



USE OF TWO BY FOUR APPLIANCE: A TREATMENT MODALITY FOR THE CORRECTION OF MALALIGNED MAXILLARY ANTERIOR TEETH DURING MIXED DENTITION PERIOD

¹Dr. Parikrama J. Solanki, ²Dr. Shantanu R. Choudhari, ^{3,*}Dr. Chirag M. Vaghela
and ⁴Dr. Sandip I. Saxena

¹B.D.S, Post Graduate Student, Department of Pedodontics and Preventive Dentistry,
Govt. Dental College and Hospital, Ahmedabad, Gujarat, India

²Professor and Head of Department, Department of Pedodontics and Preventive Dentistry,
Govt. Dental College and Hospital, Ahmedabad, Gujarat, India

^{3,4}B.D.S, Post Graduate Student, Department of Pedodontics and Preventive Dentistry,
Govt. Dental College and Hospital, Ahmedabad, Gujarat, India

ARTICLE INFO

Article History:

Received 11th September, 2017
Received in revised form
21st October, 2017
Accepted 19th November, 2017
Published online 29th December, 2017

Key Words:

2x4 Appliance,
Maxillary Incisors,
Malposition,
Esthetic.

ABSTRACT

The 2x4 appliance consists of bonded brackets on the maxillary incisors, bands on the first permanent maxillary molars and a continuous archwire inserted into buccal tubes of the molar bands. It has many advantages over other techniques; it provides total control of anterior tooth position, is very well accepted by the patient, does not require any adjustment and allows precise and rapid positioning of the teeth. This article presents two cases of correction of malpositioned upper anterior teeth with the help of 2x4 appliances. The results achieved, satisfied the esthetic demands of the patients as well as parents.

Copyright ©2017, Parikrama J. Solanki et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Citation: Dr. Parikrama J. Solanki, Dr. Shantanu R. Choudhari, Dr. Chirag M. Vaghela and Dr. Sandip I. Saxena . 2017. "Use of Two by Four Appliance: A Treatment Modality for the Correction of Malaligned Maxillary Anterior Teeth during Mixed Dentition Period.", *International Journal of Development Research*, 7, (12), xxxxxxxxxx.

INTRODUCTION

Children having malocclusion in the mixed dentition period are frequently delayed for treatment until all permanent teeth erupt or are given removable appliances which only result in limited tooth movement (Jalis Fatima, 2015). Interceptive therapy provided in such cases prevents further complications in future, making use of partial fixed treatment. Greater emphasis is given to early correction of malocclusion as it will help in preventing further complications if left untreated and also correct the relationship of malpositioned teeth with adjacent and opposite teeth (Profitt et al., 2001).

***Corresponding author:** Dr. Chirag M. Vaghela,
B.D.S., Post Graduate Student, Department of Pedodontics and Preventive Dentistry, Govt. Dental College and Hospital, Ahmedabad, Gujarat, India.

The 2x4 appliance used in the mixed dentition is a versatile appliance, consisting of bands on the first permanent molars and bonded brackets on the erupted maxillary permanent incisors. Continuous archwire is used to provide complete control of the arch form (Fiona, 2001). With this approach, a single short phase of fixed appliance therapy in the early mixed dentition period helps in rapid correction of early malocclusions (Tulloch et al., 1997). Recently, much discussion has been carried out in the literature regarding the ideal timing of initiating orthodontic treatment. Many aspects of orthodontics have been taken into consideration, such as the clinical effectiveness, the orthodontists' preference, the outcome of early treatment, and psychological influences associated with it (Tulloch et al., 1997; Yang, 1998). Treatment of younger children in the early mixed dentition period offers advantages in terms of stability and avoidance of

future complications, which helps them build their self-esteem and esthetic appearance, thus enhancing their overall personality (Tung et al., 1998). Complex malocclusions can also be corrected, which are to be treated in two steps i.e early correction of mild malocclusions by 2x4 appliance which is a fixed partial appliance and comprehensive treatment in the second step (Profitt et al., 1986). This article presents 2 case reports of patients with different forms of malocclusion in the anterior region treated by 2x4 appliances.

CASE REPORT 1

A nine year old female patient reported to the Department of Pedodontics with the complaint of a forwardly placed front tooth and resulting poor esthetics (Figure 1a). There was no significant family or medical history. Clinical and radiographic examination revealed the presence of a mesiodens in palatal relation to the left maxillary central incisor (Figure 1b). It was planned to remove the mesiodens followed by correction of the malocclusion with 2x4 appliance therapy. The mesiodens was extracted under local anesthesia without any complications and the patient was recalled after 1 week.



Figure 1a and 1b. Pre-op photographs showing labially displaced left central incisor and a mesiodens palatally in relation to it

After 1 week, orthodontic molar bands with buccal tubes were bonded on permanent first molars and brackets were placed on all permanent incisors (2x4 appliance) (Figure 2). A 0.12 NiTi arch wire was inserted in the brackets for initial movement which was replaced by 0.14 arch wire after 1 month which in turn was replaced by 0.16 archwire 2 months later. One month



Figure 2. Intra-op photograph showing anterior and intraoral view of placement of 2x4 appliance



Figure 3a and 3b. Post-op photograph showing alignment of central incisors and placement of lingual bonded retainer

after that, a 0.16 rectangular stainless steel wire was placed and kept for 1 more month. Ligatures were replaced at monthly intervals. At the end of 5 months, the central incisors had been aligned in proper position (Figure 3a) and a lingual bonded retainer was placed (Figure 3b). The patient is kept on follow-up every month.

