A CASE REPORT
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# A BREAKTHROUGH IN CLASS III STEREOTYPES – MAXILLARY PROTRACTION WITH TANDEM TRACTION BOW APPLIANCE – A CASE REPORT.

Dental Science

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## ABSTRACT

Since Class III malocclusion is progressive in nature, the facial growth of Class III malocclusion worsens with age. It is characterized by a deficient maxilla, retro gnathic mandible, or a combination of both. The early orthopedic treatment of Class III malocclusions allows accomplishment of successful results, providing facial balance, modifying the maxillofacial growth and development, and in many instances, preventing a future surgical treatment by increasing the stability. The major problem with extraoral anchorage has been of patient compliance due to its physical appearance. This case report presents an intraoral Tandem Traction Bow Appliance for maxillary protraction that has been used clinically to achieve successful results without relying much on patient co-operation. Skeletal change was primarily a result of anterior movement of the maxilla.

## KEYWORDS

## INTRODUCTION

Growing patients with dentofacial deformities characterized by either a midfacial deficiency or true mandibular prognathism are perhaps the most challenging cases for the clinician to manage. In patients with midfacial deficiency, the current clinical protocol calls for orthopaedic maxillary protraction by means of elastics to either an extraoral facemask or a chin cup.[1,2] A maxillary expander is often used to enhance the orthopedic effect.[3,4] If the patient is motivated enough to wear a facemask, treatment is likely to be successful.[5,6] Downward and forward movement of the maxilla, an increase in overjet,[7-12] and a backward rotation of the mandible with increased anterior facial height have all been documented with facemask therapy.[13-

16 The major problem, however, has been one of compliance, due to both the physical appearance of the extraoral appliance and skin irritation from the anchorage pads. This article presents an intraoral appliance that has been used clinically to achieve successful results in such cases without relying on unusual patient cooperation.

## DIFFERENTIAL DIAGNOSIS

Careful evaluation of the diagnostic records, in conjunction with the clinical examination and medical history, is critical. If the patient presents with an anterior crossbite, the clinician must distinguish between the dental component and the skeletal growth component.

Furthermore, a skeletal development problem must be differentiated between mandibular prognathism and midfacial maxillary deficiency. The Tandem Traction Bow Appliance (TTBA) shown in this article is designed for Class III patients with skeletal midfacial deficiencies as described by Leon Klempner.[17]

## APPLIANCE DESIGN

The TTBA has the following components, two acrylic splints (upper and lower) with a modified facebow for traction. An upper removable appliance consists of an acrylic retainer has soldered buccal arms or embedded in the acrylic splint used for elastic traction. The lower appliance comprises a removable acrylic retainer with posterior occlusal coverage and buccal headgear tubes embedded in the area of the lower first molars. An .045" headgear facebow with the outer bows bent out for elastic attachment is inserted into the lower tubes. Heavy orthopedic elastic traction (400g per side) from the facebow to the buccal arms of the upper appliance delivers the protraction force to the maxilla. Initially, the protraction of maxilla was started with only light force of 230 g/ 8 oz (Leone Orthodontics, Italy). The patients are instructed to begin wearing the appliance minimum of 10-12 hours per day, including while sleeping. Recall the patient one week later to verify compliance and check the appliance. On occasion, the buccal arms may irritate the inside of the cheeks, requiring minor adjustment. The patient is then scheduled every six weeks to monitor progress.

