A Case Report-to Correct Midline Diastema with Split Essix Retainer

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Introduction

Midline diastema is a common aesthetic concern among patients[1]. Keene[2] defined it as a gap greater than 0.5 mm between the proximal surfaces of adjacent anterior teeth. The prevalence of midline diastema varies with factors such as age and ethnicity[2], with a higher incidence observed in the maxillary arch compared to the mandibular arch. Several contributing factors include: (1) developmental anomalies such as microdontia, congenitally missing lateral incisors, mesiodens, macroglossia, or an enlarged labial frenum; (2) pathological conditions like midline cysts, tumors, or periodontitis; and (3) neuromuscular influences such as oral habits like tongue thrusting during speech, swallowing, or rest.

Placek's classification offers a morphological-functional framework for categorizing labial frenum attachments, assisting clinicians in identifying functional abnormalities that may require treatment. Frenum attachments are classified as mucosal, gingival, papillary, or papillary penetrating, based on their location—ranging from the mucogingival junction and attached gingiva to the interdental papilla or extending to the palatal region[3]. In some cases, the frenum may be completely absent. Treatment generally includes addressing the underlying cause, followed by orthodontic tooth movement, aesthetic restoration with composite materials, prosthetic space management using porcelain jacket crowns, or the application of laminates[3].

So the purpose of this case report is to demonstrate the management of a midline diastema using an alternative approach in a patient who declined fixed orthodontic treatment due to its lengthy duration. To address the patient's concern, a simplified

method was adopted, resulting in successful diastema closure within a significantly shorter timeframe of 2 to 3 months.

Case Report

Case report no.1

The patient presented to the department with a complaint of spacing between the upper front teeth. Clinical examination revealed a well-aligned Class I interarch relationship, with a 2–3 mm overjet and a 1.5 mm overbite, along with a 2.5 mm midline diastema between the maxillary central incisors (Figure 1). As the patient declined fixed orthodontic treatment, an alternative approach was planned. Composite attachments were bonded to the upper right and left canines, and corresponding holes were created in the modified split Essix retainer to accommodate these attachments. Elastics were engaged between the attachments to facilitate space closure (Figure 2). Additionally, a 2 mm hard modified split Essix retainer was provided to prevent the development of distal spacing adjacent to the canines during the course of treatment (Figure 2). Following successful space closure, a fixed retainer was bonded from canine to canine in the upper arch to maintain the achieved results (Figure 3).

Case report no.2

The patient presented to the department with a complaint of spacing between the upper front teeth. Clinical examination revealed a well-aligned Class I molar relationship, 2mm overjet and overbite present with a 1.5 mm midline diastema between the maxillary central incisors (Figure 4). As the patient declined fixed orthodontic treatment, an alternative method was planned. Attachments were placed on the upper right and left canine regions, and elastics were used between these attachments to facilitate space closure. Additionally, a modified split Essix retainer (2mm hard) was provided to prevent distal space opening adjacent to the canines during the course of treatment.

The elastic was stretched and engaged from the right canine attachment to the left canine attachment, and holes were created in the modified split Essix retainer to accommodate these attachments (Figure 5). Modified split Essix retainers were placed in both cases to support the treatment process. By the end of 2–3 months, the midline diastema had closed successfully. Following space closure, appropriate retention protocols were implemented. Bonded retainer canine to canine, which are well accepted by patients and require minimal cooperation, were provided to maintain the achieved treatment outcome (Figure 6).

