



CORRECTION OF SINGLE TOOTH MALPOSITION USING 2×4 APPLIANCE: A CASE REPORT

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ABSTRACT

Malposition of anterior teeth poses several problems including poor aesthetics, low self-esteem, reduced functioning of mastication and speech. Malpositioned teeth confer with altered positioning of one or more teeth from a well-aligned jaw. So, early correction of malposition is necessary as this ensure a proper growth and development. However the major obstacle in correction of malposition in young children is treatment compliance. In majority of cases, poor compliance is because of the unacceptability of the removable appliance used. 2×4 has many advantages over other techniques; it provides total control of anterior tooth position, high patient acceptance, without the need for any adjustment and also allows rapid and exact positioning of the teeth. This article presents a case of malpositioned maxillary anterior tooth which is in labioversion being treated using a 2×4 appliance.

KEYWORDS: 2x4 Appliance, Maxillary Incisors, Malposition, Labioversion.

INTRODUCTION

Tooth position affects to a greater extent the aesthetics, beliefs or the looks of the body and also the function of the teeth in chewing, swallowing and talking. The position of the teeth is in an individual varies greatly, which is determined by the size, shape, occlusion and harmonized space.^[1] Malposition of teeth refers to abnormal tooth position or incorrect tooth position mainly caused by a pattern of habitual chewing, size and shape of teeth. It is prudent to warn these patients and their parents about the possibility of future unfavourable growth, and the need for later surgical intervention.^[2] Lavelle and Foster conducted a research and inferred that more than 65 % of the population had teeth that were larger than the size of the arch of the tooth, leading to crowding or malpositioning of teeth.^[1]

Malposition of individual teeth includes: (1) mesioversion are the position of the teeth more mesial than normal; (2) distoversion of tooth denotes the position of the teeth more distally than normal; (3) whereas buccoversion, are the position of the teeth more buccal than normal; (4) then palatoversion, are the position of the teeth more palatally than normal; (5) now

linguoversion, are the position of the teeth to be more lingual than normal; (6) however labioversion, are the position of the teeth more labial than normal; (7) torque represents the position of the rotating gear against the axle; (8) then transversion, are the position of all the teeth moving with their axles and finally (9) axiversion, are the position of the teeth moving but the ends of the axles are fixed.^[3]

Greater emphasis is given to early correction of malocclusion because it will help in preventing further complications if left untreated and also correct the position of malpositioned teeth with adjacent and opposite teeth.^[4] 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.^[5,6] Different techniques have been used for corrections of malpositioned teeth. Although removable appliances such as Hawley's appliance is often used to correct malpositioned maxillary anterior teeth related to tooth factor, but it

requires good cooperation between the dentist and the patient for the success. This cooperation is sometimes difficult to obtain in pediatric patients.^[7]

Two by four appliance is used for rapid correction of malpositioned anterior teeth. Complex malocclusions can also be corrected in two steps that is early correction of mild malocclusions by 2x4 appliance which is a fixed partial appliance and comprehensive treatment in the second step.^[4] This article presents a case of successful correction of single tooth anterior maxillary tooth in labioversion using simple short-span fixed 2x4 orthodontic appliance. The use of this sort of appliance provides an alternate treatment modality to correct

anterior malposition with good patient compliance and minimal disruption of oral functions.

CASE REPORT

A 12-year-old girl reported to the Department of Pedodontics and Preventive Dentistry at Kothiwal Dental College and Research Centre, Moradabad with a chief complaint of irregularly placed upper front teeth since 1 year and also parent was esthetically concerned, therefore wanted treatment for the same. No significant medical or dental history was found. On extraoral examination the lips were incompetent, otherwise nothing significant changes were found (Figure 1).



Figure 1: Frontal and Lateral profiles of the patient.

Intraoral examination revealed Angle's Class I molar relation with permanent maxillary left central incisor in labioversion with an overjet measuring about 4.5mm in relation to the adjacent maxillary right central incisor (Figure 2).



Figure 2: Pre operative intraoral photograph showing malpositioning of 21.

