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Case Report

TADS assisted camouflage orthodontic treatment of class II malocclusion in a non-growing patient- A case report

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ABSTRACT

Background: In individuals with Class II malocclusions, there is an anteroposterior discrepancy between the maxillary and mandibular dentitions, which may or may not be accompanied with a skeletal discrepancy, the most effective treatment option to eliminate is by modified three-piece base arch combined with TADS for simultaneous deep bite correction and en masse retraction.
Aim: The present case report showcases the treatment results and biomechanics involved for en masse retraction and intrusion of anterior teeth using three-piece intrusion arch and temporary anchorage device.
Conclusion: The modified three-piece base arch combined with TADS is effective in controlled translation and intrusion of anteriors and would be a preferable mechanotherapy in low angle case with deep bite, proclined anteriors and Class II malocclusion.

1. Introduction

Class II malocclusions are generally defined as having dental, skeletal and/or functional components or features. It should be noted that most often they show features simultaneously and to different degrees.

Angle (1907) proposed a classification system based on the relationship of mandibular first molars to maxillary first molars. Class II defines malocclusion as a relationship between the mandibular teeth and the maxillary teeth more than half the width of the tubercle. Angle (1907) described two types of malocclusion in class II based on the impression of the maxillary central incisors.

Class II division 1 malocclusions, is defined as labial inclination of the maxillary incisors, increased coating, narrow or absent maxillary arch. Vertical incisor overlap can range from overbite to open bite. Class II and Class 2 malocclusions are defined as excessive tilting of the maxillary central incisors with overlapping labial maxillary lateral incisors. Sometimes both the middle and posterior incisors descend lingually, and the canines overlap the labial lateral incisors.

Angular class II malocclusion in adults with skeletal class II contours and maxillary vertical excess is a difficult problem for the dentist to treat. This is because clockwise rotation of the mandible to correct molar relationship after the removal of the upper molars confuses skeletal differences and sometimes worsens facial features. In addition, in patients with severe gingival trauma due to vertical enlargement of the maxilla, incursion of only the maxillary anterior teeth is aesthetically inappropriate because the procedure worsens smile arch. Therefore, the best treatment option for patients who want to remove their gingival smile is the orthognathic (surgical) method. Due to the reluctance of some patients to undergo surgery, a new dental treatment is required in patients with deep bite

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and vertical gingival smile. This treatment is necessary to effectively treat maxillary teeth and eliminate gingival smile without invasive surgery.

The skeletal anchor was recently developed to treat severe malocclusions. Using this technique allows the maxillary molars to move without side effects. In addition, several reports describe the use of temporary bearing devices to support the posterior teeth of the two arches and to reduce the facial height of adults with osteoporosis. In class II malocclusionin the 1970s Burstone A partial segment invaded the mandibular incisors and thus flattened the Spee curve applied for. The wire used in this treatment does not extend from the right molar to the left molar. The Burstone (1970) invasive mechanism has three parts: (1) posterior fixation using buccal stabilization based on placement of posterior brackets or tubes from either side; (2) anterior portion of fourth incisors; (3) There are inlet springs on both sides.

The present case report showcases the treatment results and biomechanics involved for en masse retraction and intrusion of anterior teeth using three-piece intrusion arch and temporary anchorage device.

2. Case Report

A female patient of age 20 years visited the department of Orthodontics and dentofacial orthopaedics at Bhojia dental College, Budh Baddi with the chief complaint of forwardly placed upper and lower front teeth. Extra oral examination (Figure 1) showed that she had a leptoprosopic facial form with good facial symmetry, convex profile with posterior divergence, increased facial height, incompetent lips, acute nasolabial angle, deep mentolabial sulcus, high mandibular plane angle, and a non-consonant smile arc. No signs/ symptoms of temporomandibular joint dysfunction. Intraoral examination (Figure 2) revealed as Class II molar relation on right side and Class I on left side. The vertical relation showed deep bite (6 mm, 80%), overjet of 8 mm, mandibular midline was coincident. Orthopantomogram (Figure 3) showed full complements of teeth were present. The maxillary and mandibular anterior teeth presented with extrusion and the deep curve of spee (3 mm). Lateral cephalograms showed (Figure 3) she had prognathic maxilla (90) and orthognathic mandible (80) with ANB (8), Wits (7 mm) depicting a skeletal Class II jaw bases. Patient had a hyperdivergent growth pattern on account of Sn-Go-Gn (39), FMA (33) and Jaraback ratio of 66% (Table 1).

