



Case Report

Segmental intrusion and retraction with tads for the correction of gummy smile -A case report

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ABSTRACT

The intrusion of the maxillary anteriors with Temporary Anchorage Devices (TADs) is one of the most common and effective treatment methods for the correction of gummy smile, but the main disadvantage of this method is the extrusion of posterior teeth, especially when used in conjunction with a continuous arch wire leading to an increase in the lower anterior facial height. The objective of this case report is to demonstrate the true intrusion of the maxillary anterior segment without causing extrusion of the posterior segment using a segmented arch wire rather than the routine continuous arch wire with the assistance of TADs in a patient diagnosed with a 5 mm gummy smile. After the initial leveling and alignment, a 0.019×0.025 stainless steel posted arch wire was sectioned distal to the canines. The TADs were positioned bilaterally mesial to upper first molars and an intrusive force of 250gm was applied per side using elastomeric chains attached to the miniscrews. At the end of the treatment, complete correction of the gummy smile was achieved by the intrusion of maxillary anteriors without any significant extrusion of the posteriors. The TAD assisted segmented arch wire for intrusion and retraction of maxillary anteriors is an excellent method for the successful correction of the gummy smile rather than using regular continuous arch wire as we can avoid the unwanted extrusion of posteriors.

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1. Introduction

The excessive gingival exposure on smiling has provoked considerable interest and concern among the orthodontist. The “gummy” smile can be defined as 2mm or more of maxillary gingival exposure in full smiling^[1]. The etiology of gummy smile varies from excess vertically maxillary growth, short upper lip, hyperactive levator muscles of the upper lip, passive eruption of upper anteriors and gingival hyperplasia. There are different treatment strategies for the correction of gummy smile including headgear therapy, crown lengthening procedures, surgical methods like Lefort 1 osteotomy with superior impaction, botulinum toxin injections, skeletal anchorage systems assisted intrusion and different loop mechanics depending upon the etiology.

The skeletal anchorage systems are increasingly being used in orthodontics. The TADs had replaced many traditional mechanics and simplified orthodontic treatment. These days, the miniplates also have been considerably used in similar situations and are quite popular due to added stability they exhibit in comparison to TADs.¹ However, miniscrews have various advantages as they are cost-effective, can be placed and removed easily, are small in size and thus can be implanted comfortably in most sites and thus are the most popular absolute anchorage support today.² Anchorage for intrusion and retraction using mini implants produced consistent result even though it produces extrusion of the posteriors when used with continuous arch wires. This extrusion can compromise the facial height, especially in grown-up patients with vertical growth trend, where no growth can compensate for increased facial height.³

