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Case Report

Orthodontic Management of Anterior Crossbite with ClearPath Aligners

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Abstract

Background: Clear aligner therapy has become an increasingly popular orthodontic treatment modality due to its aesthetic appeal, comfort, and effectiveness. This case report presents the comprehensive management of a 19-year-old female patient with anterior crossbite and mild dental crowding using a combination of clear aligners, interproximal reduction (IPR), attachments, and the Elastic Button Technique (EBT).

Case Presentation: The patient exhibited an anterior crossbite, Class II molar and canine relationships, and mild crowding. A digital treatment plan involving 22 stages was developed using intraoral scans and photographs. Treatment included IPR for space creation, extrusion attachments for incisor leveling, and elastic buttons to facilitate crossbite correction. Over nine months, aligners were worn 22 hours daily and changed every 10 days. Periodontal health and aligner tracking were monitored at regular intervals.

Results: The treatment successfully corrected the anterior crossbite and achieved ideal overjet, overbite, and arch alignment. The patient maintained good oral hygiene, showed excellent compliance, and exhibited no signs of periodontal complications. Retention was initiated with clear retainers following completion.

Conclusion: This case demonstrates the effectiveness of clear aligner therapy, enhanced by IPR, attachments, and EBT, in treating moderate malocclusions. Careful planning, patient cooperation, and periodic evaluation were key to achieving functional and aesthetic outcomes without resorting to fixed appliances or extractions.

Keywords: *ClearPath Aligners, Crossbite, Interproximal reduction; Attachments; Elastic Button Technique*

Introduction

Anterior crossbite is defined as an abnormal labiolingual relationship between the maxillary and mandibular incisors, in which one or more of the maxillary anterior teeth are positioned lingual to the mandibular anterior teeth when the jaws are in centric occlusion [1]. This condition can result from a variety of etiological factors, including dental anomalies such as retained deciduous teeth, aberrant eruption paths, or skeletal discrepancies like maxillary deficiency or mandibular prognathism [2,3]. Anterior crossbite, if left untreated, may contribute to significant functional and esthetic issues, such as incisal wear, periodontal damage, temporomandibular joint dysfunction, and compromised facial esthetics [4].

Timely intervention is critical, particularly in growing patients, to prevent the progression of dental and skeletal malocclusions. Traditional modalities for the correction of anterior crossbite include removable appliances with finger springs, inclined planes, or fixed orthodontic appliances [5]. While effective, these options are often associated with esthetic concerns, difficulties in maintaining oral hygiene, soft tissue irritation, and reduced patient compliance, particularly among adolescents and adults seeking discreet treatment options [6].

In recent years, the emergence of clear aligner therapy has transformed orthodontic treatment paradigms. Clear aligners offer a more esthetic, comfortable, and hygienic alternative to conventional fixed appliances, especially for patients who are concerned with appearance and oral hygiene during treatment [7]. These systems utilize a sequence of removable, transparent trays that gradually move teeth into the desired position through controlled force application. Among various clear aligner systems available, ClearPath Orthodontics has gained increasing popularity due to its custom-fabricated, BPA-free medical-grade aligners and its unique programming system for planned tooth movements [8].

Numerous studies have demonstrated the efficacy of clear aligners, such as Invisalign, in managing malocclusions like mild to moderate crowding, spacing, open bites, and deep bites [9]. However, data on the use of ClearPath aligners for the correction of anterior crossbite, particularly in permanent dentition, remains limited. The treatment of anterior crossbite with aligners poses challenges such as controlling the labial tipping of maxillary incisors and maintaining overbite stability [10].

This case report aims to present the successful correction of an anterior dental crossbite using ClearPath aligners in a 19 -year old female patient. It highlights the diagnostic considerations, aligner staging process, treatment progression, and the final outcome, thus contributing to the growing body of literature supporting the versatility of ClearPath aligners in managing challenging cases of malocclusion.

Case Presentation

A 19-year-old female with no significant medical or family history presented with concerns related to anterior crossbite, dental crowding, and misalignment. She was otherwise in good general health, and her dental history revealed no prior complications.

Extraoral assessment showed a mesocephalic head type and a mesoprosopic facial structure with symmetrical frontal appearance. The patient had an orthognathic profile, along with a medium-sized nose and competent lips (Figure 1). The interlabial gap was within normal range, and there were no observable symptoms of temporomandibular joint disorders.