2.1. Treatment objectives

To correct the inclination of upper and lower anterior teeth, obtain optimum overjet and overbite, to correct deep curve of spee, establish Class I molar and canine relation, improve the facial features by obtaining a straight profile with straight divergence, a pleasing smile arc and soft tissue

Figure 1: Pre-treatment extraoral photographs

Figure 2: Pre-treatment Intraoral photographs

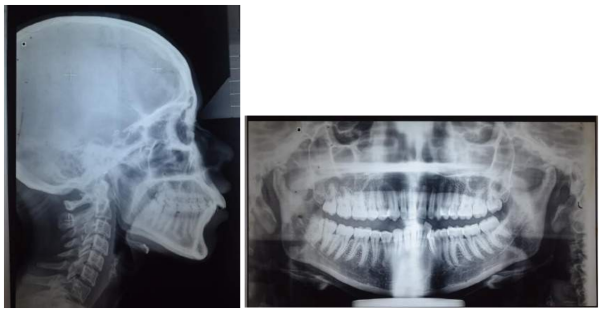

Figure 3: Pre-treatment radiographs

Table 1: Pre-treatment cephalometric values

Measurements	Pre-treatment
SNA	90º
SNB	82º
ANB	8º
Beta Angle	22º
SN-GoGn	38º
FMA	33º
Jarabak ratio	66%
1 to NA	8 mm
1 to SN	110º
IMPA	99º
Nasolabial Angle	106º
Upper lip to E-Line	2.5mm
Lower lip to E-Line	3.5mm

aesthetics.

2.1.1. Treatment

After analysing all diagnostic records, the patient was treated with extractions. The maxillary and mandibular teeth were bonded and banded with pre-adjusted 0.022" slot MBT prescription brackets. A 0.9 mm nance palatal arch (Figure 4) was placed to preserve the anchorage and to prevent buccal flaring of molars. The arches were aligned using the following sequence of arch wires; 0.016 Niti, 17 × 25 Niti, and 19 × 25 Nickel Titanium arch wires. Later 19 × 25 stainless steel archwire. After both the arches were levelled and aligned they were followed by extraction of all first premolars.

Figure 4: Mid treatment photographs

This was followed by placement of three-piece intrusion arch (0.017" X 0.025" TMA with 2 mm helix was engaged in auxiliary tube and placed in extracted space of 1^{st} premolar in anterior piece of intrusion arch) (Figure 5) in the upper arch to intrude and retract the upper incisors which help to attain a proper incisor inclination, overjet and overbite. Retraction force of 150 gm was given and intrusion force of 60 gm was given This phase was continued for 1 year.

Figure 5: Three-piece intrusion arch (0.017" X 0.025" TMA with 2mm [internal diameter] helix was engaged in auxiliary tube and placed in extracted space of 1^{st} premolar in anterior piece of intrusion arch)

After achieving desirable intrusion and retraction three-piece intrusion arch was removed and placement of temporary anchorage device in the region distal to lateral incisor 16 mm away on right side and 17.5 mm away on left side was done (Figure 6). 50 gm intrusive force was added via hooks made between 11, 12 and 21, 22 to prevent buccal flaring with intrusion of incisors. This resulted in intrusion of incisors and for canine retraction continuous active tie backs with a force of 200 gm was given, Finishing and detailing were carried out and the appliance was debonded. The total treatment time was 19 months.