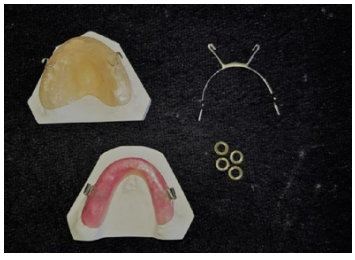

**Figure 1. Components of TTBA**

## CASE REPORT

A 13-year-old boy reported to our department with the chief complaint of an unesthetic profile and malaligned upper front teeth. His medical history was non-contributory, but his family history revealed that his mother also had the similar facial pattern. Clinical examination revealed a significant midfacial deficiency and with soft tissue masking suggesting of a tendency towards skeletal class III malocclusion. Intraoral examination revealed an anterior cross bite,

Class I malocclusion, reduced overjet and overbite. There were no interference and deviation of mandible on closure. Lateral cephalogram and orthopantomogram were taken to confirm the malocclusion and the skeletal discrepancy. The TTBA was fabricated and inserted as explained above. The boy was reviewed at an interval of 4 weeks for 8 months (active treatment phase) and the patient was highly complaint with no report of appliance breakage or discomfort during the initial phase of treatment. Marked improvement in the face and profile was observed post treatment and appliance was removed 2 months after active treatment. The pretreatment and the posttreatment values of the cephalogram are given in the Table 1. Cephalometric evaluation revealed a significant skeletal improvement. The boy was advised to have regular follow-up, as there is a high relapse tendency for skeletal class III malocclusion.