Procedure/ Steps

1. **Oral Prophylaxis**: Begin with thorough oral prophylaxis to remove any debris, plaque, or calculus from the teeth.
2. **Impression Making**: Take an alginate impression of the upper arch (or the arch to be treated).
3. **Model Preparation**: Pour the impression to prepare a study model.
4. **Fabrication of Essix Retainer**: Fabricate an Essix retainer (2mm hard) using a vacuum-forming machine over the study model.
5. **Modification of Essix Retainer**: Cut or split the Essix retainer at the midline with the help of bur to allow for movement of the anterior teeth.
6. **Tooth Surface Preparation:** Use 37% phosphoric acid etching gel (FROST), designated teeth (typically the canines) where attachments are to be placed then rinse thoroughly and dry to enhance bond strength.
7. **Apply bonding agent:** Following the etching procedure, apply a thin layer of bonding agent (ORTHOSOLO, a universal bonding primer) to the etched surface to ensure optimal adhesion of the flowable composite material.
8. **Attachment Placement**: Give composite attachments on the canines (both right and left side) and cure them properly.
9. **Essix Retainer Placement**: Place the modified split Essix retainer in the patient mouth.
10. **Elastic Placement**: Attach elastic from one canine to the other through the attachments to apply controlled force for space closure.
11. **Follow-Up**: Monitor the patient periodically to assess space closure.

Discussion

Diastema refers to the space between two or more consecutive teeth. In the present case, intraoral examination revealed a 2.5 mm gap between the maxillary central incisors, which progressively increased from the gingival margin towards the occlusal edge. As the patient was not willing to undergo fixed orthodontic treatment, an alternative approach was planned. A new technique involving a modified Essix retainer with bonded attachments and elastic traction was chosen to close the midline diastema conservatively and effectively.

David Lee Mitchell[3] treated midline diastema in two patients using tube-type and edgewise M brackets on the upper central incisors, along with a 0.016-inch round sectional archwire and 3 oz elastic force, achieving space closure within one month. In contrast, **Shivaram, Nemani, Annamaneni, and Manne**[4] used Begg brackets on the lingual surfaces of central and lateral incisors for improved esthetics and to prevent space

redistribution. However, their lingual approach required frequent adjustments due to bracket positioning difficulties.

In this case, composite attachments were bonded to both the right and left canines, and elastics were placed through these attachments to apply the necessary force for space closure. Additionally, a split Essix retainer was provided to prevent the opening of spaces distal to the canines. The combined effect of the attachments, elastics, and modified Essix retainer resulted in complete closure of the midline diastema within just 2-3 months. Patient compliance was excellent, as the appliance was easy to remove and reinsert, allowing the patient to independently manage the elastics and wear the retainer comfortably.

Conclusion

In conclusion, bonded attachments and elastic traction proved to be an effective, esthetic, and patient-friendly alternative for closing midline diastema. The technique achieved successful space closure within a short duration, with excellent patient compliance and without the need for fixed orthodontic appliances.

References

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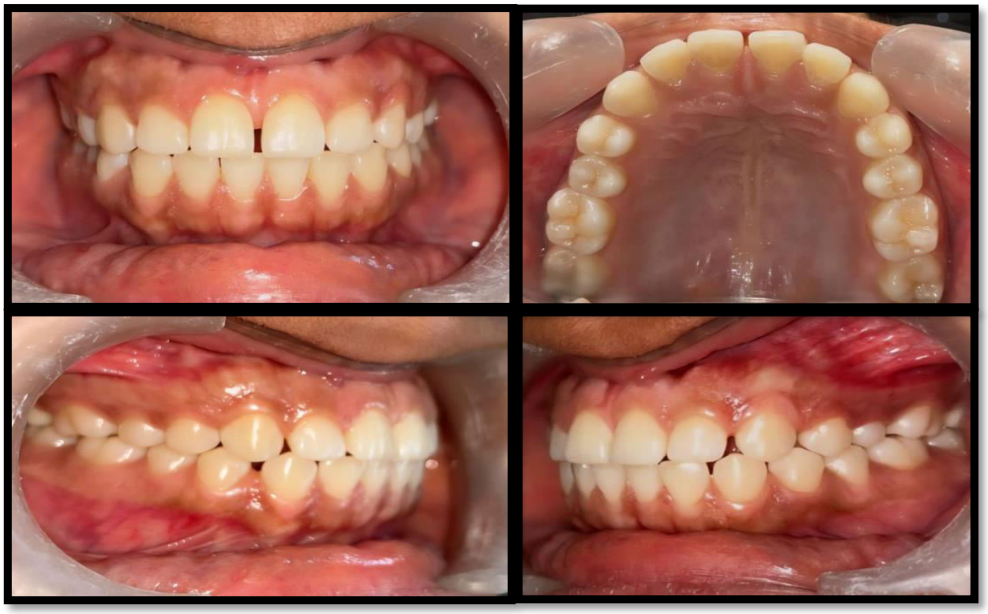

Figure 1: Intraoral photographs. a) Front view b) Maxillaryocclusal view c) Right lateral View d) Left lateral View.

