Case Report

Closure of Midline Diastema through Combined Fixed Orthodontic Approach and Periodontal Surgery

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Abstract

Spacing is a very common problem, can be seen in the maxilla and mandible both the arches or between any tooth which has to be corrected to bring out the perfect smile for which everyone wishes. Maxillary midline diastema is a common aesthetic problem which needs a definite treatment. This case report presents the treatment of a patient with a midline diastema using combination of both fixed orthodontic mechanotherapy and frenectomy procedure. A 15-year-old female patient, whose chief complaint was gap between upper central incisors, had a symmetric face and incompetent lips. Intraoral examination showed class 1 molar relationship bilaterally with decreased overjet and overbite with lower midline shift towards right side. For the closure of midline diastema, here we used fixed orthodontic treatment along with frenectomy procedure.

Key Words: Fixed orthodontic, Midline diastema, periodontal surgery, Spacing, Retention.

Introduction

Space closure in anterior segment of the jaws, has been a major challenge in dentistry.[1] Diastema between anterior teeth or generalized spacing may be caused by several factors which can be physiological or dent alveolar or due to a missing tooth, peg shaped lateral, midline supernumerary teeth, due to the position of the teeth in their bony crypts, wrong eruption path of the cupids, and due to the increase in size of the premaxilla, proclination of the upper labial segment, prominent frenum and due to a self-inflicted pathology by tongue piercing.[2,3,4] Approximately 98% of 6 year olds, 49% of 11 year olds and 7% of 12–18 year olds has midline diastemas.[5] The treatment options involves observation and follow up, active orthodontic tooth movement, combined orthodontic and surgical approach, restorative treatment and Mulligan's technique of overcorrection.[5] In younger patients, space closure is easy and can be done by orthodontic treatment alone. Keene described greater than 0.5 mm spacing between the proximal surfaces of adjacent teeth midline diastema as anterior midline spacing, also reported the incidences of maxillary and mandibular midline diastema are 14.8% and 1.6%, respectively.[6] Maxilla had a higher prevalence of midline diastema than the mandible. Angle concluded the cause for midline diastema is an abnormal frenum and this view was supported by other researches.[7] Here, a case of spontaneous closure of midline diastema after frenectomy with fixed orthodontic appliances is presented.

Case Report

A 15-year-old girl reported to the Department of Orthodontics and Dent facial Orthopaedics Rama Dental College, Hospital & Research Centre, Kanpur with a chief complaint of spacing in the upper and lower front teeth region.

On intraoral examination there was a generalized minimal spacing in the upper and lower arch along with a 3 mm of midline diastema, Angles class I molar relationship bilaterally with slightly decreased overjet and overbite.

On extra oral examination, patient had a Mesoprosopic facial form with a slightly convex facial profile.

There was neither gross asymmetry nor any facial disproportion.

On smile analysis, the amount of incisor exposure was 90 %, with 0 mm of gingival exposure. On an average the smile line was low with a straight smile arch. Her upper and lower lip length was normal with a 3 mm of interlabial gap.

On hard tissue examination, Dentition is Permanent with all the teeth present in the upper and lower arch except third molars**,** shape and size of teeth were normal with a normal enamel texture. Dental caries is detected with respect to lower right first and second molar. Patient had a 1.5 mm of overbite with 1mm over jet along with a lower midline shift towards left side.

Blanch test was done to confirm the diagnosis of frenal attachment wherein the upper lip was stretched upward and outward which showed an apparent zone

of attached gingiva along the midline/ the interdental papilla shift, indicating "papilla penetrating frenal attachment"(type 4).

Pre-Treatment Extra oral Photographs

Figure 1: A,profile view, B,profile view with smile, C,Oblique view, D,Lateral view