The patient was in permanent dentition stage, no deciduous teeth were present. Impressions were taken for both maxillary and mandibular arch, then casts were poured and model analysis using Carey's method was performed and 2.5mm discrepancy was found in the maxillary arch. So, in maxillary arch proximal stripping was recommended. After discussing the treatment modalities with parents, proximal stripping followed by a

short-span fixed orthodontic treatment by 2x4 appliance was planned with two preadjusted edgewise brackets with a 0.022" slot in maxillary teeth. Proximal stripping was performed from left maxillary canine to right maxillary canine. Bands were fabricated on the first molars and the brackets were bonded on the labial aspects of the both left and right maxillary permanent central and lateral incisors. A short-span nickel-titanium

(Ni-Ti) 0.014"round archwire was taken and then it was cut equally on both sides of the centre line and was

placed into the bracket slots. The wire was stabilized using elastics (Figure 3).



Figure 3: Placement of Brackets and Ni-ti arch wire in relation to upper arches.

Two weeks later, marked tooth movement was noted in relation to 21 (figure 4). Within a month after starting the treatment, the anterior malpositioning was corrected successfully. The 0.014"round Ni-Ti archwire was then changed to the 0.016"round Ni-Ti archwire and retained for further two weeks before debonding of the brackets. Any excess composite and GIC on 16 and 26 were then cleaned by ultrasonic scaler (figure 5). Finally a fixed retainer was placed lingually starting from 13 till 23 for about 6 months (figure 6).



Figure 4: After 2weeks follow up.



Figure 5: Post –Operative Intraoral Photograph after debonding.

DISCUSSION

Malpositioned teeth are defined as improperly positioned teeth in the alveolar process of the maxillary or the mandibular, with respect to other teeth as well as the overall positioning of the teeth in the jaw bone. The ideal position of the teeth is determined by the resting and functional positioning of the mandibular although the situation can be reversed, but incorrect tooth position (malpositioned) can affect mandibular function. The position of the teeth is considered ideal when: (a) the incisors are slit; (b) mesial anthropoid clefts of the upper and distal canines of the lower canines; (c) vertical incisors, lower incisors occlusion with the upper incisor cingulum and (d) the distal surfaces of the upper and lower second molars are in the same vertical plane.^[8]

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.^[9] Removable appliances are easy to wear and patient comfort is more satisfactory. But there are few

drawbacks which include lack of control over tooth position, 2 or 3 appointments, immense patient cooperation, and single-point contact on teeth leading to undesired tipping movements. Also, these appliances can be troublesome 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 occur mainly due to frequent tendency of the patient to move the appliances in and out, and that results in loss of retention, which will discourage the patient to wear the appliance.^[10] Contrast to this fixed appliance treatment can be initiated immediately as soon as the permanent molars and incisors have erupted and have minimal patient discomfort and produces active and controlled tooth movement and due to the high application of force the treatment duration is relatively faster compared to the removable appliances.^[11]

If a substitution to the removable appliances can be found, then all the above problems can be solved.^[12] A 2x4 appliance, which is a sectional fixed appliance, it

helps in more effective and efficient positioning of teeth as three dimensional control is possible during correction of malaligned anterior teeth. Therefore diastemas, rotations and improper inclinations of teeth can be treated very easily and quickly using this technique.^[13] Advantages of 2 x 4 Appliance include ease of application, versatility, prevention of malocclusion at an early stage, shorter duration of treatment, less application of force compared to the traditional orthodontic treatment, minimal root resorption, improves the self stage. The appliance also has certain disadvantages including that this cannot correct skeletal malocclusions, needs significant patient cooperation, unsuitable for primary teeth.^[14]

Although this is a simple method for anterior malposition correction, the clinician should perform a thorough clinical assessment of the patient's facial and dental profiles. The 2x4 fixed orthodontic appliance is very reliable to correct malposition of anterior teeth as described in this article, where labioversion of maxillary left central incisor was successfully corrected. However, one should still be very cautious in selection of patients who is suitable for fixed appliance therapy.

CONCLUSION

Identifying malocclusions at an early stage and intercepting it as early as possible is the main goal for achieving the ideal treatment results. This case highlights that 2x4 appliance is an early, simple, and tolerable method of correction for anterior teeth malposition; which is beneficial to provide aesthetic and social well-being of the preadolescent children.

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