Smile evaluation revealed a satisfactory display of upper incisors with a balanced smile arc, though dental alignment was suboptimal. Intraoral examination indicated fair oral hygiene and stable periodontal condition. The molars and canines exhibited a bilateral Class II occlusion, while the incisors were in a Class I relationship. Overjet measured approximately 0.5 mm, and overbite was recorded at 1.5 mm. Both upper and lower dental midlines were aligned with the facial midline.

Mild crowding was identified in the maxillary arch, accompanied by minimal spacing in the mandibular arch. Panoramic radiography confirmed healthy supporting bone structures, with no signs of dental caries, root resorption, or other abnormalities. Cephalometric evaluation demonstrated a skeletal Class I pattern, normodivergent facial growth, normally angulated incisors, and an acute nasolabial angle.

Treatment objectives:

The main goal of the orthodontic treatment was to resolve the patient's concerns using ClearPath aligners. Additionally, the treatment aimed to establish a stable, functional, and healthy occlusion while enhancing the overall appearance of the smile.

Treatment options:

Multiple treatment alternatives were discussed with the patient.

The initial option involved conventional fixed braces for orthodontic correction. However, the patient expressed reluctance toward this choice due to concerns about its appearance.

The second option recommended the use of clear aligners, which better suited the patient's preference for a more subtle and comfortable treatment experience.

Treatment procedure:

Following a thorough review of the patient's medical and dental history along with clinical findings, a complete set of intraoral and extraoral photographs was captured, and digital impressions were acquired through intraoral scanning. These diagnostic records were submitted to the ClearPath facility to develop a customized treatment plan. A panoramic radiograph confirmed healthy bone levels and satisfactory oral hygiene, supporting the decision to proceed with clear aligner therapy without the need for any preliminary dental interventions.

Using the submitted records, a 3D treatment plan was generated, detailing 22 stages for both the upper and lower arches. The plan adopted a non-extraction strategy, utilizing interproximal reduction (IPR) and arch expansion to effectively manage the patient's orthodontic concerns. A digital simulation of the planned tooth movements (Figure 2) was shared with the patient, who reviewed the proposal and gave her approval after expressing confidence in the suggested corrections.

The treatment plan was presented to the patient within one week of submitting the records. She responded positively to the outlined approach, and no changes were deemed necessary. The anticipated treatment time was approximately nine months, which the patient agreed to, allowing for a prompt initiation of the aligner therapy

IPR Technique:

Interproximal reduction (IPR) is a common orthodontic procedure used to gain space by selectively removing small amounts of enamel from the contact areas between teeth, allowing for the alleviation of crowding while preserving occlusal stability [11]. Several techniques can be employed for this purpose, including diamond burs, abrasive discs, and hand-held abrasive strips [12].

In the present case, IPR was carried out using a fine, double-sided, diamond-coated abrasive strip to ensure precise and controlled enamel reduction. The amount of enamel removed was verified with an IPR gauge to avoid over-reduction. Following the procedure, topical fluoride was applied to support enamel remineralization and reduce the risk of sensitivity or decalcification.

EBT Technique:

The Elastic Button Technique (EBT) is a commonly used auxiliary method in orthodontics, particularly in clear aligner therapy, to assist in achieving complex tooth movements such as extrusion, midline correction, and space closure. This technique involves the strategic placement of elastic buttons (typically bonded on the buccal or lingual surfaces of teeth) that serve as anchorage points for orthodontic elastics.

These buttons are usually made of composite resin or metal and are bonded directly onto the teeth. Elastics are then stretched between buttons on the upper and lower arches or from buttons to aligners with cutouts, depending on the movement required. The tension in the elastics generates continuous, controlled forces that supplement the action of aligners or braces [13].

Attachment Placement:

Attachments are integral to the effectiveness of clear aligner therapy, as they significantly enhance the accuracy and predictability of tooth movement. These small, tooth-colored composite elements are bonded to the enamel surface and are specifically designed to assist in complex movements such as extrusion, rotation, and intrusion [14]. The dimensions, shape, and positioning of each attachment are carefully customized according to the patient's digital treatment plan to maximize aligner grip and ensure appropriate force distribution [15].

Functioning as mechanical aids, attachments enable the aligners to deliver precise and controlled forces, which are crucial for managing complex orthodontic corrections. Proper attachment placement and consistent monitoring throughout treatment are essential for optimizing clinical outcomes and ensuring efficient progression [16].

