



Case Report

2 x 6 appliance a versatile option for treatment of malocclusion in early permanent dentition - A case report

Anjali N¹, Savitha N S², Rashmi S³

¹Postgraduate Student, Department of Paedodontics, K V G Dental College & Hospital, Sullia, D K, Karnataka

²Professor and Head, Department of Paedodontics, K V G Dental College & Hospital, Sullia, D K, Karnataka

³Postgraduate Student, Department of Paedodontics, K V G Dental College & Hospital, Sullia, D K, Karnataka

How to cite: Anjali et al, 2 x 6 appliance a versatile option for treatment of malocclusion in early permanent dentition - A case report *Int J Pedo Rehab* 2023; 8(2):11-17.

DOI: <https://doi.org/10.56501/intjpedorehab.v8i1.890>

Received :18/07/2023

Accepted: 16/09/2023

Web Published: 19/09/2023

ABSTRACT

Children in growing age develop dental malocclusion due to transition and exchange of dentition, oral habits or discrepancy in tooth size and arch size. If timely treatment is not performed it may progress to full fledged malocclusion that may require much time-consuming treatment and also correlation of trauma prone profile like class II div I or class II div II can even be beneficial in prevention of trauma. Early correction also reduces the psychological trauma associated with malocclusion.

This Versatile 2x6 fixed appliance offers many advantages over alternative techniques as it provides complete control of anterior tooth position, is extremely well tolerated, ease the space closure by precise tooth movement with shorter duration of correction, reduces the patient compliance, and less laboratory work makes it a acceptable treatment option in growing child. In the case report mentioned here a successful management of correction of class I malocclusion with maxillary anterior proclination was done during early permanent dentition using 2 x 6 appliance.

Keywords: *Interceptive Orthodontics, Malocclusion, Early Permanent Dentition.*

Address for Correspondence:

Dr. Anjali N

Post graduate Student

K V G Dental College & Hospital, Kurunjibhag Sullia, D K

Email: anjaliwarriern4@gmail.com

© 2023 Published by MM Publishers

<https://doi.org/10.56501/intjpedorehab.v8i1.890>

INTRODUCTION

In Paediatric dentistry, children present with various malocclusions during transition towards early and late permanent dentition. These malocclusions may be generalised or localised. Proclination of the upper anterior are most common malocclusions occur due to genetic or various oral habits and commonly associated with midline diastema due to high frenal attachment or supernumerary teeth or any odontogenic or non-odontogenic tumours¹.

A great emphasis is currently given to the early correction of malocclusions to prevent the potential of growing into skeletal malocclusion and might at a later stage require major orthodontic treatment combined with surgical procedures². Early orthodontics has the purpose of resolving dentoalveolar irregularities, functional interferences, and skeletal and muscular imbalances, to improve the orofacial environment before the complete eruption of the permanent teeth.

The 2x6 appliance used in the mixed dentition/ permanent dentition consists of bands on the maxillary first permanent molars with buccal tubes; bonded brackets on four maxillary permanent incisors and two canines continuous arch wire. It can be used for rapid correction of spacing in the anterior teeth, reduce overjet and proper alignment of teeth.³ With this approach, a single short phase of fixed appliance therapy can be done with effective and efficient tooth positioning as it allows three-dimensional control of the involved teeth in the mixed and early permanent dentition period (Tulloch et al., 1997).

The present article highlights a case report of successful correction proclined maxillary permanent incisors using the versatile 2 x 6 appliance

CASE REPORT

A 13-year-old girl reported to the Department of Pedodontic and Preventive dentistry, KVG Dental College and Hospital, Sullia with forwardly placed upper front teeth, with similar features in the patient's mother. Patient had no relevant medical history and oral habits associated with the clinical presentation. On extra oral examination, Mesencephalic and mesoprosopic with slight convex profile, potentially competent lips, deep mento labial sulcus without hyper mentalis activity was noted. On intraoral examination, permanent dentition with Angles class I molar relation and class II canine relationship, 5 mm of Overjet and 2 mm overbite with spacing in upper anterior tooth region, papillary labial frenal attachment without trauma from occlusion was noted. (As shown in figures 1 to 6)



Fig 1: Pre-treatment Extraoral photograph



Fig 2: Pre-treatment photo- maxillary arch



Fig 3: Pre-treatment photo- mandibular arch



Fig 4: Pre-treatment overjet photo



Fig 5: Pre-treatment photo frontal view

Cephalometric investigatory findings revealed SNA angle 82 degree, SNB angle 78 degree with 91mm maxillary length 113 mandibular length with proclined upper and lower incisors and vertical growth pattern. Inference of model analysis suggested a borderline non extraction case.