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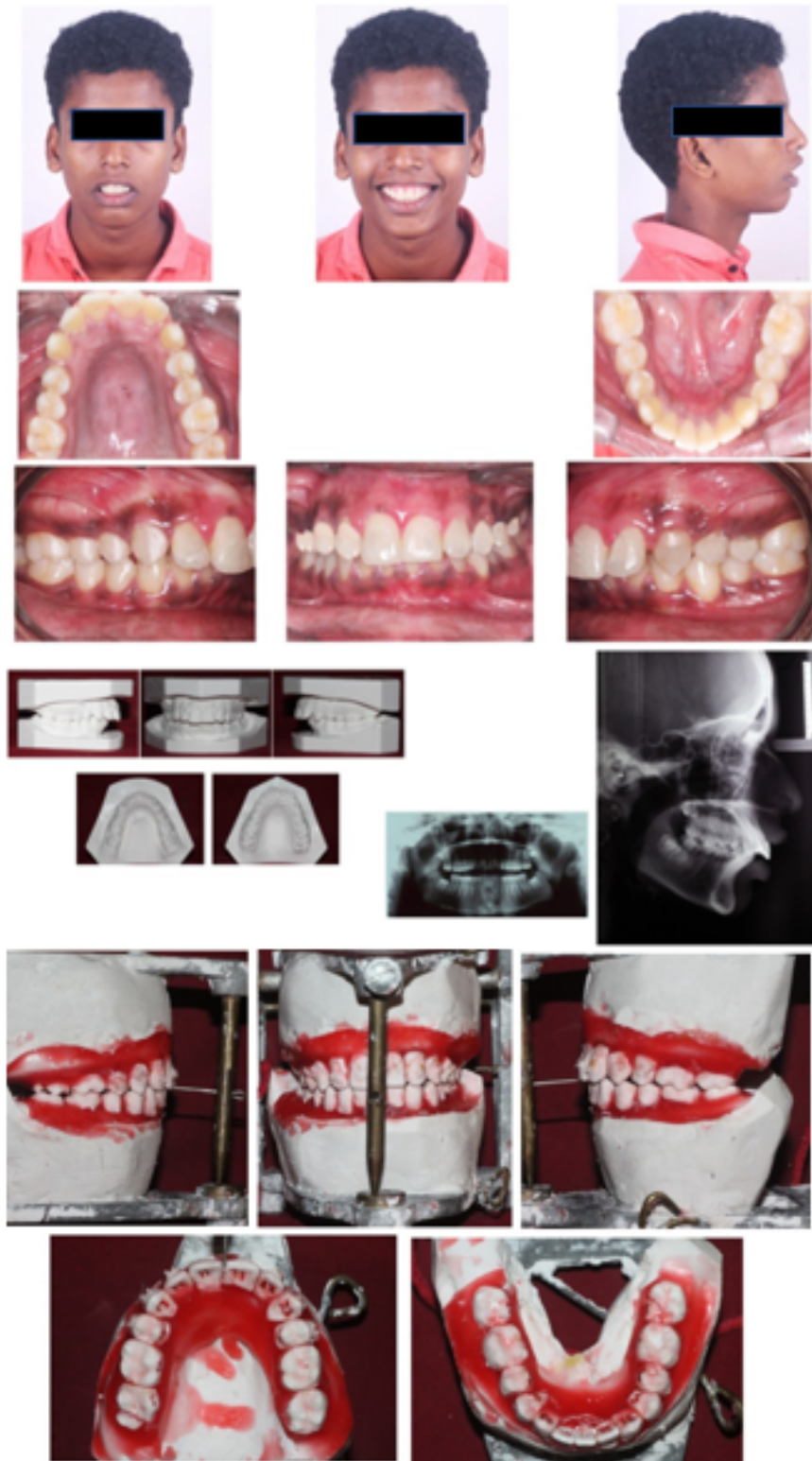


Fig. 1: Pre treatment photograph, radiographs and models and kesling setup

Various case reports by Lin,⁴ Mohammed³ and Kaku⁵ had used multiple miniscrews in the anterior and posterior segments to provide simultaneous intrusion and retraction without causing extrusion posteriors. The present study aim is to formulate a method for gummy smile correction using TADs. It aims at preventing extrusion of maxillary posterior teeth using a segmented technique with the minimal number of TADs.

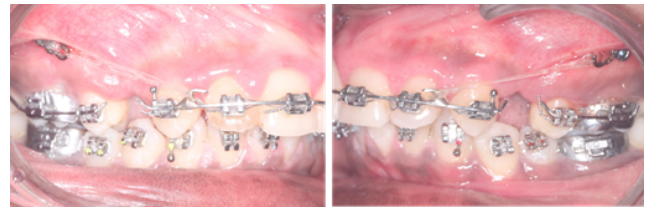


Fig. 2: Intraoral pictures of TAD placement

2. Case History and Treatment Plan

A 16-year-old male patient presented with a chief complaint of proclination and an excessive gumminess on smiling. The extraoral examination exhibited a convex profile and incompetent lips with 10 mm of inter labial gap, an acute nasolabial angle and the patient's smile exhibited a gingival exposure of 5 mm. The lower anterior facial height was increased clinically by 15 mm. The intraoral examination revealed an almost Angle's Class II molar relation with 8 mm overjet and 5mm overbite. The cephalometric analysis revealed a Class II skeletal relationship with the orthognathic maxilla and retrognathic mandible, vertical growth pattern, vertical maxillary excess, and proclined anterior teeth (Figure 1).

The primary treatment objective was the correction of the gummy smile with simultaneous retraction of anteriors to reduce the proclination. It was decided to start with fixed mechanotherapy (MBT, 0.022slot, LEONE) reinforced with skeletal anchorage using TADs after extraction of upper first bicuspids and lower left central incisor after doing a kesling set up.

