



Case Report

Modified tandem appliance for early correction of class III malocclusion – A case report

Sneha Shalu¹, Amritha Prasad², Shetty Suhani Sudhakar^{3,*}, Mithun K Naik⁴

¹Private Practitioner, Calicut, Kerala, India

²Private Practitioner, Kochi, Kerala, India

³Private Practitioner, Hebbal, Bangalore, India

⁴Dept. of Orthodontics, A.J. Institute of Dental Sciences, Mangalore, Karnataka, India



ARTICLE INFO

Article history:

Received 25-02-2022

Accepted 02-03-2022

Available online 31-03-2022

Keywords:

Orthopaedic

Proclined

Anteriors

ABSTRACT

Class III malocclusion is associated with a sagittal malrelationship of the maxilla and the mandible, characterized by a deficient maxilla, retrognathic mandible, or a combination of both. The early treatment of Class III malocclusions provides facial balance, modifies the maxillofacial growth and development, and prevents future surgical treatment by increasing the stability. Many treatment approaches can be found in the literature regarding orthopedic and orthodontic treatment of Class III malocclusion, including intra- and extra-oral appliances. The major problem with extraoral anchorage has been of patient compliance due to its physical appearance. The case report presents an intraoral modified tandem appliance for maxillary protraction that has been used clinically to achieve successful results without relying much on patient co-operation.

This is an Open Access (OA) journal, and articles are distributed under the terms of the [Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License](https://creativecommons.org/licenses/by-nc-sa/4.0/), which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: reprint@ipinnovative.com

1. Introduction

Class III malocclusion is a sagittal malrelation between maxilla and mandible characterized either by mandibular prognathism or maxillary retrognathism or the combination of both.¹ Many extraoral and intraoral appliances are available for orthopaedic correction of class III malocclusion in growing individual. Some of them are facemask, functional regulator, reverse twin block, chin cup, class III elastics etc. Early orthopaedic correction of class III malocclusion leads to better facial balance, modifies growth and prevents orthognathic surgery at a later stage.²

Facemask with rapid maxillary expansion is the most common orthopaedic appliance used in class III malocclusion and it leads to great orthopaedic changes. But they have several disadvantages such as it depends on

patient compliance, they are unesthetic and uncomfortable and patient gets uncomfortable from the anchorage pads.³

In 1999, Chun et al introduced a tandem traction bow appliance for treating class III malocclusion which eliminated the compliance and the comfort issue faced with facemask as it was an intraoral appliance.⁴ This appliance was later modified by Klemperer in 2003.⁵

Here's a case report which presents a two phase therapy in a young girl. First phase was Modified Tandem appliance used for Class III malocclusion correction followed by phase II of fixed orthodontic therapy to achieve desirable results without relying much on patient co-operation.

1.1. Appliance design

Modified Tandem appliance (Figure 1) consisted of three components, which were two fixed and one removable component. Fixed component consists of bands on

* Corresponding author.

E-mail address: suhanishetty93@gmail.com (S. S. Sudhakar).

maxillary first premolar and first molar, transpalatal arch and palatal bar arm extending to upper anteriors. The bands in the upper premolar and molar were connected with a stainless steel wire in buccal and lingual aspect. Hook was soldered buccally to premolar band for elastic engagement in maxillary arch.

Lower appliance is a removable retainer with occlusal coverage in posterior segment. 0.045" headgear tube is placed in first molar aspect for attaching modified headgear facebow with outerbow. Outerbow is used for elastic engagement in lower arch. C clasp is placed in 1st premolar for retention. Patient was advised to wear the 8 ounce elastic from upper hook to lower facebow attachment for 24 hours. Subsequently, heavy orthopedic traction with 14 ounce elastics effectively delivers the protraction force to the maxilla.



Fig. 1: Appliance design

2. Case Report

12 year old female patient came to the department of orthodontics and dentofacial orthopaedics with the chief complaint of forwardly placed lower jaw. She had no relevant medical, dental or family history. On extra oral examination, she had a round facial form, concave profile, anterior divergence, acute nasolabial angle, lip incompetence of 3mm. Intraorally, she had Angle's class

I molar relationship with positive overjet of 1mm which was a compensation for class III caused by proclined upper and retroclined lower arch, normal overbite, highly placed canines and mild crowding in lower anteriors. (Figure 2)



Fig. 2: Pre- treatment Photograph

Panoramic radiograph showed all teeth except for third molar were present. No pathology was seen. Cephalometrically, ANB value of -1° indicated a class III skeletal pattern where the maxillary was posteriorly positioned and the mandible was positioned anteriorly and reduced maxillary and mandibular lengths with average growth pattern. Patient had a proclined upper incisor and retroclined mandibular incisor which was a natural compensation for class III skeletal pattern, thus showing a positive overjet. Patient has an acute nasolabial angle and retruded upper lip. The patient was in Fishman's Stage VI of growth status as per hand-wrist radiograph (Figure 3).

