

# TAD-assisted Full Arch Maxillary Intrusion During Growth

## Non Surgical Correction of Excessive Gingival Display

This 14 year old 4 month old female presents with a chief complaint of excessive gingival display. She has not yet experienced the onset of menstruation. She presents with no significant medical or dental history affecting treatment planning and no complicating factors associated with the periodontium or oral tissues.

### ETIOLOGY AND DIAGNOSIS

Pretreatment facial photographs (Fig. 1) show a convex profile bimaxillary protrusion. The patient displays 8 mm of gingiva upon smiling. The lip profile is protrusive relative to the E-line, but she is not lip incompetent. Pretreatment Intraoral photographs (Fig. 2) show class I molar and canine relationships with normal overbite and overjet, moderate crowding in the lower arch and mild crowding in the upper arch. Cephalometric analysis (Fig. 3) shows a class II skeletal relationship  $ANB = 8$ , hypodivergent mandible  $SN-MP = 44$  and lower incisors that are inclined 102 degrees to Mn plane. The patient's chief complaint: "Can you make it so that I don't look like a horse?"

### TREATMENT OBJECTIVES

The overall treatment objectives were to level, align and develop the arches. Maintain Class I dental relationships, ideal overbite, overjet and smile arc. Intrude the maxillary dentition and modify vertical growth of the maxilla in order to reduce gingival display such that the smile line is coincident with the gingival margin.



■ Fig 1. Pretreatment facial photographs



■ Fig 2. Pretreatment intraoral photographs



■ Fig 3. Posttreatment facial photographs

The specific treatment objectives were:

- Maintain the AP position of the maxilla
- Restrain vertical growth of the maxilla
- Correct high smile line and excessive gingival display
- Improve vermilion display of the upper lip



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- Maintain class I molar/canine relationships, ideal overbite and overjet
- Encourage autorotation of the mandible
- Maintain lip competence
- Accept facial convexity and a protrusive lip profile

## TREATMENT ALTERNATIVES

A surgical correction of the high smile line was discussed but rejected by the family due to cost and lack of medical insurance coverage. The alternative of extraction treatment to reduce the protrusive lip profile was explored. The family chose to maintain the existing lip profile and pursue a nonextraction treatment plan. Family ethnicity and lip competence despite bimaxillary dentoalveolar protrusion were the driving forces behind this decision. The following treatment plan was created to achieve treatment objectives and satisfy patient preferences:

- (1) Level and align both arches nonextraction.
- (2) Intrusion of the maxillary dentition and modification of vertical maxillary growth achieved with skeletal anchorage.

## TREATMENT PROGRESS

Damon standard torque .022 appliances were placed in both arches. Routine leveling and alignment was achieved with a standard arch wire sequence to 19x25 ss requiring 6 months of treatment time. A soldered transpalatal arch was placed with 6 mm of clearance relative to

the palatal tissue and an acrylic button to provide comfort for the tongue and encourage additional intrusive forces by the tongue upon the maxillary dentition. ( Fig. 4 ) 6 mm vector tads were placed at the mucogingival junction in the buccal vestibule between the upper central and lateral incisor roots and 8 mm vector tads between the roots of the upper second bicuspids and molars.