Fig 6: Pre-treatment lateral cephalogram

Final diagnosis was done as Angles class I molar relation and class II canine relationship with orthognathic maxilla and retrognathic mandible with class I skeletal base and vertical growth pattern with proclined upper anteriors and generalised spacing of maxillary anteriors and papillary labial frenal attachment.

TREATMENT OBJECTIVES

1. Retroclination of upper anterior teeth
2. Closure of midline diastema and generalised space
3. Overall alignment of teeth and occlusion
4. Correction of high frenal attachment

TREATMENT OPTIONS

1. Removable appliances:
 2. Hawley's appliances with short or long active labial bow or Mill's retractor
 3. Double finger spring
 4. Begg's retainer
5. Fixed appliances:
 6. 2x6 appliance
 7. Clear aligners
 8. Fixed Single Wire Technique
 9. Aesthetic restoration

Out of above treatment options removable appliances are excluded as they close the anterior space by tipping the anterior crowns and they do not provide effective vertical control or torque control, which can have a strong tendency towards relapse (Manivannan P et al). Aesthetic restorations are considered as tooth size arch size discrepancy (true/relative microdontia) which was not evident in the present case. Fixed appliances provide better control of dental alignment with shorter duration of treatment. After explaining the treatment options with the patient, a 2 by 6 appliance was chosen as a treatment option.

TREATMENT DONE

Oral prophylaxis done and the fixed appliance consisted of stainless-steel bands on the first permanent molars with buccal tubings and brackets bonded on the erupted maxillary central incisors, lateral incisors and canines. 0.022" slot brackets were bonded onto the five anterior teeth. A 0.012" nickel titanium archwire was used for the correct alignment of maxillary incisors. The initial wire was eventually replaced by 0.014" NiTi arch wire after 4 weeks. (As shown in figure 7 & 8)



Fig 7: Post-treatment photo (frontal view)



Fig 8: Post-treatment photo (occlusal view)

The desired result was achieved with 19×25 stainless steel rectangular wire used for retention for 4 months. This sequence of wire followed with lesser diameter and more flexible wire by applying light and continuous forces for initial alignment followed by stiffer NiTi or SS wires to further guide the teeth into their desired positions. Laser Frenectomy was done before the appliance was removed and the patient was given a fixed palatal retainer for retention. Parents and the patient were happy with the outcomes, and the child's confidence was boosted by the enhanced oral aesthetics.



Fig 9: Post-treatment overjet reduction



Fig 10: Post-treatment with FA at 6 months follow up



Fig 11: Overjet after appliance removal 6 months



Fig 12: Post-treatment at 6 months follow up

DISCUSSION

Proclination of anterior teeth are the most common aesthetic concern of adolescents and are more concerned which affect their self-esteem, confidence, aesthetic appearance, thus improving their overall personality (Tung et al., 1998).⁴

Simple discrepancies in the teeth alignment can be corrected with methods such as use of a wooden spatula tongue blade, Catalan's appliance and removable appliance with z-spring, composite or glass ionomer cement incline plane, and expansion screw. However, correction of severely proclined, rotated or malposed teeth requires slight improvisation in the methods because these appliances may not be effective in correcting these teeth effectively. Also, the removable appliances can be cumbersome and the success of removable appliances depends mostly on the patient's compliance (Ninou and Stephens).^{5,6}

The present article describes a successful case treated using 2 x 6 appliance in a patient with Angle's class I molar relation with upper anterior teeth proclination. Early treatment was planned and achieved to reduce the psychological trauma associated with malocclusion. Maxillary anterior teeth proclination has to be treated as early as possible because there is a direct relationship between increased overjet and dental trauma. Proclined upper incisors are more prone to be fractured.⁷ Children with

increased overjet have higher chances of dental trauma than children with any other malocclusion. Increased overjet was 1.57% more likely to cause greater aesthetic impact, especially in girls. In general, the upper anterior teeth proclination is believed to occur as a consequence of the presence of an abnormal oral habit such as thumb sucking, tongue thrusting. In the present case no abnormal oral habits were detected and it was more of genetic influence.

A sectional fixed appliance that exhibits promising outcomes is the 2x6 appliance. It is employed to treat a variety of malocclusions caused by crossbite, increased overjet, midline diastemas, ectopic eruption, and rotations throughout the mixed dentition and early permanent phase³. The major advantages in carrying out this treatment with a 2x6 appliance are the ease with which space closing can be controlled with a fixed appliance, and also that the force magnitude and vector can be controlled much more precisely than with a removable appliance. Another advantage of fixed appliances is that no laboratory facilities are required. Treatment can be initiated as soon as sufficient permanent teeth have erupted and the child is co-operative enough to have separators placed, bands cemented and brackets bonded.⁸⁻¹⁰ Even though initial chair side placement of a fixed appliance takes a little longer than for removable appliance, patient compliance during active treatment is minimal as compared to that for a removable appliance.^{11,12} Disadvantages of this appliance includes banding of permanent 1st molars which increases the risk of dental caries as it interferes with cleaning. Good oral health must be maintained throughout the treatment period.