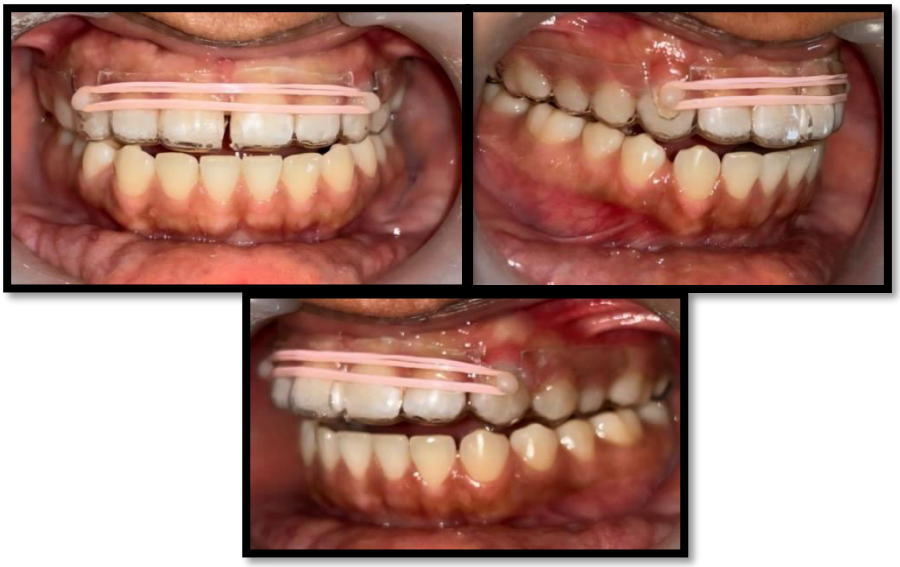

Figure 2: Intraoral photographs with appliance in place. a) Front view b) Right lateral View c) Left lateral View

