



Treatment of Class II Division 1 Malocclusion with Myofunctional Trainer System in Early Mixed Dentition Period

Nandini B Tripathi, Smita Nimbalkar Patil

ABSTRACT

Dentofacial growth interferences, caused by abnormal lip and tongue function in the mixed dentition period are a common clinical condition. The main purpose of the treatment in such cases is to eliminate oral dysfunction, establish muscular balance and correct or diminish maxillary incisor protrusion. The position of the teeth is determined by the lip and tongue pressure. Lip function may have been the cause of forcing teeth in to malposition they occupy. The case report is presented where the myofunctional trainer T4K is used during growth phase.

Keywords: Myofunctional appliances, Case report, Orthodontic treatment, Trainer appliance.

How to cite this article: Tripathi NB, Patil SN. Treatment of Class II Division 1 Malocclusion with Myofunctional Trainer System in Early Mixed Dentition Period: J Contemp Dent Pract 2011;12(6):497-500.

Source of support: Nil

Conflict of interest: None declared

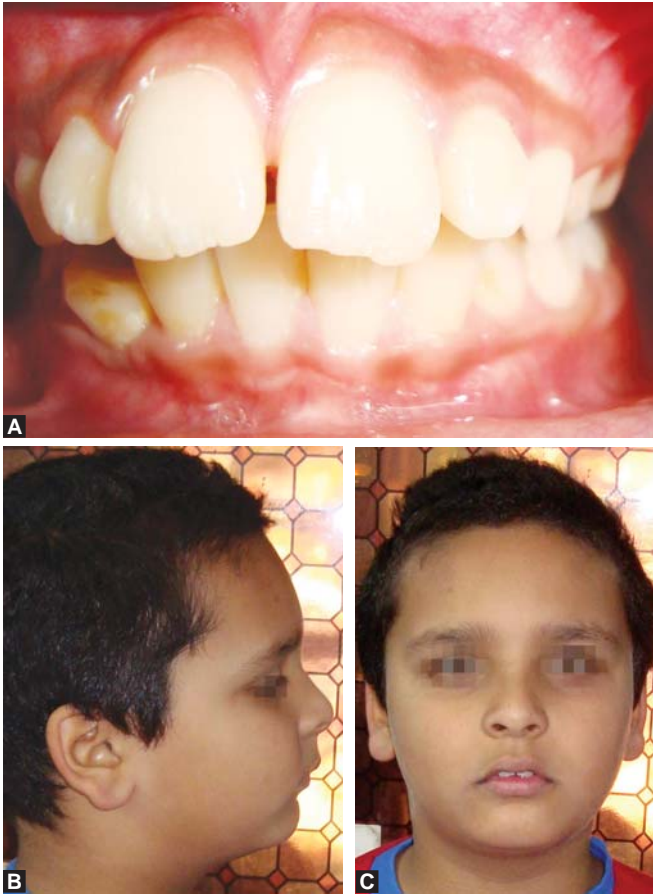
INTRODUCTION

Much attention has been paid to the problem of controlling dentofacial growth interferences caused by abnormal lip and tongue function in the mixed dentition period. Various appliances have been described in the literature for the treatment of this problem.¹⁻⁷ The main purpose of these appliances is to eliminate oral dysfunction, establish muscular balance and correct or diminish maxillary incisor protrusion.⁸ McNamara⁹ claimed that the most frequent skeletal problem in class II malocclusions in pre-adolescents is mandibular retrognathia. Animal studies have shown that appliances that position the mandible anteriorly can stimulate significant mandibular growth, primarily by an enhanced remodelling response at the condyle.¹⁰⁻¹³ Myofunctional appliances have been used for many years in orthodontics, as they are simple and economical. The