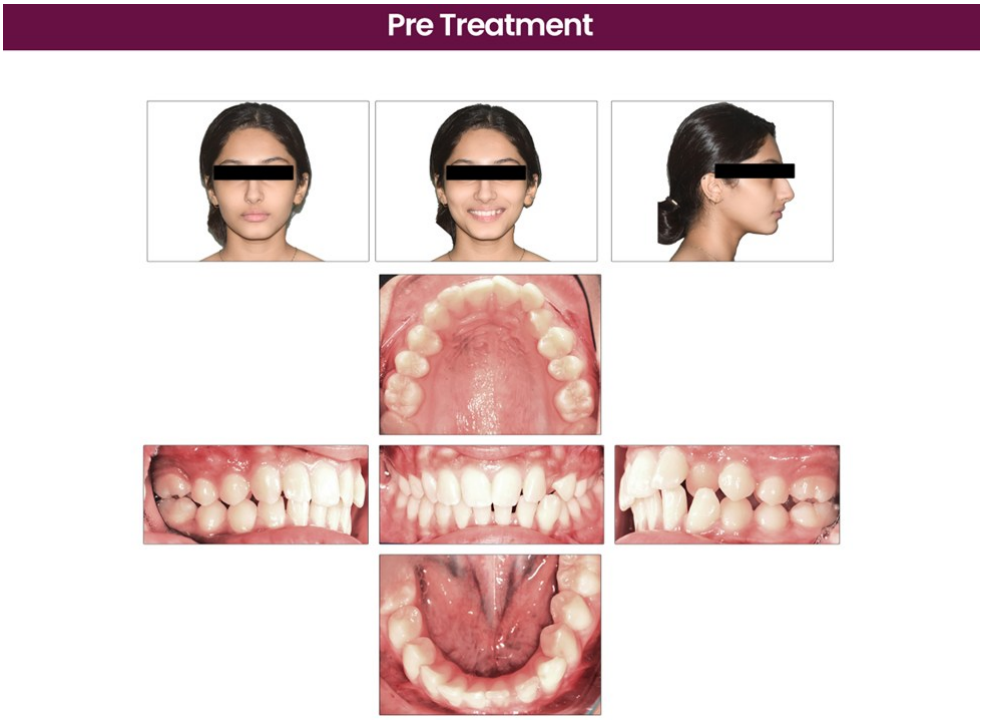


Figure 1. *Pre treatment; extraoral & intraoral photographs.*

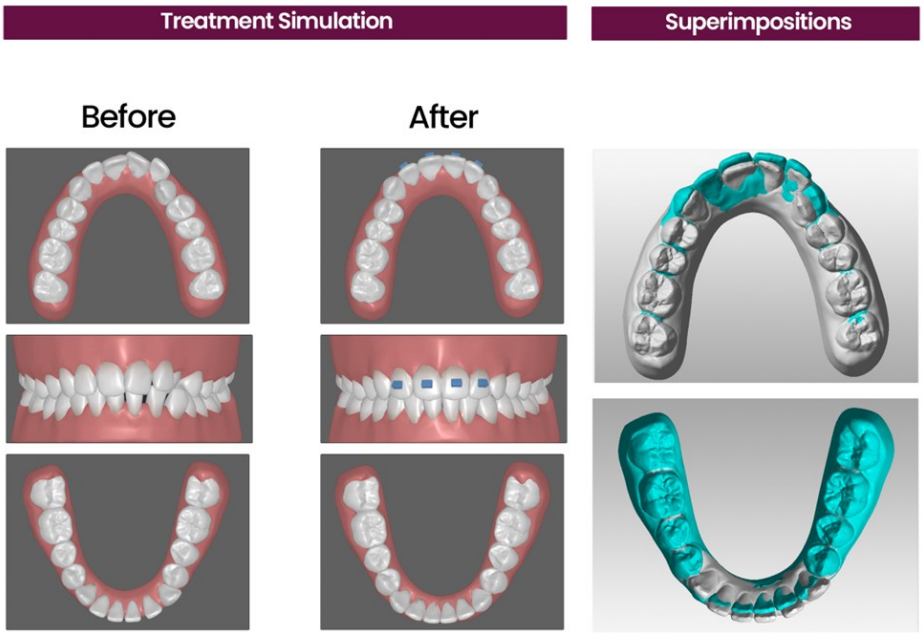


Figure 2. *3D treatment plan (a) Before & After, (b) Superimpositions.*

Treatment progress

After the treatment simulation received approval, the aligner manufacturer supplied detailed instruction forms (Figures 3 and 4) along with 22 pairs of upper and lower aligners. Each aligner set was prescribed to be worn for approximately 22 hours per day, with a change every ten days. The patient was thoroughly instructed on maintaining oral hygiene and periodontal health throughout the course of treatment.