Pre-Treatment Intraoral Photographs

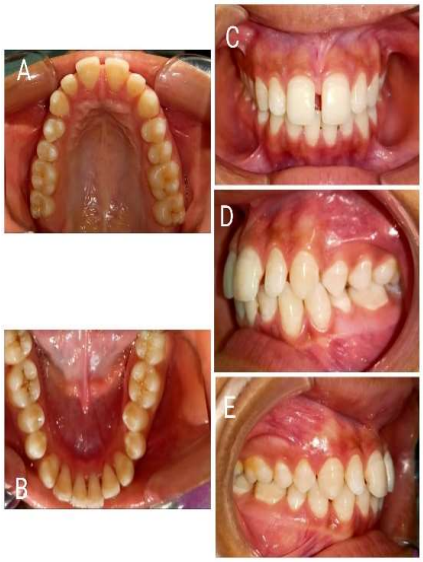

Figure 2: A,BOcclusal view, C,profile view, D,E lateral view

Figure3: Pre-treatment radiographs, A, lateral cephalogram; B, OPG

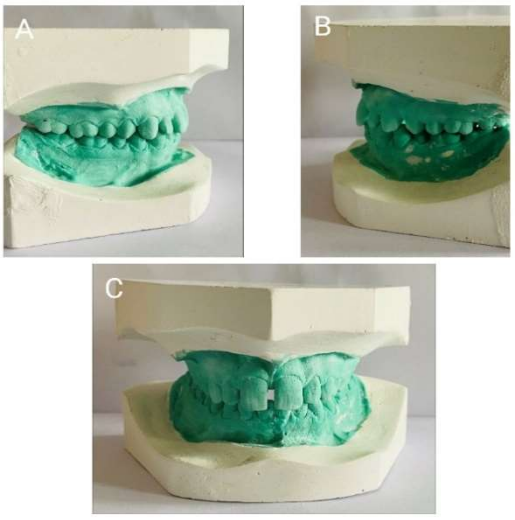

Figure 4: Pre-treatment models

Table 1: Cephalometric values

Measurement	Pre treatment
SNA	82 deg
SNB	79 deg
ANB	3 deg
FMA	20 deg
Jarabacks ratio	66.66%
Lower 1 to N-B (mm.)	8 mm
Upper 1 to N-A(mm)	6 mm
IMPA	104 deg
Wits- appraisal (Ao-Bo)	0 mm

Diagnosis

It's a case of skeletal class I Jaw base relationship with orthognathic maxilla and mandible, horizontal growth pattern and Angle's class I molar relationship bilaterally with generalized spacing in upper and lower arch along with 3mm of midline diastema and high frenal attachment.

Treatment Objective

Skeletal: To maintain class I relationship

Dental: In the Maxillary Dentition:

- To correct axial inclination and align the teeth in the arch.
- Consolidation of space
- Correction of midline diastema

In the Mandibular Arch:

- To achieve a normal axial inclination, align the teeth in the arch.
- Consolidation of space

Soft Tissue Profile:

- To achieve a pleasing and harmonious profile
- Enhance facial esthetics
- To correct the lip competancy

In Occlusion:

- To achieve the normal overjet and overbite
- To maintain class, I molar relation
- To maintain class, I Canine relation

Treatment Plan

Fixed mechan otherapy with non-extraction treatment modality. Where Space closure will be done by continuous arch mechanics in both upper and lower arch followed by maxillary frenum removal by frenectomy. Readjusted MBT with 0.022×0.028 slot (MBT prescription) will be bonded to the maxillary and mandibular arches. Anchorage preservation by trans-palatal arch in upper and lingual arch in lower arch, Lace backs bend backs. Levelling and alignment using 0.014NiTi 0.016 NiTi, 0.016 SS, 0.018 SS, 0.017x0.025 NiTi, 0.017x0.025 SS,0.019X0.025 NiTi, 0.019 x 0.025 SS.Use of power-chain for the space closure.Consolidating the lower incisors as a unit and placing a hook distal to lateral incisor and retraction using active tie back on 0.019x 0.025 SS.Finishing and settling using 0.014niti. Retention using lingual bonded retainer along with Hawley's retainer in upper and lower arch.

Treatment Progression

Bonding in the upper and lower arch till 2nd premolars, anchorage preservation by transpalatal arch in upper and lingual in lower arch, Lace back & bend backs. Levelling and alignment using 0.014NiTi, 0.016 NiTi, 0.016 x22 NiTi, 0.017x0.025 NiTi, 0.017x0.025 SS, 0.019 x 0.025 SS. Anterior space was closed by using elastomeric chain followed by retraction of canine using active tie back on 0.019 x 0.025 SS. Consolidating the upper incisors as a unit and placing a hook distal to lateral incisor and retraction using active tie back on 0.019x 0.025 SS. A 0.018 NiTi RCS was used in the upper arch to correct deepbite followed by class III elastic on left side to correct the molar relation. Finishing and settling using 0.014 NiTi.

