

Etiology Based Management of Midline Diastema: A Case Report

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Abstract:

Maxillary midline diastema is a most common occurring malocclusion, various therapy approaches are recommended for its management. Present article gives a case report of a female patient, age 19, who underwent treatment for a 4-mm maxillary midline diastema following high frenum attachment. The orthodontic treatment index was minimal (grade 2). The maxillary central incisors were bonded with McLaughlin-Bennett-Trivesi (MBT) 0.022" brackets. The tongue crib given for breaking tongue thrusting habit. A rectangular arch wire was used with E-chain to close the diastema. the total treatment duration to close the diastema was ten months. Frenectomy was performed after space closure. This is effective and efficient with uses of minimal inventory. This lessens the duration of the orthodontic treatment and conserves valuable chairside time.

Keywords- Midline Diastema, Frenectomy, Tongue crib, Malocclusion.

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INTRODUCTION:

A diastema is defined as space between the maxillary central incisors, in adults its frequently observed as an cosmetic problem¹. Midline diastema is quite prevalent in all age groups. The overall prevalence rates in adult populations have estimated from 1.6% to 25.4% and in younger ones its much higher².

Different aetiologies have been postulated leading to midline diastema including lip sucking, tongue thrusting, or thumb sucking and dental anomalies such as proclination in the maxillary incisor, a maligned tooth, and a crooked fusion of the teeth³.

However, it is argued that tongue thrust swallowing is considered as outcome rather than the cause, of malocclusion⁴.

Abnormal labial frenum is also paramount factor for development of median diastema and can lead to relapse after space closure with orthodontic treatment⁵.

Fixed appliances are being used for correction in adults with wider diastemas to control the angulations of the crown and roots¹. for the treatment of midline diastema various treatment modalities being advocated including prosthodontic rehabilitation, restorative and orthodontic procedures, And it is advised that based on time limits, and physical, physiological, and financial challenges, the practitioner need to select the most appropriate treatment strategy with the help of a well-developed differential diagnosis.

CASE REPORT:

19 years of female patient visited to the dept of Orthodontics with complaint of spacing in upper front teeth. Extraoral examination revealed straight profile, good facial symmetry, shallow nasolabial angle, competent lips at rest, and a shallow mento labial sulcus. (Fig 1)

Intraoral examination showed class I molar and canine relations on each side, tongue thrusting habit, a midline diastema, proclined upper and lower anterior, and an increased overjet, papillary frenal attachment confirmed with Blanch test.

Patient's tongue thrusting habit history was obtained. Patient reported the habit of placing her tongue forward against the anterior teeth while swallowing. The diagnosis of tongue thrusting was made as per Tolley's definition.



Fig 1:Pre-treatment extra and intra oral photograph

Treatment option

1. fix mechanotherapy with habit breaking appliance banding with all molar bonding with MBT 0.022 prescription. alignment and levelling with round NITI wire, retraction with SS wire. finishing and detailing with round NITI wire, frenectomy for removal of etiology after space closure. permanent fix retainer in upper and lower arch.

2. Removable appliance therapy with modified Howley's appliance incorporated with tongue crib.

Patient accepted the 1st treatment option after explaining both the treatment plans.

Treatment Progress

Initially full-mouth oral prophylaxis was given. Maxillary & Mandibular teeth were bonded with MBT 0.022" slot brackets using Phosphoric acid (37% concentration) to etch and Trans bond composite resin as adhesive (3M India Limited, Banga-lore, India). The bracket positioned using MBT bracket positioning gauge as per MBT chart.

Fink et al recommended tongue crib as a habit-breaking appliance which ceases the tongue thrusting habit.⁷ The crib therapy is more effective due to a redirected resting position of the tongue than a dynamic restraint of the tongue.

A modified fixed tongue crib was fabricated on working model of the patents maxillary arch using 0.045" steel wire and soldered on to trans palatal arch (Figure2). The crib trained patient to maintain tongue posteriorly so that tongue should be away from the front teeth.

Alignment and levelling were carried out with round NiTi wire and rectangular NiTi wires, Space closure with E-chain was obtained on 0.019" x 0.025" SS wire. Interproximal stripping was done in lower anterior teeth to maintain normal overjet. frenal attachment was surgically removed after space closure sutures were removed after 8 days of frenectomy procedure. (figure3). Finishing and detailing was completed by using round Ni Ti wire and settling elastics.



Fig 2:Tongue-crib placed in upper arch for tongue thrusting habit

Retractor on 0.019.0.025 ss wire

Total treatment duration for the case was 10 months. Case was deboned after 10 months followed by canine-to-canine lingual fix retainer in upper and lower arch. Essix retainer given to patient for night time to maintain occlusion.



Post Treatment Results

Class I molar & Class I canine relation were maintained. Normal overjet and over-bite were obtained. Midline matching was present and patient having pleasant profile. (figure 4).



Fig 4: Post treatment extra and intra oral photograph

DISCUSSION:

Treating diastemata is to achieve a stable and effective occlusion; maintain an environment for optimal gingival health; and sculpting a tooth form that is harmonious with the surrounding teeth, arch, and facial form⁸. While treating midline diastema addressing a etiological factors is paramount important. Tongue thrusting is also an important factor for development of midline diastema. Tulley et al defined tongue thrusting as 'forward movement of the tongue tip between the teeth to meet the lower lip during deglutition and in sounds of speech so that the tongue becomes interden-tal'⁶.

The modified tongue crib addresses the issue as it restrains the related muscles and provide physical blockage which serve as a reminder to break the habit. This can be used in conjunction with a fixed

appliance to improve its productiveness. Tongue movement gets positioned and cause tongue to function in a higher and posterior aspect in patients after using a tongue crib⁹. However, Subtelny and Sakuda¹⁰ et al observed the substantiated effect in those who used the appliance for at least six months.

Another vital etiology is presence of Labial frenum. Labial frenum is fibro-mucous tissue which attaches the lip to the alveolar mucosa/gingiva & underlying periosteum. Midline bony clefts are attached with an abnormal frenum & its fibrous tissue inserts into the notch of the alveolar bone¹¹. Relapse of median diastema is found to be twice in patients with abnormal frenum compared to those with normal frenal attachment, and the risk of relapse reduced by performing frenectomy⁵. But in retrospective analysis, Suter et al. found that in only a few cases of median diastema being closed after frenectomy alone & more effective outcome was obtained with frenectomy and collateral orthodontic treatment.¹²

The frenectomy procedure was performed after the space closure. However, after the surgery, scar tissue formation occurred, which made it difficult to close the space.

CONCLUSION:

Etiological management of midline diastema is of paramount importance. Along with Fixed orthodontic treatment addressing other accessory etiological factors gives good results like in this case we advocated use of tongue crib. Adjunctive surgical procedure for an abnormal frenum could be planned to reduce the risk of relapse. Frenectomy along with orthodontic treatment should be done to achieve competent and consistent outcome.

Despite its transformative potential, 3D printing faces challenges such as high costs, time constraints, and the need for advanced infrastructure. Current evidence is primarily based on preclinical studies, case reports, and limited clinical trials. To fully establish its efficacy and optimize its applications, further high-quality, randomized controlled trials are essential.

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