

# Early Correction of Skeletal Class III with Modified Tandem Appliance

Dr. Rekha Sharma<sup>1</sup>, Dr. Sachin Parashar<sup>2</sup>, Dr. Shakti<sup>3</sup>

<sup>1</sup>Professor and Head, Department of Orthodontics and Dentofacial Orthopaedics, Post Graduate Institute of Dental Sciences, Rohtak

<sup>2</sup>Consultant Orthodontics, Ex Resident Department of Orthodontics and Dentofacial Orthopaedics, Post Graduate Institute of Dental Sciences, Rohtak

<sup>3</sup>Post Graduate Student, Department of Orthodontics and Dentofacial Orthopaedics, Post Graduate Institute of Dental Sciences, Rohtak

---

## ABSTRACT

Managing a mid-facial deficiency or true mandibular prognathism is perhaps the most challenging situation for the clinician. Many orthopedic appliances like chin cup, facemask, orthodontic camouflage or combined surgical/orthodontic approach for patients with severe skeletal discrepancies. and so on have been advocated to correct class III malocclusion. The major problems with these appliances are physical appearance, skin irritation from the anchorage pads and hence, less patient compliance. Due to poor patient compliance during facemask therapy there has been growing interest in intraoral appliances for correcting Class III malocclusion. The tandem traction bow appliance (TTBA) is an intraoral appliance which has been used successfully for the treatment of growing Class III patients. This paper presents the fabrication of the new modified tandem appliance and its use in management of developing Class III malocclusion. The therapeutic results of a new modified tandem appliance with fixed mandibular component are presented in a girl 11yrs of age with anterior cross bite and prognathic mandible. There was a significant improvement in profile of the patient. The use of this appliance in this type of malocclusion enabled the correction of malocclusion in a few months and encouraging favorable skeletal growth in the future. The results of this case showed that Class III malocclusion should be intercepted as early as possible to permit growth redirection.

---

## INTRODUCTION

Managing a mid-facial deficiency or true mandibular prognathism is perhaps the most challenging situation for the clinician. Many orthopedic appliances like chin cup, facemask, orthodontic camouflage or combined surgical/orthodontic approach for patients with severe skeletal discrepancies. and so on have been advocated to correct class III malocclusion. The major problems with these appliances are physical appearance, skin irritation from the anchorage pads and hence, less patient compliance. Due to poor patient compliance during facemask therapy there has been growing interest in intraoral appliances for correcting Class III malocclusion.

Chun *et al.* (1999) introduced the tandem traction bow appliance (TTBA) for the treatment of growing Class III patients. They defined the TTBA as a more aesthetic and comfortable device compared with conventional appliances because it is removable, easy to maintain oral hygiene, and worn intraorally. In two published case reports, it has been suggested that TTBA and modified applications have a similar treatment effect to that of an expander-facemask combination (Chun *et al.*, 1999; Klempner, 2003).

The Tandem Appliance provides a tooth borne anchorage system that combines skeletal and dentoalveolar movement. Nevertheless, the increased level of patient cooperation with the Tandem Appliance, combined with the ability to control the vertical dimension, protract the maxilla, and benefit from the Class III elastic dentoalveolar effect, makes this appliance extremely valuable in nonsurgical Class III treatment.

Etiology of class III malocclusion is generally believed to be genetic and familial occurrence has also been demonstrated in several studies. A wide range of environmental factors have been suggested as contributing to the development of class III

malocclusion. Among those are enlarged tonsils, difficulty in nasal breathing, congenital anatomic defects, disease of the pituitary gland, hormonal disturbances, a habit of protruding mandible, posture, trauma and disease, premature loss of 6th year molar, and irregular eruption of permanent incisors or loss of deciduous incisors. Other contributing factors such as the size and relative positions of the cranial base, maxilla and mandible, the position of the temporomandibular articulation and any displacement of the lower jaw affect both the sagittal and vertical relationships of the jaw and teeth. Class III malocclusion can be divided into three groups:

1. Skeletal type caused by maxillary underdevelopment, mandibular overgrowth or both,
2. Dental type caused by disharmony of interincisal inclination in a normal skeletal base and
3. Functional type caused by forward shift of the mandible from occlusal interference (pseudo class III)

### Appliance design

The appliance has three components two fixed and one removable. The upper fixed appliance has fixed hyrax with bite blocks with buccal arms soldered to the framework. The lower appliance has fixed lingual holding arch with soldered buccal headgear tubes. An 0.045" headgear facebow with the outer bows bent out for elastic attachment is inserted into the lower tubes. Posterior acrylic bite blocks inhibit vertical eruption and mandible auto rotates, reducing the mandibular plane angle.