After obtaining the result a decision was made to remove high frenal attachment by a surgical technique, a written consent was taken from the parents and patient for the frenectomy procedure. After 10 days of the surgical procedure a bonded lingual retainer along with haw leys retainer in upper and lower arch were delivered. And this whole treatment procedure was finished within a 8 months of time period.

At the end of treatment, an optimum over jet and overbite was obtained along with closure of midline diastema and corrected midline shift. A consonant smile was established by maintaining a proper class l molar and canine relation.

Post Treatment Extra oral Photographs

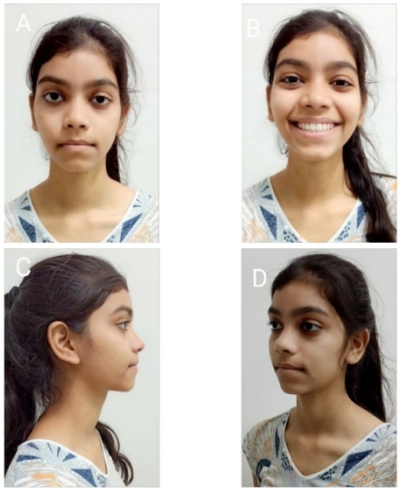

Figure 6: A,B, Occlusal view view, C,Profile view,D,E, Lateral ew

Post Treatment Intraoral Photographs

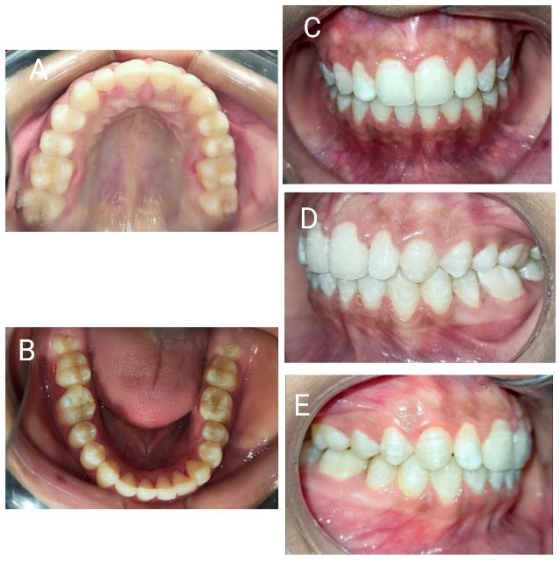

Figure 5: A,profile view, B,Profile view with smile,C,Lateral view,D,Oblique view

Overall, the post treatment result showed a significant improvement in facial profile and smile aesthetics. There was a proper class I molar and canine relation with 2 mm of over jet and overbite. The midline shift also was corrected.

Discussion

One of most common aesthetic problems in adults is spacing between teeth. The characteristic feature of mixed dentition is the presence of spacing particularly in the anterior segment, which usually is corrected by the termination of mixed and beginning of permanent dentition. The frenal attachment can be different types, including mucosal, gingival, and papillary and papilla penetrating. It has been stated that when the remaining teeth erupt by 16 years of age, 83% of the maxillary midline diastemas disappear spontaneously.[8] Relapse might occur after treatment of small initial diastema [9], measures must be taken to avoid relapse. Bonded lingual retainers are easily accepted by patients and are nondependent of patient cooperation. [10, 11] In general; abnormal frenal attachment may require removal either before orthodontic treatment or at the end of active treatment. The advantage of excision prior to orthodontic treatment is the ease of surgical access. Performing surgery before the orthodontic procedure might impede the closure of diastema by forming a scar tissue, but there is anoted advantage of excision after orthodontic tooth movement, which helps to maintain closure of diastema.

Conclusion

The present case report showed the presence of a thick frenum in the maxillary arch causing midline diastema and aesthetic problem in the patient and also there was a discrepancy in the arch length and total tooth material, which was corrected by a non-extraction orthodontic treatment modality along with a frenectomy procedure. A correct diagnosis and early intervention of etiology is always necessary for a proper treatment plan.

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