GMR
The Original

MANAGEMENT OF MIDLINE DIASTEMA IN A 13-YEAR-OLD MALE WITH LABIAL FRENECTOMY FOLLOWED BY 2 BY 4 MECHANO-THERAPY: A CASE REPORT

[1]Dr. Vishal Sharma, [2]Dr. Anil Gupta, [3]Dr. Medha Sharma, [4]Dr. Vibhusha Jain, [5]Dr. Muskan Kalra, [6]Nikita Yadav

[1]Assistant Professor, Department of Pediatric and Preventive Dentistry, Faculty of Dental Sciences, SGT University, Gurugram.
Email Id: sdrvishalsharma0219@gmail.com Orcid Id: https://orcid.org/0000-0001-5687-9462
[2]Professor and Head, Department of Pediatric and Preventive Dentistry, Faculty of Dental Sciences, SGT University, Gurugram.
Email Id: anilgupta_in@yahoo.in Orcid Id: https://orcid.org/0000-0002-7848-942X
[3]Postgraduate Student, Department of Pediatric and Preventive Dentistry, Faculty of Dental Sciences, SGT University, Gurugram.
Email Id: drsharma.medha@gmail.com
[4]Postgraduate Student, Department of Pediatric and Preventive Dentistry, Faculty of Dental Sciences, SGT University, Gurugram.
Email Id: vibhushaj14@gmail.com
[5]Postgraduate Student, Department of Pediatric and Preventive Dentistry, Faculty of Dental Sciences, SGT University, Gurugram.
Email Id: muskanvk99@gmail.com
[6]Postgraduate Student, Department of Pediatric and Preventive Dentistry, Faculty of Dental Sciences, SGT University, Gurugram.
Email Id: yadavnikita625@gmail.com

ABSTRACT

Background: A high labial frenum is a common developmental variation that may cause midline diastema, aesthetic concerns, and orthodontic complications. Early identification and combined surgical–orthodontic management can prevent long-term sequelae.

Case Presentation: A 13-year-old male presented with a midline diastema due to a thick, aberrant labial frenum. Following clinical and radiographic evaluation, a frenectomy was performed under local anaesthesia. A fixed orthodontic 2 by 4 mechano-therapy was then employed to achieve space closure and alignment. The patient showed excellent aesthetic and functional improvement, with stable results at follow-up.

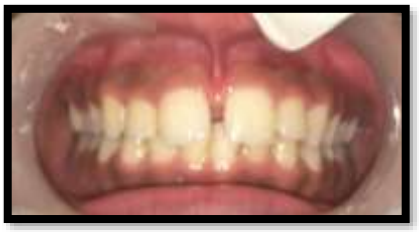
Conclusion: This case highlights the importance of timely intervention with a multidisciplinary approach, combining frenectomy and orthodontic mechanics to achieve optimal aesthetic and functional outcomes in adolescents.

KEYWORDS: Midline diastema, Labial frenectomy, 2 by 4 mechano-therapy.

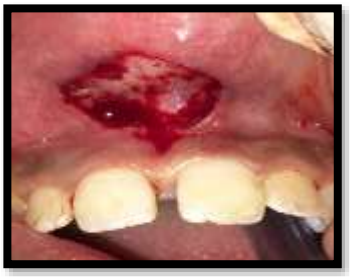
Case Report

A 13-year-old male presented to the OPD of Department of Pediatric and Preventive Dentistry, with a chief complaint of spacing between his upper central incisors and unpleasant appearance. Clinical examination revealed a 4 mm maxillary midline diastema associated with a thick, fibrous labial frenum exhibiting a papillary penetrating attachment. Apart from mild crowding in the maxillary arch, occlusion was otherwise normal. The patient's medical and family history was non-contributory.