3. Treatment Progress

After the initial leveling and aligning, a segmented 0.019×0.025 stainless steel arch wire with bilateral posts between the upper lateral and canines was placed from canine to canine. The upper second premolars and first molars were stabilized bilaterally with two 0.019×0.025 stainless steel sectional arch wires. The TADs (TOMAS-Dentaraum) of 8mm length and 1.5mm diameter were positioned bilaterally mesial to the upper first molars and the intrusion was carried out with force of 250gms per side using elastomeric chains attached to the TADs (Figure 2).

Using the law of parallelogram and the trigonometric formulae, the force vector F can be divided into an intrusion component $F \sin \theta$ and a retraction component $F \cos \theta$, where θ is the angle formed between the force vector F and a line parallel to the plane of the arch wire. The horizontal and vertical component of force was calculated as 228gm and 101 gm respectively (Figure 3).

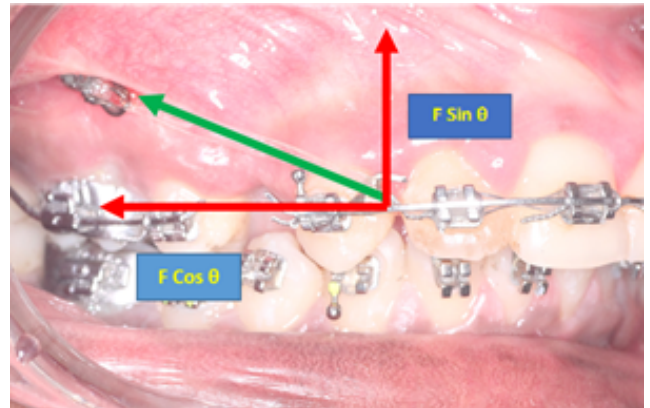


Fig. 3: Intraoral pictures of TAD placement

4. Treatment Outcome

A gummy smile of 5mm was completely corrected with the intrusion of the upper anterior segment (Figure 4). The maxillary anteriors were simultaneously intruded and retracted to attain a remarkable improvement in the profile of the patient (Figure 5). The cephalometric values demonstrated that the maxillary incisors were fairly upright on their base (Table 1). The cephalometric superimpositions showed that point A moved superiorly by 2mm, the upper anteriors moved superiorly by 5mm and the upper molars showed no extrusion. The lower anterior facial height remained constant (Figure 6).

5. Discussion

In this case report the primary objective of treatment was the correction of a gummy smile with true intrusion of the upper anterior teeth using TADs. The major problem of using conventional continuous archwires with the TADs was the extrusion of posterior teeth causing an increase in lower anterior facial height. In this case, the prevention of unfavorable extrusion of the posterior teeth was equally important as the gummy smile correction as the patient had vertical maxillary excess accompanied by an increased lower anterior facial height.

When a force is applied from the post of a continuous arch wire in the anterior region to the TADs placed in the posterior region, an anticlockwise moment is produced in the entire maxillary arch. (Figure 7 a) This moment causes

Table 1: Pre and Post Cephalometric measurements

Cephalometric parameters	Pre treatment	Post treatment
SNA	81°	80°
	75°	75°
Upper incisor to NA (mm)	11mm	4mm
Upper incisor to NA (°)	30°	23°
Lower incisor to NB (mm)	13	9mm
Lower incisor to NB (°)	37°	31°
FMA	30°	30°
IMPA	110°	104°
Upper incisor to SN	111°	103°
Inter incisal angle	106°	119°
LAFH	85mm	85mm