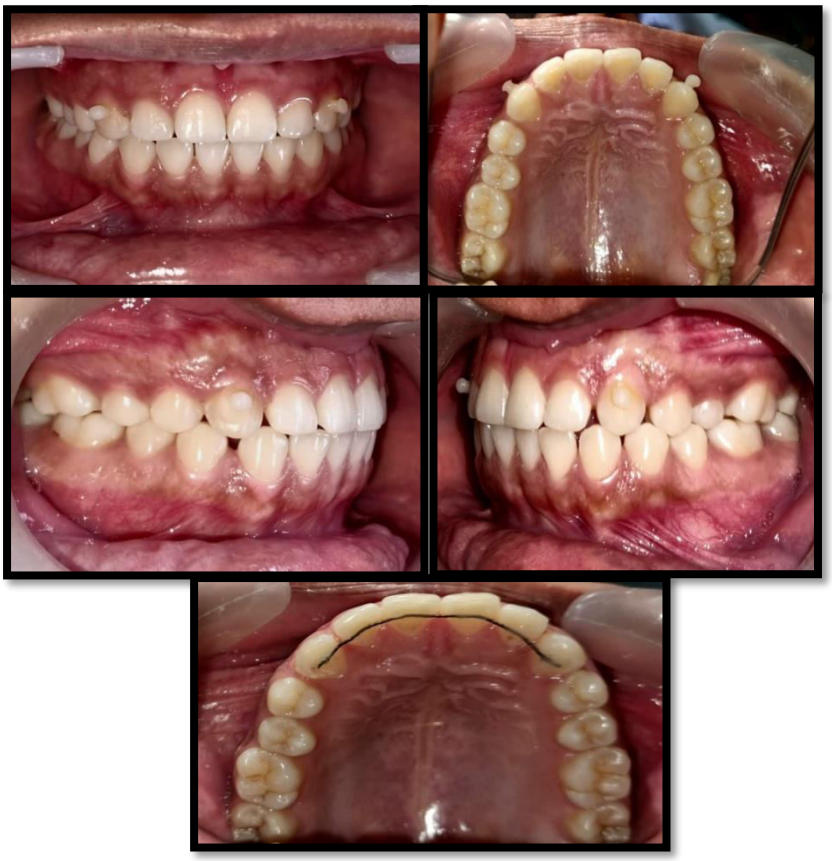

Figure 3: Intraoral photographs after space closure and witha) Front view b) Maxillary occlusal viewc) Right lateral View d) Left lateral View e) with retention appliance

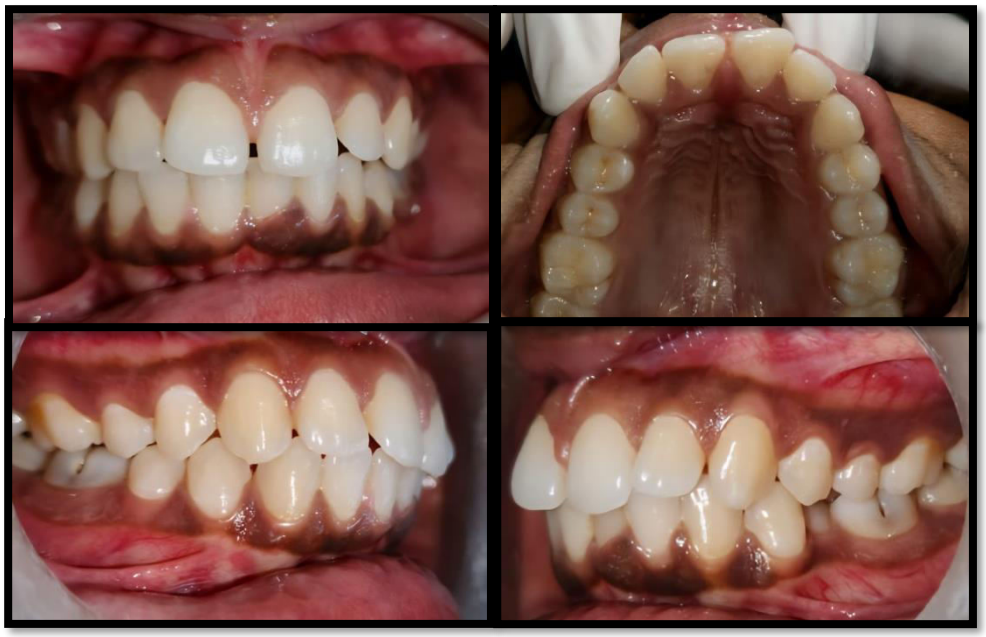

Figure 4: Intraoral photographs.a) Front view b) Maxillaryocclusal view c) Right lateral View d) Left lateral View