CASE REPORT 2

A ten year old female patient reported to the Department of Pedodontics with the complaint of irregular front teeth (Figure 4) with no significant medical or family history.



Figure 4. Pre-op photograph showing mal-aligned incisors



Figure 5. Intra-op photograph showing placement of 2x4 appliance

Clinical examination revealed mal-aligned maxillary incisors and mobility in relation to primary right canine and carious first molar. Both the teeth were near to exfoliation and hence were not extracted. After 2 days, a 2x4 appliance was placed, similar to that placed in case report 1 (Figure 5 and 6).



Figure 6. Intraoral view of 2x4 appliance after 4 months

A 0.12 NiTi arch wire was inserted in the brackets for initial movement which was replaced by 0.14 archwire after 1 month which in turn was replaced by 0.16 archwire after 2 months. Two months later, a 0.16 rectangular stainless steel wire was placed and kept for 1 more month. Ligatures were replaced at monthly intervals.



Figure 7. Post-op photograph showing correction of anterior malocclusion

At the end of 6 months, the incisors had been properly aligned and a lingual bonded retainer was placed (Figure 7). The patient is kept on follow-up.

DISCUSSION

It has been suggested that anterior tooth malpositions, teeth in cross-bite or narrow maxillary arches can be corrected with the use of removable appliances. But lack of control over tooth position, and single-point contact on teeth leading to undesired tipping movements is the drawback of removable appliances (Fiona Mckeown, 2001). Also, these appliances can be cumbersome for the patients to fit and if they are either too loose or too tight, they will not be worn by the patient. Breakage of the clasps or other components due to frequent tendency of the patient to move the appliances in and out, and the resulting loss of retention will discourage the patient to wear the appliance (O'Brien, 1997). According to Ninou and Stephens, the success of removable appliances depends mainly upon patient compliance, both for wearing and adjusting the appliance. If a substitution to the removable appliances is found, then all the above problems can be solved (Ninou, 1994). A 2x4 appliance, which is a sectional fixed appliance, results in more effective and efficient positioning of teeth as three dimensional control is possible during correction of mal-aligned anterior teeth. Therefore diastemas, rotations and improper inclinations of teeth can be treated very easily and quickly using this technique (Dowsing, 2004). Besides this, one also has to have the knowledge with what "should be" or "should not be" treated at mixed dentition stage. This is due to the reason that many self correcting malocclusions exist during this stage, but it will get corrected once the transition has taken place. Sectional fixed treatment aids in early correction of minor malocclusions like rotations or malpositioning involving one or more teeth (McKnight, 1965; Lee, 1978). One should be very cautious in selection of patients who are candidates of fixed appliance therapy. As the 2x4 appliance is one type of fixed orthodontic appliance, it can be used in different clinical

situations with only minor alterations in the appliance design (Graber, 1972; Benham, 1975).

Conclusion

With two by four appliance therapy, the treatment objectives can be easily achieved within a short period of time and a bonded retainer can be used to maintain the alignment. Early treatment of minor malocclusions during the mixed dentition period will reduce the duration and complexity of any subsequent treatment required in the permanent dentition.

REFERENCES

- Benham NR. 1975. Treatment of simple anterior crossbite using a fixed appliance technique. *J Dent Child.* 42:487-488.
- Dowsing, P. and Sandler, P.J. 2004. How to effectively use a 2 x 4 appliance. *Journal of Orthodontics.* 31: 248-258.
- Fiona Mckeown, H. and Jonathan Sandler. 2001. The Two by Four Appliance: A Versatile Appliance. *Dent Update.* 28: 496-500.
- Graber TM. 1972. *Orthodontics: Principles and Practice*, 3rd ed. Philadelphia; WB Saunders Co. 840-842.
- Jalis Fatima, Parul Jain, Anuj Kumar Pathak, Paras Angrish. A witty hand of orthodontic treatment - Fixed partial appliance. *Journal of Applied Dental and Medical Sciences.* 2015;1(3): 86-89.
- Lee BD. 1978. Correction of crossbite. *Dent Clin North Am.*, 22: 647-668.
- McKnight J. 1965. The responsibility of the pedodontist in diagnosis and correction of minor irregularities of occlusion. *J Dent Child.* 32: 57-61.
- Ninou S, Stephens C. 1994. The early treatment of posterior crossbites: A review of continuing controversies. *Dent Update.* 21: 420-426.
- O'Brien K. 1997. Guest Editorial: Undergraduate orthodontic education: what should we teach rather than what can we teach? *Br J Orthod.* 24:333-334.
- Proffit. William R, Fields W Henry, Sarver David M. 1986. *Contemporary Orthodontics*, 5th Edition, 391-394.
- Tulloch JFC, Philips C, Koch G, Proffit WR. 1997. The effect of early intervention on skeletal pattern in class II malocclusion: A randomised clinical trial. *Am J Orthod Dentofac Orthop.* 111: 391-400.
- Tulloch JFC, Proffit WR, Philips C. 1997. Influences on the outcome of early treatment for class II malocclusion. *Am J Orthod Dentofac Orthop.* 111: 533-542.
- Tung AW, Kiyak HA. 1998. Psychological influences on the timing of orthodontic treatment. *Am J Orthod Dentofac Orthop.* 113: 29-39.
- Yang EY, Kiyak HA. 1998. Orthodontic treatment timing: A survey of orthodontists. *Am J Orthod Dentofac Orthop.*, 113: 96-103.
