADs), enabling effective management of anchorage during treatment [7,8].

### Clear Aligner Therapy (CAT):

Clear aligner therapy has emerged as an attractive alternative to conventional fixed appliances, offering improved esthetics and comfort during treatment. However, its efficacy in managing the complexities of Class II Division 2 malocclusion remains a topic of debate.

#### 1. Overjet Correction:

Several studies have reported that clear aligners can effectively reduce increased overjet in Class II Division 2 cases, albeit to a lesser extent compared to fixed appliances [9,10]. The use of additional auxiliaries, such as elastics or attachments, may be necessary to enhance the overjet correction potential of clear aligners [11].

#### 2. Overbite Correction:

Clear aligners have demonstrated limited efficacy in resolving deep overbites associated with Class II Division 2 malocclusion. The relatively low force levels and the absence of rigid archwires make it challenging for clear aligners to achieve significant overbite reduction, especially in severe cases [12,13].

### 3. Incisor Inclination Control:

The control of incisor inclination, particularly the correction of retroclined maxillary incisors, is one of the major limitations of clear aligner therapy. Due to the relatively low force levels and the lack of torquing auxiliaries, clear aligners may struggle to achieve the desired incisor angulation in Class II Division 2 cases [14,15].

### 4. Anchorage Management:

Clear aligners rely primarily on the patient's compliance and the sequential application of aligners to achieve tooth movements. However, anchorage management can be challenging, especially in cases requiring significant anchorage control, such as Class II Division 2 malocclusions [16].

### Comparative Efficacy:

Several systematic reviews and meta-analyses have been conducted to compare the treatment efficacies of clear aligners and conventional fixed appliances for Class II malocclusions, including Class II Division 2.

A systematic review by Rossini et al. [17] evaluated studies comparing aligners and fixed appliances for Class II malocclusions. They found that fixed appliances achieved better results, particularly in controlling incisor inclination and anteroposterior discrepancies.

Another systematic review by Dai et al. [18] specifically focused on Class II Division 2 malocclusion. They concluded that while clear aligners can correct mild to moderate cases, fixed appliances demonstrated superior efficacy in managing severe overjet, deep overbite, and maxillary incisor retroclination.

Jiang et al. [19] conducted a meta-analysis comparing the treatment outcomes of clear aligners and fixed appliances for Class II malocclusions. Their results showed that fixed appliances were significantly more effective in reducing overjet and improving incisor inclination.

### Treatment Duration:

Several studies have compared the treatment duration between clear aligners and fixed appliances for Class II Division 2 cases. While some studies found no significant difference in overall treatment duration [20,21], others reported shorter treatment times with fixed appliances [22,23].

### Patient-reported Outcomes:

In addition to clinical outcomes, patient-reported outcomes, such as satisfaction and quality of life, are crucial factors to consider when selecting a treatment modality. Several studies have reported better patient satisfaction and improved quality of life during treatment with clear aligners compared to fixed appliances [24,25]. This is likely due to the improved esthetics and comfort associated with clear aligners.

### Conclusion:

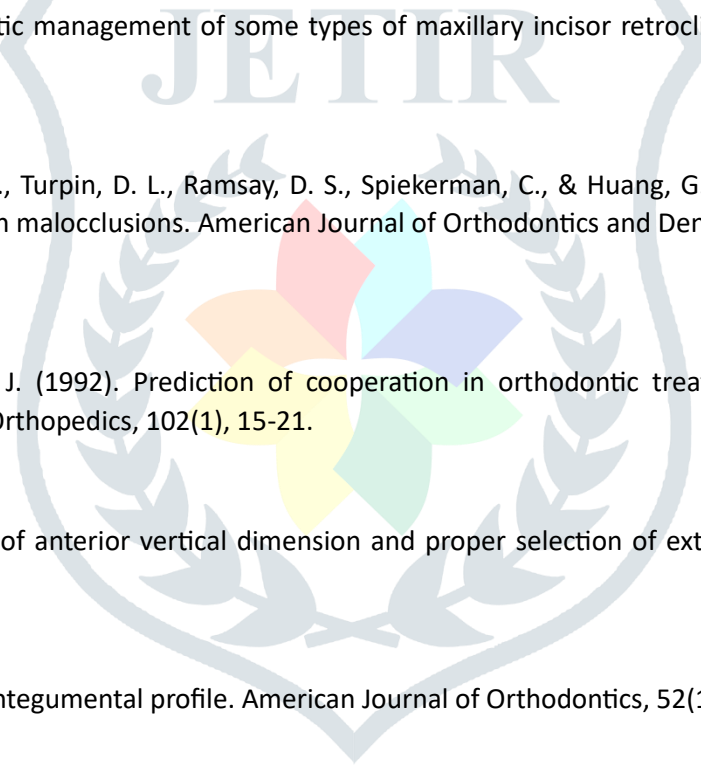
Based on the available evidence, it can be concluded that while clear aligner therapy can correct mild to moderate Class II Division 2 cases, conventional fixed appliances remain the preferred choice for more complex presentations due to their superior biomechanical control and treatment predictability. Fixed appliances offer greater efficacy in managing

severe overjet, deep overbite, and maxillary incisor retroclination, which are hallmark features of Class II Division 2 malocclusion.

However, clear aligners offer advantages in terms of esthetics and patient comfort, which may be prioritized by some patients. The choice of treatment modality should be based on a comprehensive evaluation of the malocclusion severity, treatment goals, and patient preferences. In complex cases, a combination of clear aligners and auxiliary appliances, such as intermaxillary elastics or temporary anchorage devices, may be required to achieve optimal results.

Ultimately, both treatment modalities have their strengths and limitations, and the decision should be made through a thorough discussion between the orthodontist and the patient, considering the specific clinical requirements and patient expectations.

#### References:

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- The logo for JETIR (Journal of Emerging Technologies and Innovative Research) is a large, light blue watermark in the background. It features a shield shape with a laurel wreath border. Inside the shield, the word 'JETIR' is written in a large, serif font. Below the text is a colorful, multi-petaled flower-like emblem with petals in shades of red, orange, yellow, green, and blue.
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