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CASE REPORT **OPEN ACCESS**

Surgical and Orthodontic Management of a Midline Diastema in an 11-year-old patient: a Case Report

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ABSTRACT

A maxillary midline diastema is one of the most frequently seen malocclusions in the mixed dentition stage and its management boosts the confidence and self-esteem of children in that age group. This article presents the case of an 11-year-old patient with a chief complaint of spacing in the upper front teeth. After obtaining the required diagnostic tools and based on the patient's requirements, the treatment plan was decided which consisted of a surgical maxillary labial frenectomy followed by immediate space closure using a 2x4 fixed orthodontic appliance. This case report illustrates the importance of proper case selection, treatment planning and patient cooperation in order to successfully manage a midline diastema in young adults.

Keywords*: midline diastema, fixed orthodontics, labial frenectomy*

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INTRODUCTION

A well-balanced smile and confident speech are valuable personal assets, especially in children and adolescents. A maxillary midline diastema is one of the most frequently seen malocclusions in the mixed dentition stage and its management boosts the confidence and self-esteem of these children. The maxillary labial frenum is a fold of tissue, that typically has a triangle shape and extends from the maxillary gingiva's midline region into the vestibule and middle of the upper lip. It develops as a post-eruptive remnant of the tectolabial bands, which are embryonic structures that connect the palatine papilla to the tubercle of the upper lip at around three months in utero. [1] The midline diastema has a multifactorial etiology, including genetics, superior labial frenum attachment, anterior traumatic bite, oral habits, peg-shaped laterals, supernumerary teeth, tooth size arch length discrepancy, missing teeth, pathological migration of teeth, angulation of teeth, odontomas occurring in the maxillary midline, developmental cysts in the orofacial midline, and flaccid lips.[2]

This case report describes the management of a midline diastema using the classical surgical technique followed by immediate space closure using a 2x4 fixed appliance therapy.

CASE REPORT

An 11-year-old male patient reported to the Department of Pediatric and Preventive Dentistry, Bharati Vidyapeeth (Deemed to be University) Dental College and Hospital, Pune, with a chief complaint of spacing in the upper front teeth. The patient did not have any significant medical or dental history, but a history of mouth-breathing habit was present. The intraoral examination revealed proclined maxillary central and lateral incisors and a midline diastema due to high maxillary labial frenum attachment. The frenum attachment was classified as a papillary penetrating type or a persistent tectolabial frenum.[3](figure 1) Occlusal caries and grade III mobility was present with 55.

Figure 1: Pre-operative intraoral photograph

A pre-operative orthopantomogram was obtained and diagnostic casts were prepared on which the midline diastema was measured to be 2.5 mm (figure 2).