The blanch test was performed by stretching the upper lip upward and forward, blanching of the interdental papilla (Type III) was well appreciated, confirming the abnormal extension of frenum fibres. Similarly, the pull test demonstrated mobility of the interdental tissue and widening of the midline diastema when the upper lip was retracted, further supporting the diagnosis of an aberrant frenum.



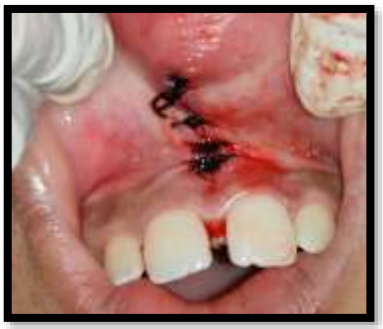
Table/Fig-1: pre-operative picture showing high labial frenum and mid line diastema diastema



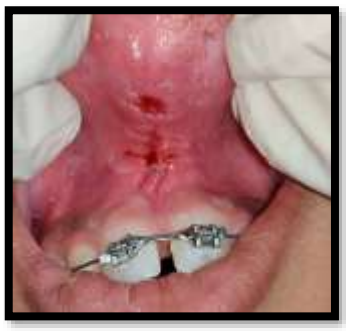
Table/Fig-2: diamond shaped tissue excision

The treatment plan comprised labial frenectomy under local anaesthesia, orthodontic closure of the diastema using a 2 × 4 fixed appliance, and post-treatment retention with a bonded fibre-reinforced composite retainer. A conventional frenectomy was performed, and primary closure was achieved with interrupted sutures. Two weeks later, orthodontic therapy was initiated with banding of the maxillary first molars and bonding of the incisors using a 0.022" slot MBT appliance. Initial alignment was carried out with a 0.012" NiTi arch wire, followed by sequential progression to 0.019" × 0.025" stainless steel. Space closure was accomplished using an elastic chain.

Complete diastema closure was achieved with satisfactory alignment of the incisors in 8 weeks. At the 3 months follow-up, results remained stable with no recurrence of spacing, and the patient was highly satisfied with the aesthetic outcome.

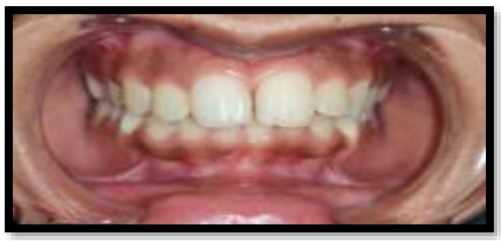


Table/Fig-3 sutures placed post frenectomy



Table/Fig-4 - Follow up after 1 week and placement of molar bands and brackets with 0.012 NiTi Wire

Table/Fig-5 - 2 by 4 Mechano-Therapy initiated



Table/Fig-6 – 3 months Follow-up Post-operative Picture showing Space closure

DISCUSSION

Midline diastema is a common aesthetic concern, particularly in adolescents, and its persistence beyond mixed dentition often warrants intervention. Etiological factors include abnormal frenum attachment, tooth-size discrepancies, mesiodens, habits or skeletal growth patterns. Among these, an aberrant maxillary labial frenum with a papillary penetrating insertion is well recognized as a primary cause of persistent diastema. [1]

An aberrant labial frenum is a well-recognized etiological factor in the persistence of midline diastema, particularly when it presents with a papillary penetrating attachment. In such cases, frenectomy is indicated as it removes the fibrous tissue that interferes with orthodontic space closure and contributes to relapse. When orthodontic treatment is attempted without frenectomy, the residual pull of the frenum often leads to reopening of the diastema. [2,3] Edwards demonstrated that frenectomy performed before space closure resulted in significantly greater long-term stability than orthodontic treatment alone. [4] Huang and Creath further emphasized that frenectomy should ideally be performed after eruption of the permanent canines but prior to space closure to reduce the likelihood of recurrence. [5]