Diagnosis was Skeletal Class III base with average growth pattern and underlying Angles Class I malocclusion with proclined upper and retroclined lower incisors and bimaxillary crowding.

2.1. Treatment objective

1. Correction of anteriorly positioned mandible and posteriorly positioned maxilla
2. Correction of proclined upper and retroclined lower anteriors
3. Correction of crowding in relation to upper and lower anteriors
4. Correction of retruded lower lip
5. Correction of reduced nasolabial angle
6. Achieving a pleasant soft tissue profile

2.2. Treatment alternative

Facemask therapy for orthopaedic correction was suggested for skeletal class III correction. But as Tandem appliance



Fig. 3: Pre- treatment Radiograph

was more esthetic than facebow. Facebow therapy was rejected by the patient.

2.3. Treatment plan

Phase 1 is to be carried out with Tandem appliance for skeletal correction of Class III followed by phase 2 of fixed orthodontic treatment for final detailing of occlusion.

2.4. Treatment progress

Tandem appliance was chosen for the orthopaedic correction of skeletal class III. Upper fixed appliance was banded to 1st premolar and molar and cemented to upper arch with GIC. Hooks for elastic was soldered precisely in upper arch for elastic engagement. The protraction hooks in the maxilla were placed distal to the permanent canines, so that the elastic force passes through the center of resistance of the maxilla. Facebow is modified into a traction bow for elastic attachment in lower arch. On both sides, a force of 400–450 g was applied bilaterally for 14–16 hours per day. Figure 4 shows appliance after placement in patient's mouth. Patient was recalled ever 6 weeks to check the progress.



Fig. 4: Patient photograph with appliance in mouth

2.5. Treatment result

After 4 months of treatment, overjet increased to 5 mm as a part of overcorrection. Appliance was placed in the patient for 3 months as a part of safety protocol. . After 7 months of appliance wear, there was positive overjet of 5 mm and pleasing facial profile.(Figure 5) This was followed by phase 2 of fixed orthodontic treatment. (Figure 6)



Fig. 5: Photographs after phase 1

After phase 1 and Phase 2, we were able to attend out treatment goals. Patient had a pleasing soft tissue profile with competent lip. Intraorally, patient had a class I molar relation with normal overjet and overbite and well aligned upper and lower arch.(Figure 7)

Cephalometrically, Sella-nasion- point A increased by 2° whereas, Sella-nasion- point B decreased by 2°, thus resulting in a class I skeletal pattern. Dentally upper incisor



Fig. 6: Fixed orthodontic therapy (Phase 2)

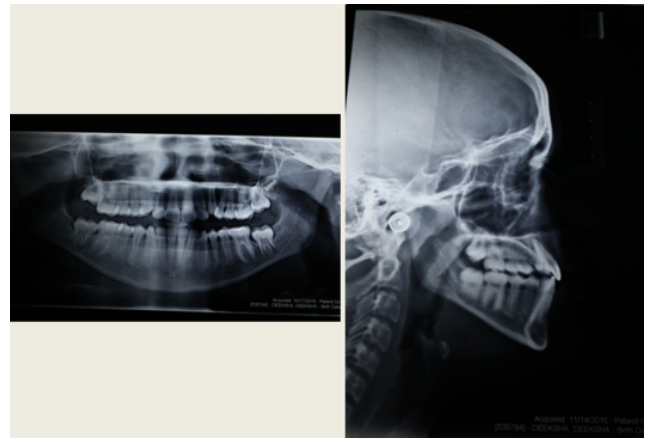


Fig. 8: Post- treatment Radiograph



Fig. 7: Post- treatment photograph

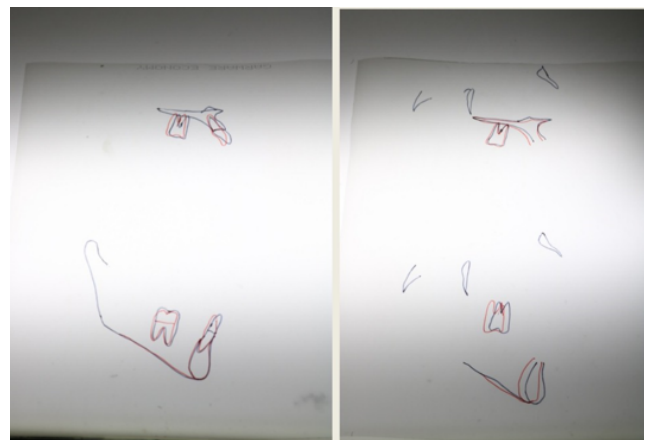


Fig. 9: Superimposition

proclined and lower incisor retroclined after phase 1 which was corrected in phase 2 by proclining the lower incisor and distalization in upper arch.(Figure 8)

Figure 9 shows the superimposition after the completion of phase 1 and phase 2.