Figure 6: TAD in the region distal to lateral incisor 16 mm away on right side and 17.5 mm away on left side

3. Treatment Results

There was remarkable improvement in the patient's profile and facial aesthetics as seen in the post-treatment facial photographs. Facial balance, smile aesthetics, and lip positions were improved. (Figure 7). There was intrusion and retroclination of the upper and lower incisors. Class I molar and canine relationships were established. Overjet and overbite were improved to 0.5 and 2mm respectively (Figure 8). Cephalometrically the upper incisors were retroclined from 8 mm to 1 mm in relation to NA perpendicular to point A line and lower incisors were retroclined from 99 to 92 (IMPA) (Table 2). Superimposition demonstrated the treatment changes (Figure 9). There was a significant intrusion and retraction of maxillary incisors. At the end of treatment, the patient had reduced Interlabial gap with reduced convexity of face. Intraorally, 2 mm overjet, and 2 mm overbite with stable functional occlusion were achieved. Posttreatment orthopantogram (OPG) and lateral cephalograms were taken at the end of orthodontic treatment.

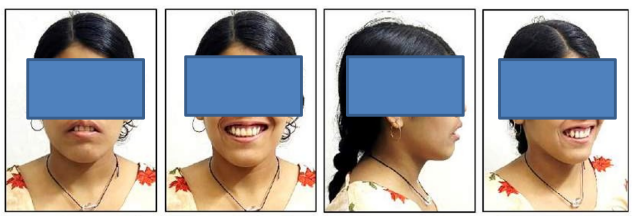

Figure 7: Posttreatment extraoral photographs

Figure 8: Post-treatment intraoral photographs

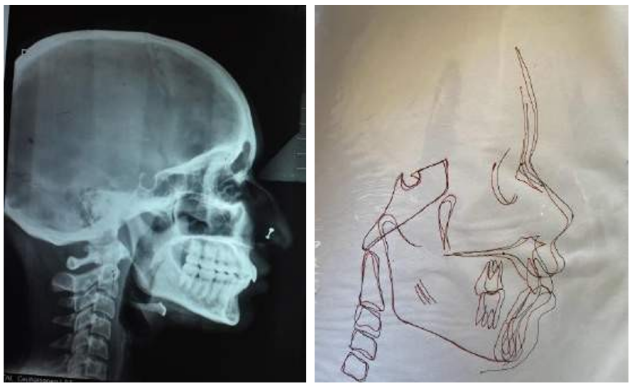

Figure 9: Post treatment lateral cephalogram and superimposition

Table 2: Post-treatment cephalometric values

Measurements	Pre-treatment	Mid treatment	Post treatment
SNA	90º	89º	89º
	82º	80º	80º
ANB	8º	9º	9º
Beta Angle	22º	26º	27º
SN-GoGn	38º	38.5º	38.5º
FMA	33º	30º	38º
Jarabak ratio	66%	62%	60.6%
1 to NA	8mm	7 mm	1mm
1 to SN	110º	107º	98º
IMPA	99º	101º	92º
Nasolabial Angle	106º	98º	97º
Upper lip to E-Line	2.55mm	4 mm	4 mm
Lower lip to E-Line	3.5 mm	5.5 mm	5mm

4. Discussion

Absolute incursion, relative incursion and posterior extrusion are the three overbite treatments. Relative intrusion is achieved by preventing eruption of the lower incisors where posterior growth provides vertical space for posterior eruption, and during posterior extrusion the mandible rotates downward and backward without eruption.[1] As a general rule, extrusion is undesirable, but relative invasiveness in the growth stage and absolute invasiveness in the nongrowth stage is allowed. For patients with anterior incisors, our central arch suppression mechanism can perform overbite correction and gap closure at the same time. The force system applied to the front depends on the point and direction of application of the input force.

This segmented approach to intrusion and retraction was developed because it allows simultaneous control of tooth movement in the vertical and anteroposterior planes.[2] The equipment has low load bias to ensure stable input power and low power consumption. The design of the device allows the therapist to provide static control with minimal chair adjustments. Article (2008) evaluated the effect of Spee mechanics' augmentation and inversion curves on root resorption of incisors and found that the invasive approach caused more root resorption than the control group.