To assist in leveling the teeth, four extrusion attachments were bonded to the upper incisors using a transfer tray. For crossbite correction, buttons for the Elastic Button Technique (EBT) were positioned on the palatal surface of the upper left canine and the buccal surface of the lower left canine.

The use of 3/16-inch elastics for 15 hours daily was recommended to achieve the desired movement. The first aligner set was then issued, and an appointment for interproximal reduction (IPR) was scheduled prior to the transition to the second set.

During the IPR appointment, enamel reduction was performed at three locations in the upper arch: between the central incisors, between the left central and lateral incisors, and between the left lateral incisor and canine. A total of 0.6 mm of enamel was removed. The patient continued with the aligner sequence as planned and was reviewed at three-month intervals to evaluate periodontal health and aligner fit, both of which remained consistently satisfactory.

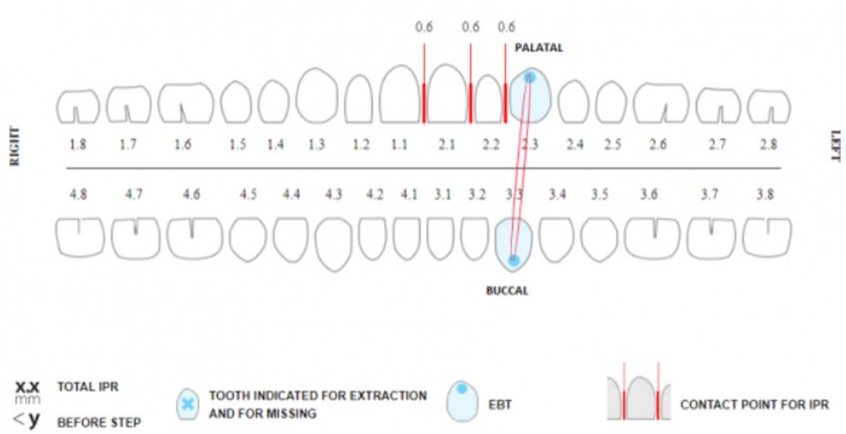
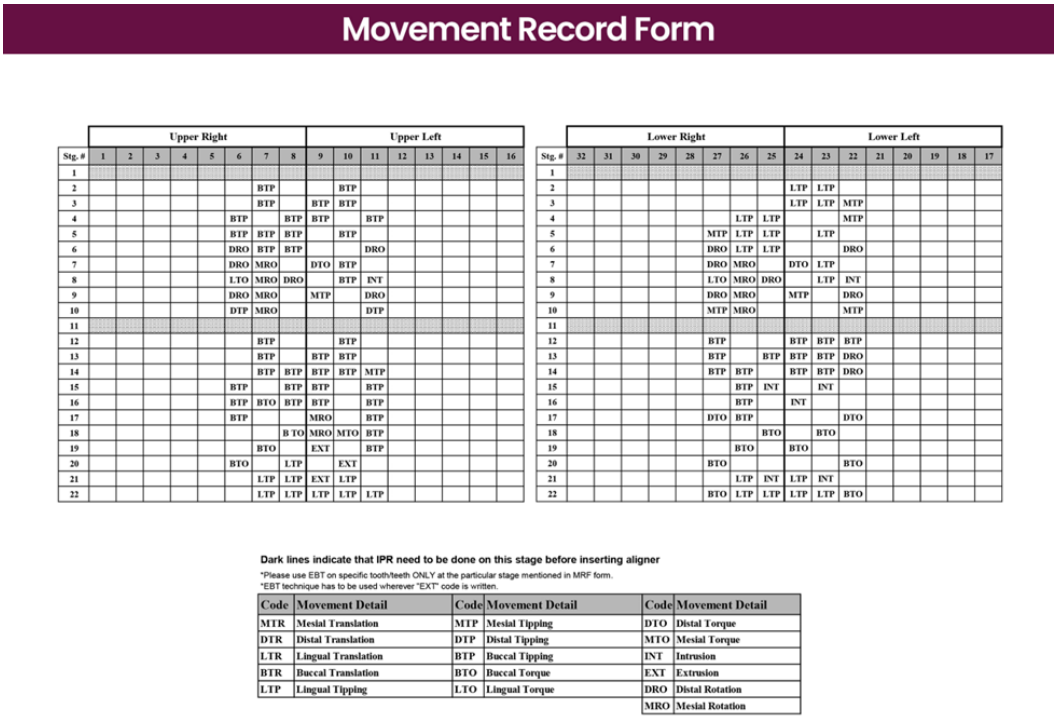