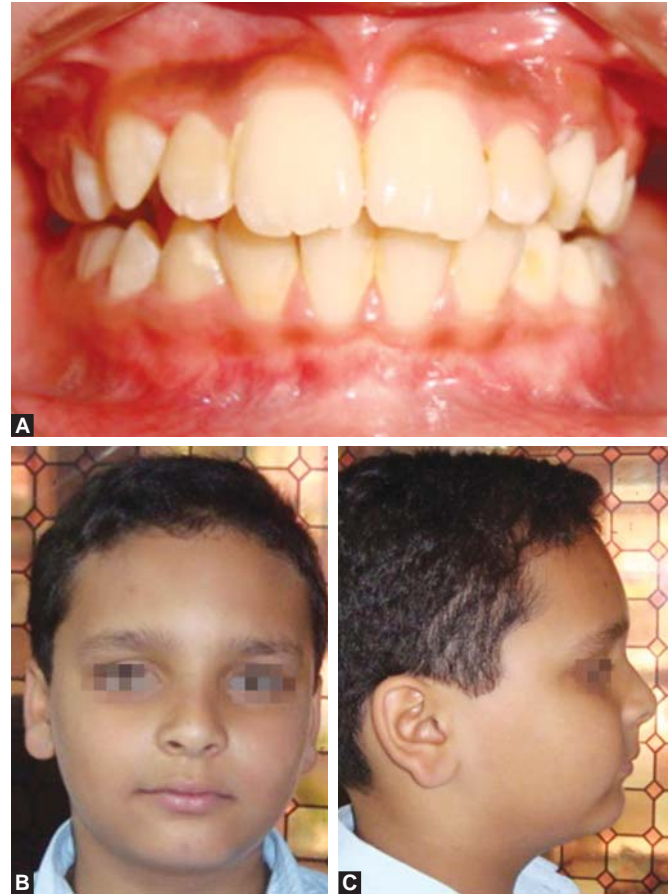
cases need to be carefully selected, and the operator needs to be well-trained in their use. Original study using myofunctional trainers in growing children has shown that increase in total facial height, lower incisor proclination, and overjet reduction are significantly higher compared with the changes observed in the control group.¹⁴ Research shows the position of teeth is determined by the lip and tongue pressure. It was generally accepted that the peculiarities of lip function is responsible for forcing teeth in to malpositions they occupy. As small a force as 1.7 gm is sufficient to move a tooth.¹⁵ It is also shown that lip exerts about 100 to 300 gm of force.¹⁵⁻¹⁶ Quadrelli Ghiglione V, Marchetti C, Gheorghiu M, Ghiglione V. Approccio¹⁷⁻¹⁹ recommended the trainer appliance to correct the interposition of lips between dental arches, atypical swallowing and the centripetal thrust of cheeks upon the dental arches; to discourage oral respiration; to avoid bruxism; and to favor the action of the external pterygoid and thus encourage advancement of the mandible. Keeping these studies as guidelines, a case report is presented where the trainer T4K is used in prepubertal male patient.

CASE DESCRIPTION

A 10-year-old boy reported to the Department of Orthodontics with the chief complaint of forwardly placed anterior teeth. On examination, it was seen that deciduous canines and first and second molars were present in all quadrants of upper and lower arch. Patient had class II molar relationship, incompetent lips and lip trap was present (Figs 1A to C). Hyperactive mentalis muscle was observed on swallowing. Facial profile showed the mandibular retrusion. The cephalometric analysis confirmed the diagnosis of a class II skeletal relationship with deficiency in mandibular size and retruded position of mandible (Table 1). A 'Blue



Figs 1A to C: Pretreatment photographs; (A) pretreatment intra oral, (B) pretreatment profile, (C) pretreatment front



Figs 2A to C: Posttreatment photographs; (A) posttreatment intra oral, (B) posttreatment front, (C) posttreatment profile

phase 1 T4K appliance' fabricated and manufactured by Myofunctional Research Company, Australia was used as the first appliance. The appliance was delivered and the patient was educated about the insertion/removal technique. The patient was encouraged to wear the appliance on his own. Instructions were given to gradually increase the appliance wear by 15 minutes per day to bring it to 1 hour in a period of 8 to 10 days and then to wear it every day for 1 hour and overnight. This ensures good acceptance, so that the appliance does not tend to fall out at night. Since this appliance requires a high level of compliance, every care was taken to bring about motivation as well as awareness about regular use of the appliance. Detailed instructions along with counseling were given for both parents and patient. The first recall-appointment was scheduled after 3 weeks so as to get a feedback from the patient and eliminate any difficulties faced by the patient. After 9 months of wear, more than 50% reduction in overjet and improvement in competency of lips was observed and the premolars were seen to be erupting. At this stage the II phase T4K' was delivered to the patient as per manufacturer's protocol. The second phase trainer is stiffer and is made-up of harder plastic than first phase appliance. The wear time and other

instructions remained the same. In next 9 months, overjet was corrected and lip trap was completely eliminated along with straight facial profile and fully competent lips (Figs 2A to C). The posttreatment cephalometric analysis showed a class I molar and skeletal relationship (Table 1). The patient was asked to wear the same trainer as retention during night time only till the completion of growth. The active treatment time was 18 months.