3. Discussion

Developing Class III malocclusion is one of the most challenging problem which is faced by an orthodontist in their practice. It requires early diagnosis and management.^{6,7}Optimal time of class III correction is at the time of maxillary incisor eruption.^{8,9}

Various treatment modalities has been proposed in literature. Turley et al showed class III correction with the use of palatal expansion and headgear.¹⁰ Tsai suggests the use of rapid palatal expansion and standard edgewise appliance to resolve an anterior cross bite in a 7 years old

boy.¹¹ Rabie and Gu have used a simple method for the early management of pseudo-Class III malocclusion in the mixed dentition with fixed appliance.¹² The therapeutic use of a Balters' Bionator appliance is suggested in three subjects with anterior cross bite in mixed dentition by Giancotti et al.¹³

Tandem appliance is been suggested for correction of Class III malocclusion. With Tandem appliance, a positive overjet can be obtained which appears to maintain normal occlusion.^{7,9} For long term stability in growing Class III malocclusion, overcorrection is required as skeletal pattern continue to grow in the same direction after initial treatment.^{7,14}

The modified Tandem appliance used in our case report provide a tooth borne anchorage system that combines skeletal and dentoalveolar movement. This appliance provides high level of patient compliance combined with the ability of protracting maxilla which is very important in early treatment of class III malocclusion. The patient selected in the present case report have mild skeletal malocclusion and the appliance showed appreciable

changes, it warrant that the appliance can also be used in more severe form of skeletal malocclusion.

4. Conclusion

Satisfactory correction can be obtained with this modified tandem appliance in patient with Class III malocclusion and average and horizontal growth pattern. As the appliance is more esthetic compared with a conventional facemasks, it could be a good alternative for noncompliant patients.

5. Conflict of Interest

None.

6. Source of Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.


References

1. Pujari P, Shetty P, Quadros DD. Rationale for early treatment and different treatment modalities of class III malocclusion: A review. *Indian J Dent Sci.* 2015;7:121–6.
2. Almeida MR, Almeida RR, Oltramari-Navarro PV, Conti AC, Rde LN, Camacho JG, et al. Early treatment of class III malocclusion: 10-year clinical follow-up. *J Appl Oral Sci.* 2011;19(4):431–9. doi:10.1590/s1678-77572011000400022.
3. 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(3):211–5. doi:10.1093/ejo/15.3.211.
4. Chun YS, Jeong SG, Row J, Yang SJ. A new appliance for orthopedic correction of class III malocclusion. *J Clin Orthod.* 1999;33(12):705–11.
5. Klemptner LS. Early orthopedic class III treatment with a modified tandem appliance. *J Clin Orthod.* 2003;37(4):218–23.
6. Joondeph DR. Early orthodontic treatment. *Am J Orthod Dentofacial Orthop.* 1993;104(2):199–200. doi:10.1016/S0889-5406(05)81011-X.
7. Ngan P. Early timely treatment of Class III malocclusion. *Semin Orthod.* 2005;11(3):140–5. doi:10.1053/j.sodo.2005.04.007.
8. Kapust AJ, Sinclair PM, Turley PK. Cephalometric effects of face mask/expansion therapy in Class III children: A comparison of three age groups. *Am J Orthod Dentofacial Orthop.* 1998;113(2):204–12. doi:10.1016/s0889-5406(98)70141-6.
9. Ngan P, Yiu C, Hu A, Hägg U, Wei SH, Gunel E, et al. Cephalometric and occlusal changes following maxillary expansion and protraction. *Eur J Orthod.* 1998;20(3):237–54. doi:10.1093/ejo/20.3.237.
10. Turley PK. Orthopedic correction of Class III malocclusion with palatal expansion and custom protraction headgear. *J Clin Orthod.* 1988;22(5):314–25.
11. Tsai HH. Treatment of anterior crossbite with bilateral posterior crossbite in early mixed dentition: A case report. *J Clin Pediatr Dent.* 2000;24(3):181–6.
12. Rabie AB, Gu Y. Management of pseudo Class III malocclusion in southern Chinese children. *Br Dent J.* 1999;186(4 Spec No):183–7. doi:10.1038/sj.bdj.4800058.
13. Giancotti A, Maselli A, Mampieri G, Spanò E. Pseudo-Class III malocclusion treatment with Balters' Bionator. *J Orthod.* 2003;30(3):203–15. doi:10.1093/ortho/30.3.203.
14. Ngan PW, Hagg U, Yiu C, Wei SH. Treatment response and long-term dentofacial adaptations to maxillary expansion and protraction. *Semin Orthod.* 1997;3(4):255–64. doi:10.1016/s1073-8746(97)80058-8.

Author biography

Sneha Shalu, Private Practitioner

Amritha Prasad, Private Practitioner

Shetty Suhani Sudhakar, Private Practitioner  <https://orcid.org/0000-0002-8827-318X>

Mithun K Naik, Assistant Professor

Cite this article: Shalu S, Prasad A, Sudhakar SS, Naik MK. Modified tandem appliance for early correction of class III malocclusion – A case report. *IP Indian J Orthod Dentofacial Res* 2022;8(1):60-64.