■ Fig 4. Occlusal Upper Progress 3.18.09

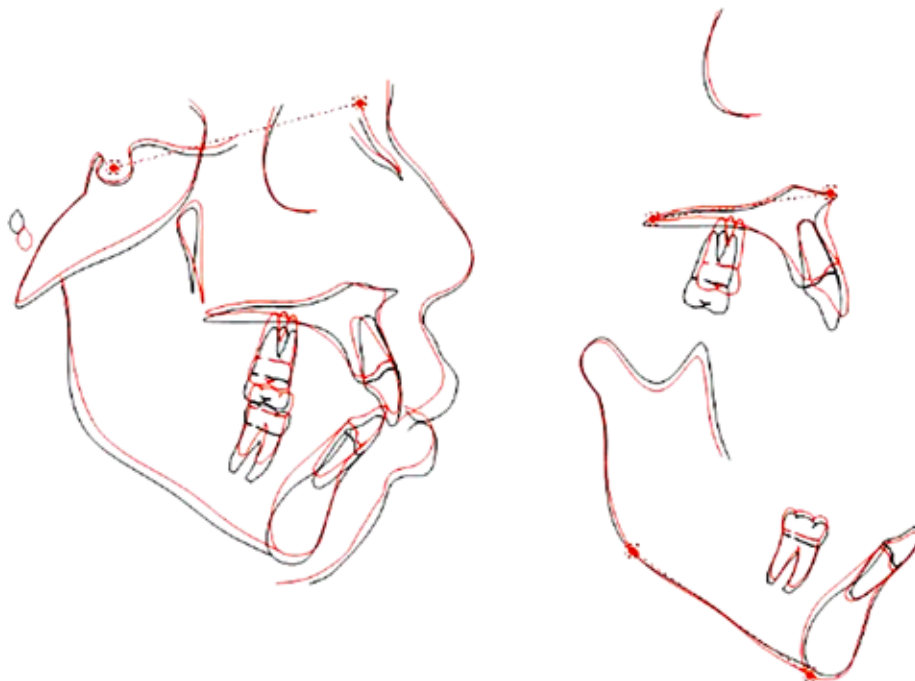
Intrusive forces were applied to the posterior segments with 250 gm Niti coil springs between the upper first molars and second bicuspids. Smaller intrusive forces of 150 gms each were applied to the arch wire between the maxillary central and lateral incisors so as to maximize molar intrusion and autorotation of the mandible while simultaneously reducing gingival display. The intrusive forces were applied for a total of 14 months. During the course of treatment the upper

right posterior TAD failed twice as well as the upper right anterior TAD once due to root collisions during intrusion. The TAD was then removed and final detailing of the posterior occlusion, anterior root torque, ideal overbite and overjet relationships were achieved with 19x25 TMA and light interarch elastics for an overall treatment time of 24 months. Some gingival countouring was performed with a diode laser to maximize enamel display and establish pleasing gingival margin symmetry. Osseous crown lengthening was not necessary as reported by others<sup>1</sup>. Bonded wire retainers were placed and night time essix retainers were delivered.

## TREATMENT RESULTS

The cephalometric analysis and superimposition of before and after treatment tracings show a significant dental-alveolar intrusion of the entire upper arch as well as a restraint of downward and forward growth of the maxilla coupled with a

mandibular forward autorotation. ( Fig 5 ) A pleasing display of first and second bicuspids was achieved in the buccal corridors. Class I molar and canine and ideal overjet and smile arc relationships were maintained. Maxillary gingival display was reduced such that a pleasing smile line was achieved with the upper lip being just above the gingival margin of the maxillary incisors. Vermillion display of the upper lip was improved with remodeling of the anterior alveolus. Overbite is ideal and crowding is resolved while maintaining lip competence. (Figs. 6,7)The outcome was pleasing to the patient, patient's family and to the clinician. It was significant to note that this patient experienced the onset of menstruation at the 13 month mark of the overall 24 month treatment time. Significant growth modification of the maxilla was achieved with skeletal anchorage and accounted for approximately 40% of the correction of vertical maxillary excess. Facial convexity was accepted. However, the patient is considering advancement genioplasty. Failures of TADs occurred in this case



■ Fig 5. Superimposed tracings

due to root proximity during dental intrusion, especially in the posterior where limited inter-radicular space was present. An updated treatment protocol would include use of an alternative TAD placement site such as the midpalatal suture to reduce the chance of posterior TAD failure due to root proximity. Creating root divergence prior to TAD placement and intrusion could reduce the chance of anterior TAD failure. In conclusion, this case demonstrates the profound and exciting application of skeletal anchorage to modify growth of the maxilla in the vertical plane of space, reduce gingival display while maintaining ideal occlusal relationships.



■ Fig 6. Posttreatment intraoral photographs



■ Fig 7. tracing with black values

**REFERENCE**

1. Bowman et al. Journal of Clinical Orthodontics, May 2009.

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