Table 1: Cephalometric findings		
Parameter	Pretreatment	Posttreatment
Facial angle	84°	87°
Angle of convexity	+10°	2°
Y-axis	60°	59°
Interincisal angle	107°	116°
U1 to (A-Pog)	+11 mm	+9 mm
Max 1-SN	118°	72°
SNA	80.5°	80°
SNB	74.5°	82°
ANB	3°	2°
SND	76°	73°
U1 to NA degree	22°	30°
U1 to NA (mm)	4	5
L1 to NB degree	25°	35°
L1 to NB (mm)	4	6
IMPA	104°	115°
Wits	4 mm	2 mm

DISCUSSION

Although the influence of the soft tissue on teeth alignment was proposed a long-time ago, the biology and physiology of stomatognathic system is understood in a better way in current consensus. The morphology of skeleton and arrangement of teeth are mainly determined by jaw growth and development of dentition and influenced by functional aspects. Functional appliances are described in the literature as an effective method to correct functional abnormalities in the orofacial region. However, the success of treatment with functional appliances depends on two important issues namely patient's collaboration and design of the appliance. The former depends on the ability of the dentist to convince the patient about the importance of treatment and ill effects of oral dysfunctions on performance and health of the stomatognathic system. Fortunately, the later has been addressed by orthodontic fraternity. A prefabricated functional appliance was developed, which is designed to adjust to different age groups, and thus, to correct functional problems present in young individuals. These appliances correct the malocclusions not by directly moving the teeth, but by correcting the myofunctional alterations, and so permitting the teeth to occupy more stable physiological position in the oral cavity.²⁰ The functional appliances are still controversial. It appears that these appliances produce neuromuscular changes that lead to morphological modifications in the craniofacial complex. Another point of discussion is the prediction of both, success and duration of treatment for class II malocclusions. Successful outcome for treatment with functional appliances have been associated with the patient's age and the severity of the malocclusion. The activity of the facial muscles, particularly labial musculature has also been reported to influence the response and duration of treatment for class II malocclusions.²¹ Treatment with preorthodontic trainer have positive influence on the masticatory and perioral musculature.²² Class II corrections can be achieved with the preorthodontic trainer appliance, which appears to have mostly dentoalveolar effects with smaller but significant skeletal effects.²³ Less time may be required to treat a class II division 1 than class II division 2 malocclusion.²⁴

CONCLUSION

Unlike the other conventional myofunctional appliances, i.e. Twin-block, Frankle, T4K is an innovative appliance and extremely patient friendly. T4K, is a prefabricated functional appliance, is a valid alternative to treat malocclusions at an early age, as it significantly stimulates growth of mandible. Therefore, this appliance is a valuable tool in improving class II dental and skeletal relationship

when deficiency of mandibular growth is diagnosed at an early age. Use of preorthodontic trainer system in routine orthodontic practice should be encouraged, however, it should be accompanied with appropriate patient selection.

CLINICAL SIGNIFICANCE

Class II cases need early attention. Whenever, class II skeletal and dental problems are diagnosed in the mixed dentition period, interceptive orthodontic procedures should be immediately initiated. Use of preorthodontic trainers in handling such cases gives the following advantages:

1. Wear time is 1 hour and overnight. So loss of appliance in school and during other activities is eliminated.
2. It improves tongue posture and lip seal.
3. There is no restriction on any diet as there are no chances of any breakages.
4. Abnormal lip and tongue pressures are eliminated thereby establishing normal growth.