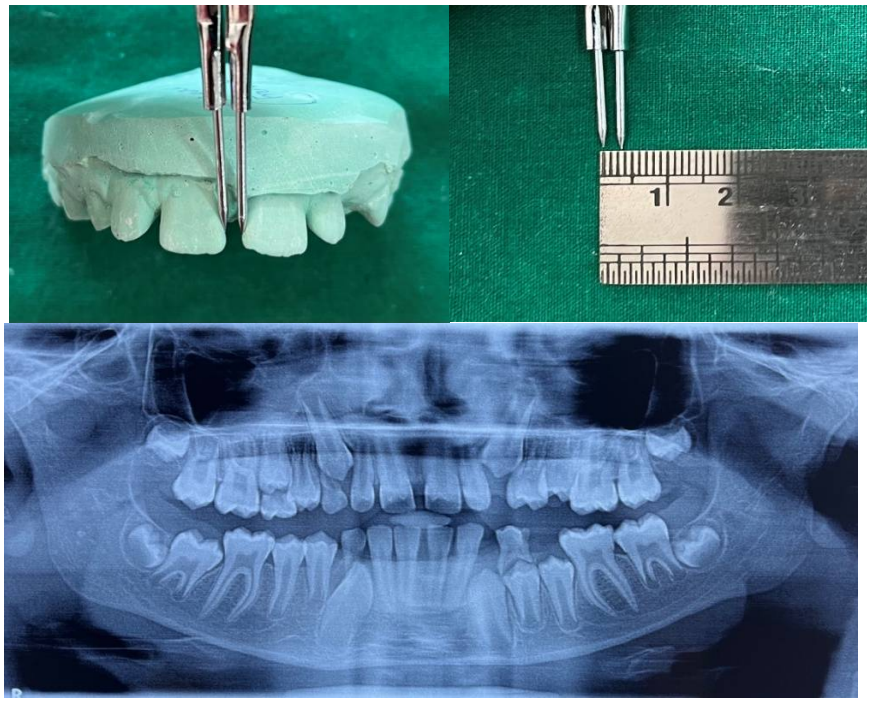

Figure 2: Pre-operative diagnostic aids

Various treatment modalities were discussed with the patient and full mouth orthodontic treatment was advised. However, based on the patient's requirements, it was decided to go ahead with the treatment of the midline diastema only. The treatment plan consisted of a surgical maxillary labial frenectomy followed by immediate space closure using a 2x4 fixed appliance therapy.

After obtaining informed written consent from the parents, the surgical frenectomy was carried out under local anesthesia using the classic surgical method.[4] A number 11 Bard Parker blade was used to make vertical incisions on either side of the frenum till the depth of the underlying bone. Blunt dissection was carried out to remove the fibrous tissue, leaving behind a diamond/bell-shaped wound. Three 4-0 vicryl sutures were placed to approximate the wound and post-operative instructions were given. There were no immediate post-operative complications and examination after two days revealed satisfactory healing (figure 3).

Figure 3: Immediate post-op

The 2x4 fixed orthodontic therapy was initiated thereafter (figure 4).

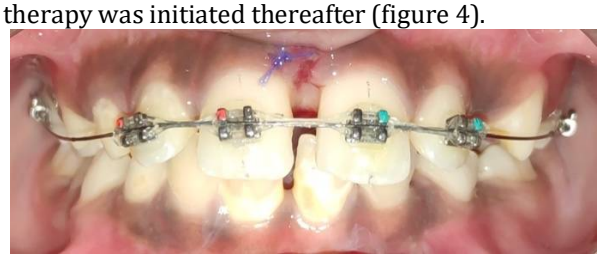

Figure 4: 2x4 appliance therapy

On the second post-operative day, four standard edgewise MBT brackets were bonded to the maxillary incisors and 0.022" molar tubes were bonded on the maxillary first permanent molars. 0.14" NiTiarchwirewas placed and an elastic chain was placed with respect to the maxillary central and lateral incisors. After 3 weeks, the archwire was replaced with an 0.14" stainless steel archwire, elastics were replaced and the bite was raised by 2 mm by placing glass-ionomer cement on 36 and 46. The next sequence of archwires was 0.016" and 0.018" stainless steel archwires placed at a gap of 3 weeks each along with replacement of the elastic chain at every appointment. The grade III mobile 55 was extracted under local anesthesia. After 3 weeks, onceadequate space closure was achieved, the brackets, molar tubes, archwire and glass-ionomer cement were removed. The teeth were polishedand a lingual bonded retainer was placed with respect to the maxillary central and lateral incisors using composite resin. A post-operative orthopantomogram was obtained which corresponded with the clinical findings of closure of the midline diastema. (figure 5)