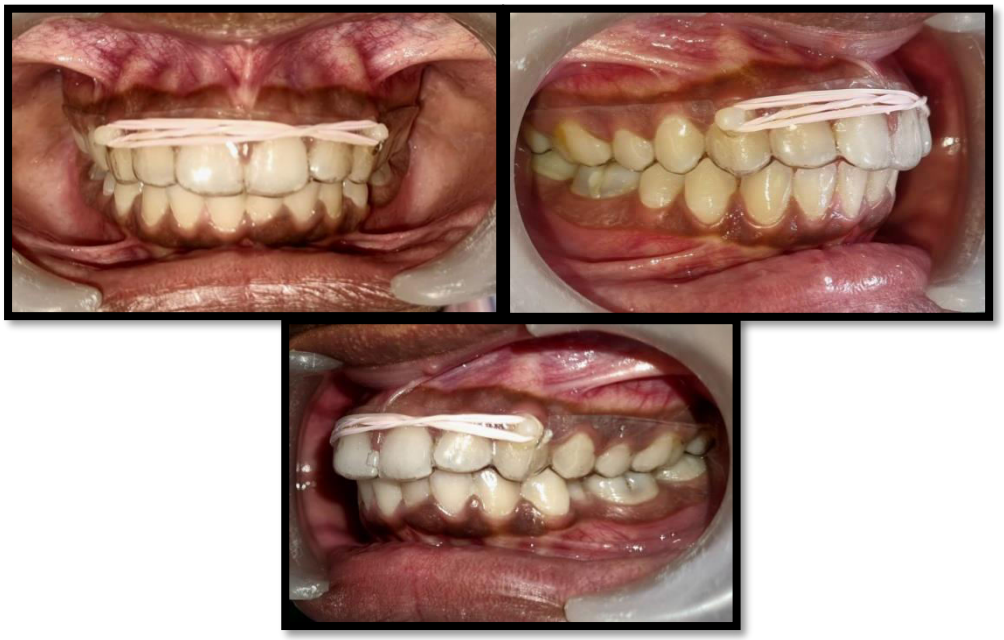

Figure 5: Intraoral photographs with appliance in place. a) Front view b) Right lateral View c) Left lateral View

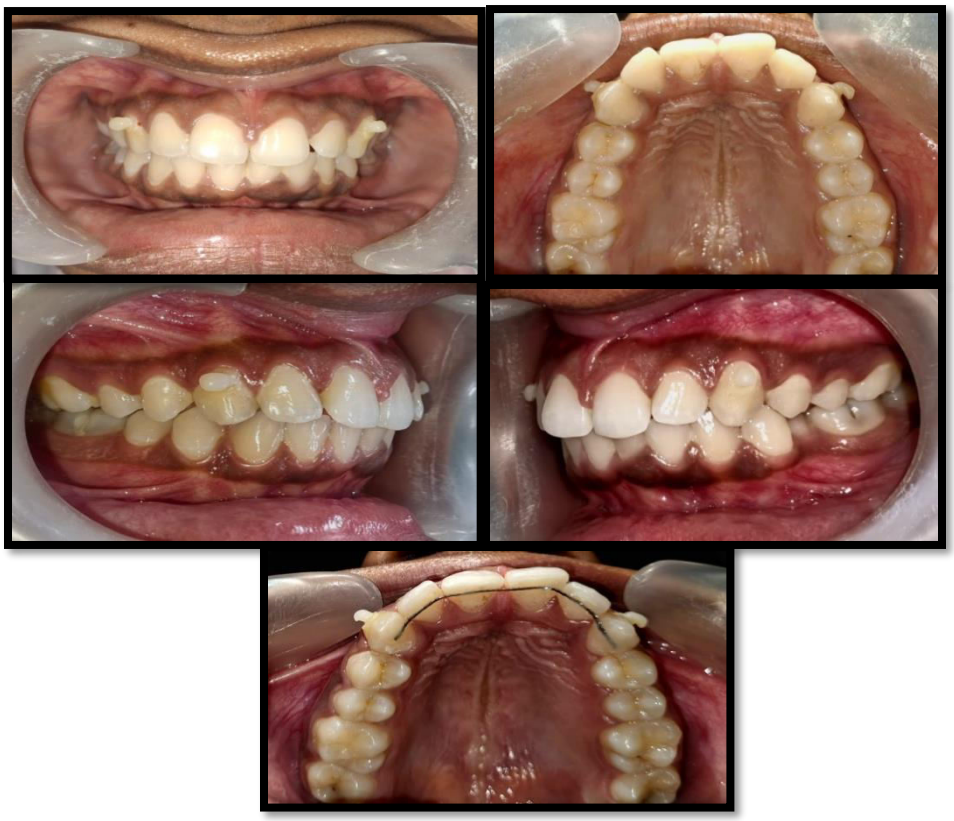

Figure 6: Intraoral photographs after space closure and witha) Front view b) Maxillary occlusal view c) Right lateral View d) Left lateral View e) with retention appliance