### CASE REPORT

An 11-year-old girl reported with a chief complaint of an unesthetic profile and forwardly placed lower front teeth. Her medical and family history was noncontributory. Clinical examination revealed midfacial deficiency and anterior facial divergent characterizing class III malocclusion. There were no interference and deviation of mandible on closure. Investigations confirmed class III malocclusion. Intraorally, she had anterior crossbite i.r.t 11, 12, 21, and 22 spacing i.r.t 33, 34, 35 and 43 44; class III molar relation on both sides; a low anterior tongue posture. On analysis of lateral head cephalogram patient had Class III maxillomandibular relation ( $ANB = -2^\circ$ , Wits appraisal = -6 mm). There was horizontal growth tendency with FMA  $21^\circ$ , and Jarabak ratio was 67.7%. Maxilla was normal and with prognathic mandible. Upper and lower incisors were slightly proclined. Maxillary protraction was started after 5 weeks of alternate rapid maxillary expansions and contractions (Alt-RAMEC), with a force of 300 cN per side applied for 12-14 hours per day. The girl was reviewed at an interval of 4 weeks.





Mid treatment

Post treatment





## RESULTS

There was a significant improvement in profile of the patient. The use of this appliance in this type of malocclusion enabled the correction of malocclusion in a few months and encouraging favorable skeletal growth in the future. The results of these cases showed that Class III malocclusion should be intercepted as early as possible to permit growth redirection. Early intervention, adequate indication of appliances, and patient compliance are key factors for good outcomes.

## DISCUSSION

The success of orthodontic treatment in patients with a developing Class III malocclusion depends on individual growth and timing of orthodontic or orthopedic intervention. For patients with moderate to severe Class III malocclusions, the decision of whether to treat early or to wait until the end of growth is difficult. The advantages of early treatment include minimizing dental compensation and over closure of the mandible, which can lead to better facial esthetics during this important growth period. Takada *et al.*, reported that the forward maxillary displacement with protraction is more favorable before or during acceleration of a child's pubertal growth spurt. Baccetti *et al.*, reported that Class III treatment with maxillary expansion and protraction is effective in the maxilla only when it is performed before the peak (cervical Stage 1 or cervical Stage 2)

Alt-RAMEC can increase the amount of maxillary protraction and result in a shorter period of protraction. We used 5 weeks of Alt-RAMEC as suggested by Wang *et al.*

The traditional facemask has the advantage of generating maxillary protraction with pure extraoral anchorage. In contrast, the tandem appliance provides a tooth-borne anchorage system that combines skeletal and dentoalveolar movement. Nevertheless, the increased level of patient cooperation with the tandem appliance, combined with the ability to protract the maxilla, and benefit from the Class III elastic dentoalveolar effect, makes this appliance valuable in nonsurgical Class III treatment.

## CONCLUSION

Satisfactory correction can be obtained with modified TTBA appliance in patients having skeletal and dental Class III malocclusion with an average or decreased mandibular growth pattern. From the above two cases, it is apparent that it induces favorable skeletal changes like maxillary advancement along with restriction of mandibular protrusion, resulting in an esthetic profile.

## REFERENCES

- [1]. Chun Y, Jeong SG, Row J, Yang SJ. A new appliance for orthopedic correction of Class III malocclusion. J Clin Orthod. 1999;33:705-711.
- [2]. Ngan, P.; Yiu, C.; Hu, A.; Hagg, U.; Wei, S.H.; and Gunel, E.: Cephalometric and occlusal changes following maxillary expansion and protraction, Eur. J. Orthod. 20:237-254, 1998.
- [3]. Ngan, P.W.; Hagg, U.; Yiu, C.; and Wei, S.H.: Treatment response and long-term dentofacial adaptations to maxillary expansion and protraction, Semin. Orthod. 3:255-264, 1997.
- [4]. Takada K, Petdachai S, Sakuda M. Changes in dentofacial morphology in skeletal Class III children treated by a modified maxillary protraction headgear and a chin cup: a longitudinal cephalometric appraisal. Eur J Orthod 1993;15: 211-21.
- [5]. Bacetti T, Franchi L, McNamara JA Jr. Treatment and posttreatment changes after rapid maxillary expansion and facemask therapy. Am J Orthod Dentofacial Orthop. 2000; 118:404-413.
- [6]. Klemmner LS. Early orthopedic class III treatment with a modified tandem appliance. J Clin Orthod 2003;37: 218-23.