Case selection is a key criterion in 2x6 appliances. When employing this fixed appliance during the era of mixed dentition, the clinician should be well-versed in its use. Anomalies that can self-correct already exist in the early permanent phase and will be resolved once the transition takes place.¹³ Henceforth, a thorough evaluation of the patient's facial, dental profile, and radiographs should be carried out for proper diagnosis and treatment strategy.

CONCLUSION

Proclination and midline spacing should be corrected at the earliest to decrease the incidence of dental trauma associated with increased overjet. Malocclusion in Early permanent dentition using 2 x 6 appliance allows rapid correction in a single short phase, provides functional improvement with psychological benefits with minimal discomfort, and reduced cooperation from children. However, self-correcting anomalies before eruption of canine is not advised.

FINANCIAL SUPPORT AND SPONSORSHIP

Nil

CONFLICTS OF INTEREST

There are no conflicts of interest

REFERENCES

1. Garrocho-Rangel A, Hernández-García G, Yáñez-González E, Ruiz-Rodríguez S, Rosales-Berber M, Pozos-Guillén A. 2 x 4 appliance in the mixed dentition stage: a scoping review of the evidence. *Journal of Clinical Pediatric Dentistry*. 2023 Jan 1;47(1).
2. Rohilla M, Bodh M, Kumar A, Namdev R. Early interception using 2×4 appliance: a case series. *International Journal of Advances in Case Reports*. 2017; 4: 226–229.
3. DaCosta OO, Aikins EA, Isiekwe GI, Adediran VE. Malocclusion and early orthodontic treatment requirements in the mixed dentitions of a population of Nigerian children. *Journal of Orthodontic Science*. 2016; 5: 81–86
4. Mustapha NM, Ashari A. Simplified Fixed Technique for Correction of Anterior Crossbite: A Case Series. *Archives of Orofacial Science*. 2021 Jun 1;16(1).
5. Fiona McKeown H, Sandler J. The two by four appliance: a versatile appliance. *Dental update*. 2001 Dec 2;28(10):496-500.
6. Bholia M and Gera T. Orthodontic Intervention In Mixed Dentition: A Boon for Pediatric Patients. *IDA Lud J –le Dent* 2018;2(2):10-16.
7. Dowsing P, Sandler PJ. How to effectively use a 2× 4 appliance. *Journal of orthodontics*. 2004 Sep 1;31(3):248-58.
8. Jarvinen S. Incisal overjet and traumatic injuries to upper permanent incisors: A retrospective study. *Acta Odontologica Scandinavica*. 1978 Jan 1;36(5-6):359-62.
9. Ramesh et al, A Case Report on Pre-orthodontic Trainer in a 9-year-old child with 12 month follow up, *IntJ Pedo Rehab* 2023; 8(1):1-7.
10. Ilisulu C, Uz S, Koruyucu M, Seymen F. Early interceptive orthodontic treatments: case series. *International Journal of Medical Investigation*. 2019 Sep 10;8(3):104-11.
11. Nabarrette M, Brunheroto J, Dos Santos PR, Meneghim MD, Vedovello SA. Esthetic impact of malocclusions in the anterior segment on children in the mixed dentition. *American Journal of Orthodontics and Dentofacial Orthopedics*. 2021 Jan 1;159(1):53-8.
12. Shyamala Naidu and Anand Suresh. The Applications of 2 x 4 Appliance During Mixed Dentition Treatment. *Acta Scientifica Dental Sciences* 2.11 (2018): 49-51.
13. Solanki PJ, Choudhari SR, Vaghela CM, Saxena SI. Use of the two by four appliance: a treatment modality for the correction of malaligned maxillary anterior teeth during mixed dentition period. *International Journal of Development Research*. 2017; 7: 17729–17732



Published by MM Publishers
<https://www.mmpubl.com/ijpedorehab>

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-Non Commercial 4.0 International License, 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.
 To view a copy of this license, visit <http://creativecommons.org/licenses/by-nc/4.0/> or send a letter to Creative Commons, PO Box 1866, Mountain View, CA 94042, USA.

Copyright ©2023 Anjali N, Savitha N S, Rashmi S