Figure 3. *IPR form.*



Movement Record Form

	Upper Right								Upper Left							
Stg. #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1																
2							BTP			BTP						
3							BTP		BTP	BTP						
4						BTP		BTP	BTP		BTP					
5						BTP	BTP	BTP		BTP						
6						DRO	BTP	BTP			DRO					
7						DRO	MRO		DTO	BTP						
8						LTO	MRO	DRO		BTP	INT					
9						DRO	MRO		MTP		DRO					
10						DTP	MRO				DTP					
11																
12							BTP			BTP						
13							BTP		BTP	BTP						
14							BTP	BTP	BTP	BTP	MTP					
15						BTP		BTP	BTP		BTP					
16						BTP	BTO	BTP	BTP		BTP					
17						BTP			MRO		BTP					
18								B TO	MRO	MTO	BTP					
19							BTO		EXT		BTP					
20						BTO		LTP		EXT						
21							LTP	LTP	EXT	LTP						
22							LTP	LTP	LTP	LTP	LTP					

	Lower Right								Lower Left							
Stg. #	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
1																
2									LTP	LTP						
3									LTP	LTP	MTP					
4							LTP	LTP			MTP					
5						MTP	LTP	LTP		LTP						
6						DRO	LTP	LTP			DRO					
7						DRO	MRO		DTO	LTP						
8						LTO	MRO	DRO		LTP	INT					
9						DRO	MRO		MTP		DRO					
10						MTP	MRO				MTP					
11																
12						BTP			BTP	BTP	BTP					
13						BTP		BTP	BTP	BTP	DRO					
14						BTP	BTP		BTP	BTP	DRO					
15							BTP	INT		INT						
16							BTP		INT							
17						DTO	BTP				DTO					
18								BTO		BTO						
19							BTO		BTO							
20						BTO					BTO					
21							LTP	INT	LTP	INT						
22						BTO	LTP	LTP	LTP	LTP	BTO					

Dark lines indicate that IPR need to be done on this stage before inserting aligner

*Please use EBT on specific tooth/teeth ONLY at the particular stage mentioned in MRF form.
*EBT technique has to be used wherever "EXT" code is written.

Code	Movement Detail	Code	Movement Detail	Code	Movement Detail
MTR	Mesial Translation	MTP	Mesial Tipping	DTO	Distal Torque
DTR	Distal Translation	DTP	Distal Tipping	MTO	Mesial Torque
LTR	Lingual Translation	BTP	Buccal Tipping	INT	Intrusion
BTR	Buccal Translation	BTO	Buccal Torque	EXT	Extrusion
LTP	Lingual Tipping	LTO	Lingual Torque	DRO	Distal Rotation
				MRO	Mesial Rotation