REFERENCES

1. Walpole Day AJ, Trotter PA, Norris N. A modified oral screen made of latex. *Br Dent J* 1949;87:143-47.
2. Kurer J. Improved oral screen. *Int Dent J* 1952;3:225-26.
3. Taylor AT. The use of oral screens with fixed appliances. *Int Dent J* 1952;3:232-34.
4. Massler M. The oral screen. *J Dent Child* 1952;19:100-06.
5. Kraus F. Vestibular and oral screens. *Trans Eur Orthod Soc* 1956;32:217-24.
6. Toepfer AK, Massler M, Brown WAB. Effectiveness of the oral screen in the treatment of upper incisor protrusions. *Am J Orthod* 1959;45:759-67.
7. Townend BR. The mouth screen. *Br Dent J* 1960;108:20-22.
8. Tallgren A, Christiansen R, Ash MM, Miller RL. Effects of a myofunctional appliance on orofacial muscle activity and structures. *Angle Orthod* 1998;3:249-58.
9. McNamara JA. Components of class II malocclusion in children 8-10 years of age. *Angle Orthod* 1981;51:177-202.
10. Charlier JP, Petrovic A, Herrman-Stutzmann J. Effects of mandibular hyperpropulsion on the prechondroblastic zone of young rat condyle. *Am J Orthod* 1969;55:71-74.
11. Stockli PW, Willert HG. Tissue reactions in the temporomandibular joint resulting from anterior displacement of the mandible in the monkey. *Am J Orthod* 1971;60:142-55.
12. McNamara JA. Neuromuscular and skeletal adaptations to altered function in the orofacial region. *Am J Orthod* 1973;64:578-606.
13. Basciftci FA, Uysal T, Büyükerkmen A, Sar? Z. The effects of activator treatment on the craniofacial structure of class II division 1 patients. *Eur J Orthod* 2003;25:28-93.
14. Usume S et al. The effects of early preorthodontic trainer treatment on class II, Division 1 patients.
15. Weinstein. Minimal forces in tooth movement. *Am J Orthod* 1967;53:881-903.
16. Sakuda M, Ishizwa M. Study of lip bumper. *J Dent Res* 1970;49:667.
17. Quadrelli C, Ghiglione V, Marchetti C. Relationships between posture, dysfunctions of the soft tissues of the stomatognathic

- apparatus, respiration and occlusion in early treatment of skeletal class II. Paper presented at: Congress 'Occlusion and Posture; New Trends and New Problems'; Milan, Italy; June 2001.
18. Quadrelli C, Ghiglione V, Gheorghiu M. Relationships between posture, dysfunction of soft tissues of the stomatognathic apparatus, respiration and occlusion in the early treatment of skeletal 2002;2:109 Class II. Paper presented at: XVI National Congress Sido; Genoa, Italy; October 26–27, 2001.
 19. Quadrelli C, Gheorghiu M, Marchetti C, Ghiglione V. Approccio miofunzionale precoce nelle II Classi scheletriche. *Mondo Ortod* 2002;2:109-21.
 20. German O, Ramirez-Yañez: Insights in to orthodontic treatment: *Dental Asia* July-August 2006.
 21. EH Angle. *The treatment of malocclusion of the teeth* (7th ed). Chapter 2. Philadelphia 1907.
 22. Uysal T, Yagci A, Kara S, Okkesim S. Influence of Pre-orthodontic trainer treatment on the perioral and masticatory muscles in patients with class II division 1 malocclusion. *Eur J Orthod* Jan 6, 2011.
 23. Das UM, Reddy D. Treatment effects produced by pre-orthodontic trainer appliance in patients with class II division I malocclusion. *J Indian Soc Pedod Prev Dent* Jan-Mar 2010; 28(1):30-33.
 24. Yanez R, Paulo GF. Early treatment of class II division 2 malocclusion with T4K a case report. *J Paed Dent* 2008;32.

ABOUT THE AUTHORS

Nandini B Tripathi (Corresponding Author)

Professor and Head, Department of Orthodontia and Dentofacial Orthopedics, Sawrgiya Dadasaheb Kalmegh Smruti Dental College and Hospital, Wanadongri Road, Hingna, Nagpur, Maharashtra, India
e-mail: nandinidurgesh56@gmail.com

Smita Nimbalkar Patil

Senior Lecturer, Department of Orthodontia and Dentofacial Orthopedics, Sawrgiya Dadasaheb Kalmegh Smruti Dental College and Hospital, Nagpur, Maharashtra, India