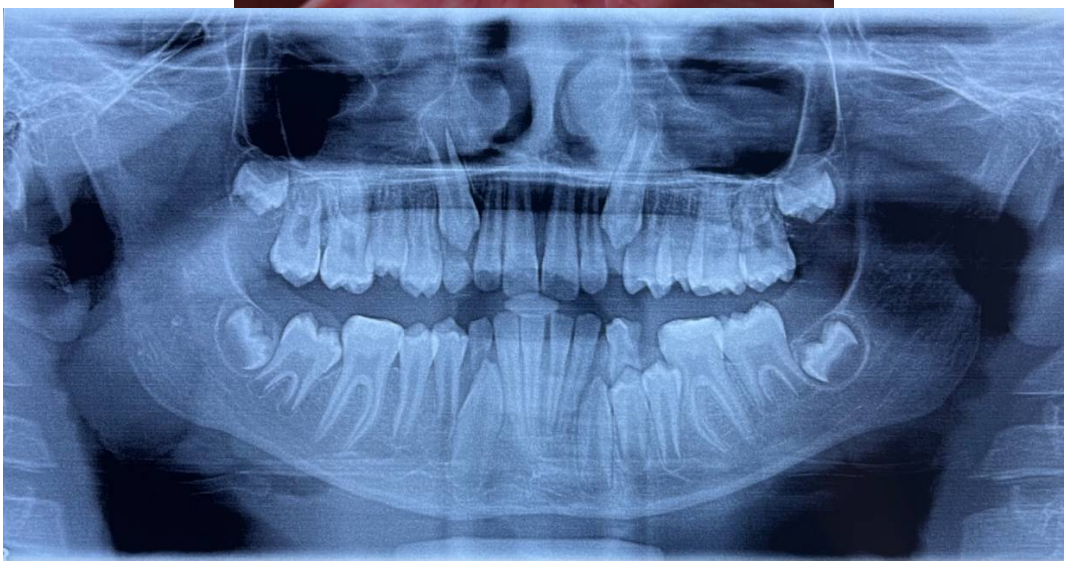

Figure 5: Post-operative clinical photographs and orthopantomogram

DISCUSSION

A midline diastema, according to Angle, has been described as a common form of incomplete occlusion characterized by a space between the maxillary and, less frequently, mandibular central incisors. In the present case, the cause of the midline diastema was attributed to genetics, a high maxillary labial frenum attachment, mouth breathing habit and tooth size arch size discrepancy. The decision to intervene early during the mixed dentition period was based on Sanin's prediction of the fate of midline diastema according to which the possibility of spontaneous space closure for a 1 mm space is 99%, for a 1.5 mm space is 85%,

for a 1.85 mm space is 50%, and for a 2.7 mm space is only 1%. This measurement is taken after the lateral incisors have erupted, and it is best to act early if the midline diastema is greater than 1.85 mm after the eruption of the lateral incisors. [2]

There are two schools of thought regarding the time of intervention. Frenectomy is advised before the space closure in cases of an extremely large and fleshy frenum which has the advantage of complete tissue removal, while performing the procedure after space closure has the advantage of the presence of scar tissue which helps in maintaining the closed space. The disadvantage of the latter is that complete tissue removal is not possible. However, it has been found that either of the methods is acceptable as long as there is no delay in the space closure following a frenectomy. [1]

The various documented techniques for frenectomy include the conventional/classical frenectomy, Miller's technique, V-Y Plasty, Z Plasty, and the use of electrocautery. The classical technique was used in this case which helps in removal of the muscle fibres connecting the orbicularis oris and the palatine papilla. [4]

There are multiple methods of space closure using removable and fixed appliances. Removable appliances such as a split labial bow and finger springs are usually advocated for cases with a space less than 2 mm while fixed appliances such as the 2x4 appliance are useful when the space is more than 2 mm. These appliances have the additional advantage of providing bodily movement of the teeth as opposed to tipping movement which is seen with removable appliances.[5] Thus, the 2x4 appliance was chosen in this case which offers the advantages of bodily movement of teeth, minimum patient discomfort, reduced need for patient cooperation, increased control of tooth movements, the possibility of movement in all three planes of space and a short total treatment duration. An important consideration here is the stability after diastema closure. Since relapse after correction of a midline diastema is a major concern, a permanent bonded lingual retainer was placed with respect to the maxillary incisors at the end of the treatment. [2]

Thus, after a total treatment duration of three months, complete space closure as well as patient and parental satisfaction was achieved. The further course of action includes delivery of a lingual arch space maintainer, correction of the mouth breathing habit and a follow-up for the eruption of the permanent maxillary canines.

CONCLUSION

Aesthetics and function are the two most important goals of modern-day dentistry. A midline diastema is one of the most frequently seen malocclusion in the mixed dentition period and its treatment is important because of its direct impact on a child's confidence and self-esteem.An effective treatment plan requires the correct diagnosis of its etiology and an intervention that is relevant to that specific etiology.Thus, with proper case selection and treatment planning, it is possible to successfully manage a midline diastema in children and young adults.

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