Fig. 5: Post treatment photograph, radiographs and models

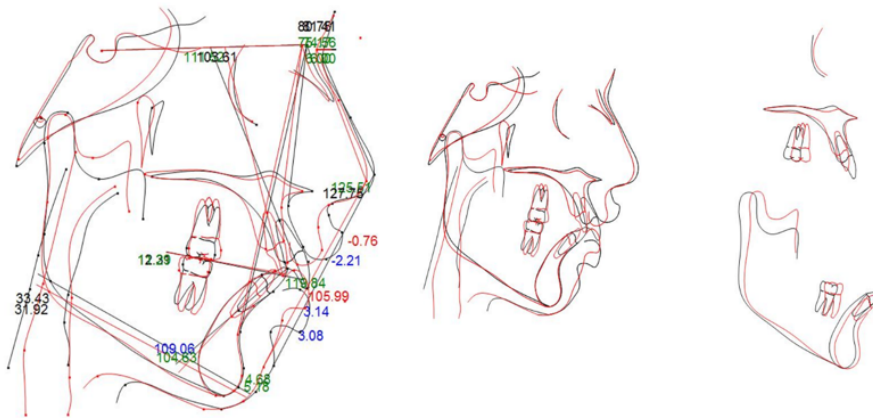


Fig. 6: Cephalometric superimposition

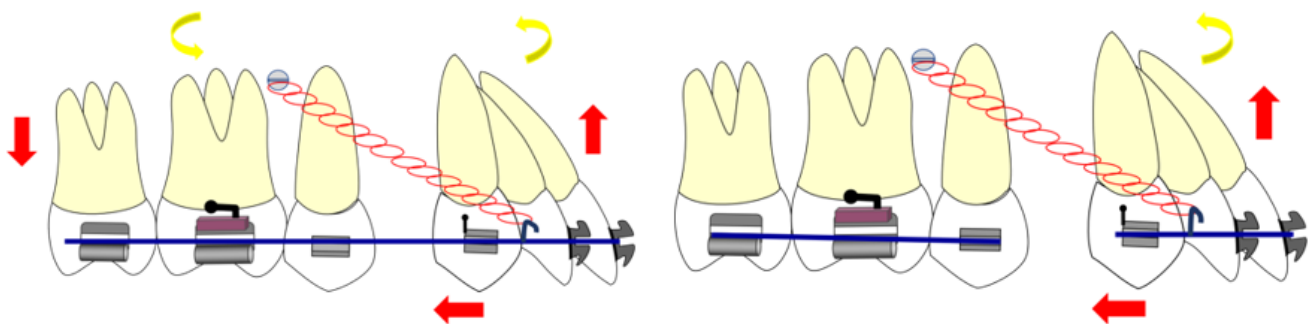


Fig. 7: a): Biomechanics of TAD along with continuous archwire; b): Biomechanics of TAD along with segmented archwire



Fig. 4: Pre treatment and Post treatment smile evaluation

the intrusion of maxillary anterior teeth with simultaneous extrusion of posterior teeth. Thus the use of segmented archwires was the treatment of choice to avoid the unwanted extrusive component on the posteriors (Figure 7b).

Seong Min Bae et al. treated a 28 year old patient.⁶ A .017" × .025" stainless steel closing loop archwire and

a .016" × .016" stainless steel overlay intrusion archwire were placed in the maxillary arch to move the maxillary anterior teeth upward and backward. The closing loops were activated by using NiTi open coil springs from a posteriorly placed microimplant to the arm of the closing loop. Extrusion of the upper molars were prevented by using NiTi open coil springs to the molar tube hook from the same microimplant.

The results showed that the FMA angle almost remained constant with the bodily movement of maxillary anteriors in an upward and backward direction with an improvement of the gummy smile. This technique involved the use of a pair of continuous wires with complex wire bendings and two pairs of NiTi open coil springs on either side making the system a little complex.

Most authors^{4,6,7} attempting this mode of treatment with the true intrusion of anteriors and no extrusion of posteriors have used multiple numbers of TADs. While Mohamed³ and Masato Kaku⁵ et al. have used anterior and posterior microimplants on the buccal aspects of the maxillary arch alone, Yi Lin et al.⁸ in addition used buccal and lingual microimplants in the lower arch also.

Another method opted was the use of skeletal plates for anchorage rather than microimplants but this technique

involved an open surgical method with its post operative consequences.

6. Conclusion

1. Segmental arch wires with TADs is an effective method for correction of gummy smile by the true intrusion of the anteriors.
2. Extrusion of molar can be prevented.
3. More cost effective and less time consuming because the retraction was frictionless.

7. Source of Funding

None.

8. Conflict of Interest

None.

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