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"Convenience" Orthodontics: Innovative Integration of Treatment Mechanics–A Case Report

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Abstract

Background: Space closure is one of the most perplexing progressions in the field of Orthodontics and involves a concrete understanding of biomechanics to evade any adverse side effects. The significance of time frame for orthodontic treatment is noticeable in the literature as numerous modalities of space closure have been proposed by the experts. It's a known fact that the appropriate usage of Begg brackets makes orthodontic therapy more proficient and versatile; while raising the comfort level of the patient. A 21-year-old male patient visited our dental center with a chief concern about forwardly placed and spaced upper front teeth.

Objective: This treatment modality had the objective to carry out orthodontic space closure with appropriate anchorage preservation bypassing initial leveling and alignment using Begg brackets in the minimal possible time.

Methodology: Simultaneous intrusion and retraction were planned by bonding Begg brackets on the palatal surface of upper anteriors and pink elastics (3/8") were engaged from the transpalatal arch to these brackets to produce light forces of approx. 45-50 gms. These elastics were changed every 7-10 days.

Results: After 07 months of this therapy, a significant amount of intrusion and retraction and complete closure of generalized upper anterior spacing was achieved. Cephalometric superimposition indicated intrusion and retraction of the maxillary anterior teeth primarily by translation.

Conclusion: This mechanotherapy can be considered a viable and efficient treatment alternative as it carries significant advantages like enhanced patient satisfaction and compliance, maintained pre-treatment functional occlusion, simplified mechanics, reduced treatment duration, cost and patient burn-out.

Keywords: Begg bracket • Elastics • Intrusion • Lingual orthodontics • Retraction • Transpalatal arch

Introduction

Space closure in orthodontics necessitates a thorough understanding of biomechanics to enable clinicians to govern anchorage and treatment optionsin a better way. Most orthodontic patients want their treatment to be finished as early as possible. Usually, the treatment time is longer in extraction cases [1-4] and it has always been a challenge for orthodontists to reduce the average treatment time [5]. Yamazaki et al. reported that the mean duration of time for conventional active orthodontic therapy was 29 months [6]. Notable factors affecting the extent of treatment include malocclusion severity, extraction or a non-extraction case [7], bracket prescription used and techniques applied for fixed orthodontic management [8,9], and the patient's cooperation [10].

Conventional orthodontic treatment generally involves four steps:

- Levelling and alignment.
- Space closure.
- Anterior retraction.
- Finishing and detailing.

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Received: 26 November, 2023, Manuscript No. OHCR-23-121183; Editorassigned: 28 November, 2023, PreQC No. OHCR-23-121183 (PQ); Reviewed: 12 December, 2023, QC No. OHCR-23-121183; Revised: 03 January, 2025, Manuscript No. OHCR-23-121183 (R); Published: 13 January, 2025, DOI: 10.37421/2471-8726.2024.10.176

Temporary Anchorage Devices (TAD's) have certainly led to a paradigm shift in orthodontic biomechanics and have been used successfully in achieving simultaneous intrusion and retraction of upper anterior in several cases; however, their success rate depends upon numerous factors like cortical bone thickness, trabecular bone density, the material used, surgical technique, appropriate placement site, patient's hygiene care, removal and the risk of fracture [11,12].

In this case report, an endeavor has been undertaken to bypass the initial leveling and alignment stage and to initiate simultaneous intrusion and retraction at the commencement of the orthodontic treatment without any use of mini-implants. This treatment modality was undertaken as it carried several benefits like more satisfied patient throughout the treatment (as no show of brackets labially on upper anteriors), shortened treatment duration, adequate anchorage preservation, and economically more viable.

Case Presentation

A 21-year-old male patient visited our dental center with a chief concern of forwardly placed and spacing in upper front teeth. The patient was healthy with no major medical or dental history in particular. Extra oral examination illustrates the patient had an orthognathic facial profile, a normodivergent growth pattern, no gross facial asymmetry, an average face height ratio, an acute nasolabial angle, moderately deep mentolabial sulcus, a leptoprosopic facial form and a dolicocephalic head form.

There was severe proclination and generalized spacing in the upper anterior segment with the upper and lower arches being symmetrical. There was an over jet of 11 mm and overbite of 3.5 mm with class I molar and canine relationships bilaterally (Figures 1 and 2). Pre-treatment lateral cephalometric and Orthopantomogram (OPG) analysis revealed a class I skeletal pattern, an average to vertical growth pattern, normal facial proportions, an orthognathic maxilla and mandible and an ANB angle of 2.5° (Figure 3).



Figure 1. Pre-treatment extra-oral photographs.



Figure 2. Pre-treatment intraoral photographs.



Figure 3. Pre-treatment Orthopantomogram (OPG) and lateral cephalogram.

Bolton tooth ratios were within standard limits, but arch-perimeter analysis presented a 10 mm arch-perimeter discrepancy in the maxillary arch.