Figure 4. *Movement Record Form.*

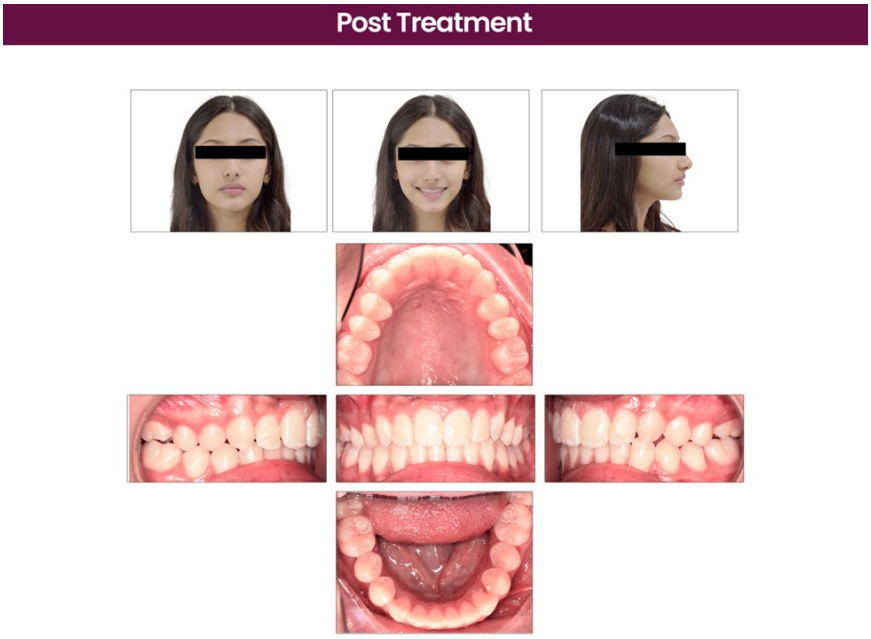


Figure 5. *Post treatment records; extra oral and intra oral photographs.*

Treatment Result

The treatment spanned a total duration of nine months, with each aligner worn for approximately 22 hours daily and changed every 10 days. By the conclusion of therapy, the anterior crossbite had been successfully resolved, leading to improved lip posture and a normal interlabial gap. The final results included the establishment of appropriate overjet and overbite, along with well-aligned teeth and a functional occlusion (Figure 5).

Additionally, both the upper and lower dental arches were brought into proper alignment, contributing to enhanced aesthetics and improved oral function. Periodontal health was regularly assessed throughout the treatment process, with no evidence of gingival recession or periodontal pocketing, ensuring the maintenance of overall oral and gum health.

Discussion

Clear aligner therapy has gained significant popularity in recent years due to its aesthetic appeal, patient comfort, and predictable outcomes when managed with appropriate planning and biomechanics [14]. In this case, a young adult female presented with anterior crossbite, mild crowding, and spacing all of which were effectively addressed using a combination of aligners, interproximal reduction (IPR), attachments, and the Elastic Button Technique (EBT).

The use of IPR in the upper anterior region played a key role in alleviating mild crowding and creating space for proper alignment without the need for extractions. This minimally invasive technique is well-documented for its effectiveness in resolving crowding while preserving periodontal integrity when performed accurately [11]. Careful monitoring and the use of an IPR gauge helped avoid excessive enamel removal, aligning with current best practices [12].

Extrusion attachments were strategically placed on the upper incisors to facilitate vertical movement and leveling, which is often challenging to achieve with aligners alone. Attachments enhance the delivery of biomechanical forces, especially in cases requiring complex tooth movements such as extrusion or rotation [17]. The positioning, shape, and number of attachments were tailored based on the digital treatment plan to optimize force application and aligner fit.

The incorporation of the Elastic Button Technique further supported the correction of crossbite, particularly in the canine region. EBT enables the application of targeted inter-arch forces that aid in tooth repositioning, especially in cases where aligners alone may lack sufficient control [18]. The use of 3/16-inch elastics for 15 hours a day proved effective in facilitating cross-arch movement while maintaining patient comfort.

Throughout the nine-month treatment period, aligner tracking and periodontal health were carefully monitored. Regular follow-ups confirmed that oral hygiene remained satisfactory, and there were no signs of soft tissue inflammation or bone loss. These findings align with previous studies emphasizing the importance of consistent periodontal assessment during aligner treatment to avoid complications such as gingival recession or decalcification [19].

The final results demonstrated not only successful correction of the anterior crossbite but also proper midline alignment, ideal overjet and overbite, and improved lip competence. The patient exhibited excellent compliance, which is a critical factor influencing the success of aligner therapy [7]. Retention protocols were implemented to ensure long-term stability of the results, following established retention guidelines.

This case underscores the effectiveness of clear aligners, when combined with auxiliary tools like attachments, IPR, and elastics, in managing moderate malocclusions. Personalized treatment planning, patient compliance, and regular monitoring are essential for achieving both functional and aesthetic outcomes in aligner-based orthodontics.

Conclusion

This case highlights the successful use of clear aligner therapy in the correction of anterior crossbite and mild dental crowding in a young adult patient. Through a combination of digital treatment planning, interproximal reduction, strategically placed attachments, and the Elastic Button Technique, precise and predictable tooth movements were achieved without the need for extractions or fixed appliances. The patient's strong compliance, along with regular monitoring of periodontal health and aligner fit, contributed significantly to the positive treatment outcome. Overall, this case reinforces the clinical effectiveness and versatility of clear aligners when integrated with appropriate adjunctive techniques in managing moderate orthodontic discrepancies while maintaining high standards of aesthetics, comfort, and oral health.

Consent & Conflict of Interest

A written consent form was signed from the patient for use of the dental records for publications & social media marketing. Also, there is no conflict of interest with this paper.

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