In contrast, Costopoulos and Nanda (1996) found that infestation was only negligible due to root resorption. The main difference between these studies is the amount of force used to grip the incisor. Spee Mechanics' reverse projection curve provides an interference force of 100 to 150 g, while Burstone's interference arc is only 15 g per maxillary incisor.[3–5]

El Aouame, et al. (2023) present clinical data of 3 young patients treated and followedup for Class II Class 1 malocclusion. Early treatment phase was applied to the first and second patients. The third patient was treated in two stages when his teeth were mixed. They concluded that there was no significant difference between the two methods (one-stage or two-stage). Early treatment of malocclusion is important because it normalizes the structure and growth of bones and shortens the duration of subsequent treatment.[6]

Review process overview to better understand what is important or new 4 Draws conclusions from different studies; this is particularly important in TAD because a large database of simulations is available to describe clinical outcomes and inform clinical decisions. There are, but not included in the review of more familiar interventions focused on randomized clinical trials. It is clear from this study that the use of TAD can be effective and efficient, but the data support the advantages of TAD over non-TAD anchors.[7]

Mahmood (2023) conducted a retrospective study of 40 cephalometric interpretations of patients scheduled for fourunit extraction. All patients received the McLaughlin Bennett Trevis (MBT) treatment, a temporary anchor device (TAD) with the same protocol, in the same orthodontic clinic, including 22 holes and onestep retraction after four units of extraction. While the inclination of the occlusal plane does not change significantly, all tissues related to cephalometric values are reduced according to the relationship of the upper and lower lip part for the Ricketts aesthetic line (ELine), except for the nasolabial

angle is reduced. For both the Frankfurt mandibular angle and the Frankfurt level, the upper incisor was not significantly associated with the change in posttreatment contour. Therefore, the use of MBT therapy in combination with TAD-based reversal is a good method in the treatment of complications.

A recurring theme in the results is the relationship between the position of the dental guard and the maxillary/mandibular arch, and the relationship between the effect of TAD action and the point of force application.[8,9] Position of the TAD The point of application in threedimensional space will create a force vector (eg, the nasolabial angle) that causes the occlusal plane to rotate and affects the teeth, body relationship, and soft tissues of the face. Understanding the complex interactions described here is important so that clinicians can distinguish between TAD position and number and select the right application to achieve the desired tooth and reduction. Orthodontists should consider these factors when planning TAD placement and include biomechanics to minimize adverse consequences.[3] Wenxin Lu, Yuan Li, Li Mei, Yu Li (2023) conducted a study to evaluate masquerade treatment with extraction of fourth premolars in patients with severe divergent skeleton class II; this was achieved using vertical using TAD. Successful and easily with prefabricated IBs of clear aligners.[10] Evaluated a study in which both maxillary first premolars were removed and the cavity was closed using a closed coil spring and elastic chain. Correction of excessive closures using ISW curves and ISW compression belts. The elastic band of the chin is used to correct the relationship between the chins. Treatment takes approximately 3 years with improvement in appearance and dental health. It was concluded that the case of deep overbite with skeletal class II malocclusion was treated with the ISW technique with good results and the patient was satisfied with the results. It should also be known that the mechanical process changes when tooth movement occurs and therefore it should be checked periodically during treatment. This study explores the use of force for TAD-based orthodontic intervention to better understand how to provide the necessary force to achieve effective orthodontic tooth movement while remaining within the confines of the bones. Global retraction of anterior teeth and use of TAD intrusion are currently the two most studied topics.[3–5,11,12]

5. Conclusion

The three-piece intrusion arch combined with TADS improves Class II malocclusion in different stages of dentofacial development. This study provided a better understanding of the complex interactions and has provided a guide to the level and direction of forces in each type of intervention to aid clinicians in achieving high quality outcomes.[13]

6. Source of Funding

None.

7. Conflict of Interest

None.

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