Treatment plan

Simultaneous intrusion and retraction were planned while maintaining the posterior occlusion in this case but in a different manner by use of palatal elastics to achieve an esthetic profile. Transpalatal Arch (TPA) was fabricated and fixed to the upper molar bands and Begg brackets were bonded to the palatal side of upper anterior teeth. The brackets were placed more apically to the direct point of force application closer to the Center of Resistance (CORes) of the teeth to evadetheir unwanted lingual tipping and consequent deepening of the bite. Pink elastics (3/8") of T.P. Orthodontics were engaged from these Begg brackets to the TPA to produce light forces of approx. 45-50 g (Figure 4). Hence, there was minimal change In Lower Anterior Facial Height (LAFH) (73 to 74 mm) and Y-axis (62 to 62.5°) values as shown in the pre and post-treatment cephalometric analysis comparison. These elastics were changed every 7-10 days (Table 1).



Figure 4. Mid-treatment maxillary occlusal view photograph with pink elastics engaged from Begg brackets to TPA.

	Pre-treatment	Post-treatment
SNA (°)	83	83
SNB (°)	80	80
ANB (°)	3	3
GoGnSN (°)	21	24
OccSN (°)	11	13
1 to SN (°)	147	105
UINA (°) (mm)	58 (18)	17 (4)
LINB (°) (mm)	27 (5)	25 (4.5)
LAFH (mm)	73	74
Y axis (°)	62	62.5
Nasolabial angle (°)	62	101

Table 1. Comparative cephalometric readings.

In case of breakage of the bracket or loosening of the band, the patient was advised to report as soon as possible to the orthodontic office. He was also given a demonstration of engaging the elastics in the correct way and some extra elastics were handed over to him, in case he could not visit the dental center in the stipulated time. An intraoral picture or a small video clip was received from the patient in such a scenario.

After 7 months of this therapy, a significant amount of intrusion and retraction and complete closure of generalized upper anterior spacing was achieved (Figures 5 and 6). Cephalometric superimposition (Figure 7) indicates intrusion and retraction of the maxillary anterior teeth was accomplished primarily by translation and slight tipping (1 to SN (°) changing from 147 to 105 and UI-NA (°) (mm) changing from 58 (18) to 17 (4)). Final detailing was then done which got completed in 6 weeks. Retention was accomplished by bonding fixed lingual retainer in both upper and lower arches postdebonding.



Figure 5. Post-treatment extraoral photographs.



Figure 6. Post-treatment intraoral photographs.



Figure 7. Pre and Post-treatment lateral cephalometric superimposition.

Discussion

In Orthodontics, anchorage can be defined as the proficiency to thwart tooth/teeth movement whilst moving another tooth/teeth. The anchorage protocol decided for each specific case plays a critical role in the success of any orthodontic treatment, hence it should be planned at the very beginning and all the specific adjustments in anterior retraction and space closure should be done accordingly [13,14].

TAD's have been like a versatile Swiss army knife in orthodontics for few years, being incorporated for reinforcement of orthodontic anchorage as and when required. Simultaneous intrusion and retraction of maxillary anterior teeth with TAD's has been reported in literature previously, however scarce attached gingival width and the desired vector of retraction and intrusion forces from buccal side mandate their insertion in loose alveolar mucosa, which invites peril of infection and failure [15,16].

Jayade et al. advocated the use of palatal elastics for intrusion and/or retraction of upper anteriors and the usage of class II elastics in bite-opening mechanics of Begg mechanotherapy. Liu and Hershelb proposed the usage of elastics from TPA to make the direction 'anteriorly pointing downward' for achieving incisor intrusion and advised to alter the vector to class I [17].

In the present case, TPA with a distally directing U-loop was made for reinforcing anchorage and also providing an attachment for the pink elastics. The Begg brackets were bonded as apically as they could be to maintain the point of force application closer to the center of resistance of upper anterior to avoid excessive lingual tipping and consequent deepening of the bite. Mild intrusive forces generated with these elastics helped to keep a check on bite deepening too. Even the point of force application on the transpalatal arch was nearer to the CORes of both the molars to enhance the anchorage preservation in a vertical plane. 3/8" pink elastics used kept the forces at quite a physiological level and prevented taxing the molars for anchorage. Although it cannot be denied that minimal amount of uncontrolled tipping can occur in such treatment modalities, mild intrusive forces that are generated with elastics keep a check on bite deepening, which would have been severe otherwise. This innovative technique of eliminating the primary stage of alignment of maxillary anterior not only decreased the treatment time, but also sheltered the molars and preserved the entire available space for the management of proclination of upper anteriors.

Conclusion

Simultaneous intrusion and retraction of spaced and severely proclined upper anterior teeth with palatally engaged light force elastics from TPA as illustrated in this case report may be considered as a viable and efficient treatment alternative as it carries significant advantages like enhanced patient satisfaction and compliance, acceptable functional occlusion, simplified mechanics, reduced treatment duration, cost and patient burn out.

Financial Support and Sponsorship

Nil.

Consent to Participate

Verbal informed consent has been obtained from the patients (with print approval from ethical committee) to undertake and publish this study.

Conflicts of Interest

There are no conflicts of interest.

Ethical Approval

Patient has given approval.

Contribution of Authors

Ashish Handa: Original drafting, validation, conceptualization, investigation, methodology, formal analysis, project administration.

Budhaditya Paul: Critical revision of the final manuscript.

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How to cite this article: Handa, Ashish and Budhaditya Paul. ""Convenience" Orthodontics: Innovative Integration of Treatment Mechanics–A Case Report." Oral Health Case Rep 11 (2025): 176.