Performing frenectomy first offers several clinical benefits. By eliminating the fibrous band, it removes the mechanical obstruction that impedes approximation of the central incisors. This improves the stability of space closure and reduces the chances of relapse caused by elastic recoil of the soft tissue. [6] It also allows adequate healing and fibre reorganization before orthodontic forces are applied, which minimizes scar-related relapse. Importantly, correcting the abnormal frenum attachment at an early stage reduces the risk of midline gingival recession and provides psychological reassurance to patients and parents, improving compliance with further treatment. [7]

Following frenectomy, the 2 × 4 appliance has proven to be an efficient modality for managing diastemas during early mixed or transitional dentition. The appliance involves bonding of the four maxillary incisors and banding of the first molars, which provides three-dimensional control of incisors, including torque, angulation, and rotation. It enables efficient diastema closure with elastic chains or closing loops, while molar bands provide anchorage to prevent unwanted tipping. Furthermore, intervention at this stage corrects aesthetic concerns during adolescence, improving self-esteem and patient motivation. [8] Priyadarshini et al. reported that the 2 × 4 appliance is particularly effective in conjunction with frenectomy as it achieves precise alignment and maintains results during the growth period. [9]

Evidence from comparative studies strongly supports this combined surgical–orthodontic approach. Campbell et al. (2007) reported in a randomized clinical trial that frenectomy followed by orthodontic space closure produced more stable outcomes than orthodontics alone.[10] Similarly, Kaimenyi (1998) observed that untreated papillary penetrating frena predisposed children to diastema relapse, even after orthodontic closure. [11] The above stated statements, along with the present case, reinforce the consensus that frenectomy followed by orthodontic therapy provides predictable, aesthetic and stable results.

Thus, early diagnosis and timely management of aberrant frenum attachment with frenectomy, followed by controlled orthodontic therapy using a 2 by 4 mechano-therapy, represents an effective multidisciplinary approach for adolescents presenting with midline diastema.

CONCLUSION

Management of midline diastema associated with an aberrant labial frenum requires a combined surgical and orthodontic approach. Performing frenectomy prior to orthodontic space closure eliminates soft tissue interference, reduces relapse, and enhances stability. The use of a 2 × 4 appliance following frenectomy provides efficient space closure, three-dimensional control of incisors and satisfactory aesthetic outcomes.

REFERENCES

1. Huang WJ, Creath CJ. The midline diastema: a review of its etiology and treatment. Pediatr Dent. 1995;17(3):171-9.
2. Priyadarshini S, et al. Two by four appliance in mixed dentition—an efficient tool for early correction. J Clin Diagn Res. 2014;8(7):ZC25-8.
3. Kaimenyi JT. Occurrence of midline diastema and frenum attachments amongst school children in Nairobi, Kenya. Indian J Dent Res. 1998;9(2):67-71.
4. Edwards JG. The diastema, the frenum, the frenectomy: a clinical study. Am J Orthod. 1977;71(5):489-508.
5. Huang WJ, Creath CJ. The midline diastema: a review of its etiology and treatment. Pediatr Dent. 1995;17(3):171-9.
6. Kamble RH, Parkhedkar RD. Surgical and orthodontic management of median diastema due to high frenum attachment. J Indian Soc Periodontol. 2012;16(2):288-291.
7. Taylor JE. Clinical observations relating the maxillary labial frenum to diastema formation and recurrence. Am J Orthod. 1939;25(8):646-660.
8. Preadolescent orthodontic management with two by four appliance. J Indian Orthod Soc. 2013;47(2):102-106.

9. Priyadarshini S, et al. Two by four appliance in mixed dentition—an efficient tool for early correction. J Clin Diagn Res. 2014;8(7):ZC25-8.
10. Campbell PM, et al. Effects of frenectomy on orthodontic stability: a randomized trial. Angle Orthod. 2007;77(5):872-878.
11. Kaimenyi JT. Occurrence of midline diastema and frenum attachments amongst school children in Nairobi, Kenya. Indian J Dent Res. 1998;9(2):67-71.