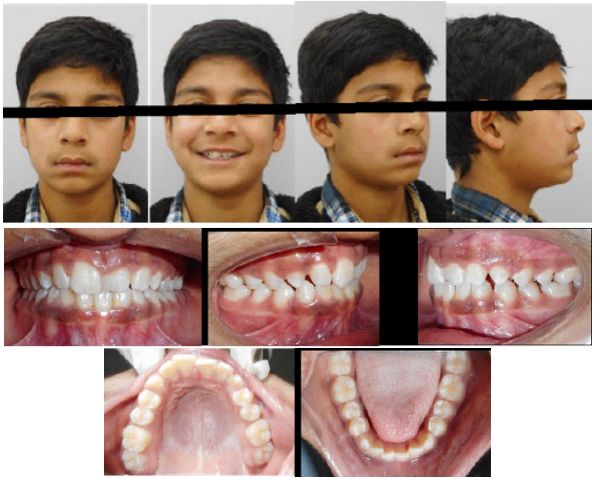

**Figure 2: Extra-Oral and Intra-Oral Pre-treatment Photographs**

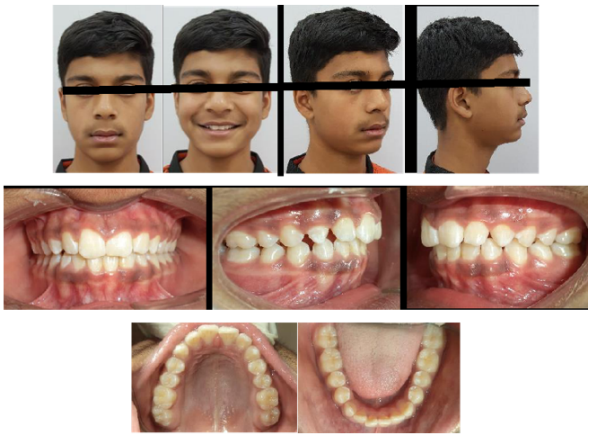

**Figure 4: Extra-Oral and Intra-Oral Post TTBA Photographs**

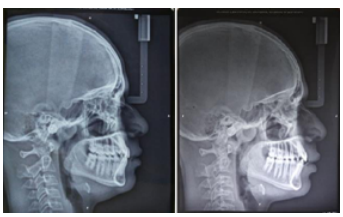

**Figure 5: Pre-treatment and Post-treatment Lateral Cephalogram**

**Table 1. Pre-treatment and Post-treatment values**

| Sr. No | Parameter | Pre-Treatment | Post-treatment |
|---|---|---|---|
| | **SKELETAL** | | |
| 1. | SNA Angle | 78° | 81° |
| 2. | SNB Angle | 78° | 78° |
| 3. | ANB Angle | 0° | 3° |
| 4. | PN to point A | 0 mm | 2 mm |
| 5. | PN to Pog | 7 mm | 7 mm |
| 6. | Go-Gn to SN | 32° | 32° |
| 7. | Angle of Inclination | 89° | 89° |
| 8. | Y-axis Angle | 66° | 66° |
| | **DENTAL** | | |
| 9. | U1 to NA Angle | 20° | 22° |
| 10. | U1 to NA Linear | 2 mm | 3 mm |
| 11. | U1 to SN Angle | 101° | 103° |
| 12. | L1 to NB Angle | 20° | 20° |
| 13. | L1 to NB Linear | 3 mm | 3 mm |
| 14. | L1 to A-Pog | 1 mm | 1 mm |
| 15. | IMPA | 90° | 90° |
| 16. | Interincisal Angle | 137° | 136° |
| | **SOFT TISSUE** | | |
| 17. | Nasolabial Angle | 106° | 105° |

## DISCUSSION

Treatment of skeletal class III malocclusion is difficult when compared with a nonskeletal class III malocclusion. Functional orthopedic appliances affect the facial skeletal complex of children, activate orthodontic force in teeth and alveolar areas, create a more normal skeletal development and achieve a clinically acceptable esthetic facial profile. These appliances are effective only in growing children. Most commonly facemask or reverse pull headgear is used to correct these malocclusions which use elastics and extraoral anchorage for protraction of maxilla. In the above case, we used TTBA which was more comfortable to the patient. This appliance is more esthetic and does not require any extraoral anchorage as the other appliances. Specific diagnosis of skeletal relationships can be made using a number of conventional cephalometric analyses. The pretreatment cephalometric analysis in the patients confirmed a skeletal class III malocclusion. The patient had an anterior cross bite with central incisor in the first and the third quadrant. The ultimate goals in treating a class III malocclusion are to protract the maxilla to correct the anterior cross bite, restrict the growth of mandible, and establish a stable esthetic profile. The patients had an average growth pattern which was favorable for our appliance therapy. Mobilization of the maxillary suture system has become an integral part of orthopedic correction of class III malocclusion in spite of presence or absence of posterior cross bite. This is achieved by expanding the maxilla with rapid maxillary expansion appliances even though no transverse expansion is indicated. This expansion disrupts the circummaxillary suture system, presumably facilitating the response of maxilla for protraction. Oppenheim[18] was one of the first to discuss this possibility. Hass[19-22] has demonstrated that rapid palatal expansion can produce a slightly forward movement of point A and a slightly downward and forward movement of the maxilla. As there was no posterior cross bite and the arches were fairly normal, expansion was not carried out. Profitt stated that the optimal age for maxillary protraction is about 6-7 years.[23] Sullivan recommended such treatment before the age of 10 years or at least 1 or 2 years before the pubertal growth spurt.[22] Our patient was a 13 year old male falling in the acceleration phase and pubertal growth spurt hence undertaken for protraction of maxilla. Initially, very light bilateral traction was applied using 8 oz elastics followed by heavy force using 14 oz elastics. The direction of force is determined by the position of the hooks on the upper appliance and the buccal tubes on the lower appliance. They are so positioned that the elastic force passes through the center of resistance of the maxilla (20° to the occlusal plane).[24-26] The patients were more comfortable wearing the appliance for a longer duration everyday. The duration of treatment of skeletal class III malocclusion varies with individuals. The duration of active treatment phase for the two patients is about 9 months. The post treatment cephalometric analysis confirmed a significant improvement in the skeletal relationship. The change in ANB angle reveals the correction of the overjet and anterior cross bite.

## CONCLUSION

TTBA is more effective in the treatment of skeletal class III malocclusion. The action of the appliance is the same as with conventional face mask therapy, but with much better cooperation and fewer adjustments. Patient has not experienced any TMJ discomfort or pain despite the heavy elastic forces. From the above case, it is apparent that it induces favorable skeletal changes like maxillary advancement along with restriction of mandibular protrusion, resulting in an esthetic profile.

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