

Orthodontic Management of Midline Diastema and Anterior Spaced Dentition: A Case Report

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Abstract: *Maxillary midline diastema is one of the most frequently encountered esthetic problems in mixed and permanent dentition. It can occur either as a transient malocclusion or created by developmental, pathological or iatrogenic factors. Proper history taking and correct diagnosis of the etiology of the diastema is essential to ensure that the orthodontic correction is successful, and no future relapse takes place. The following case report presents treatment of an adult female patient having a midline diastema and a spaced upper and lower anterior dentition using conventional straight wire orthodontic technique and closure of spaces.*

Keywords: Midline Diastema, Spaced Dentition, Straight wire appliance, Fixed Appliance Therapy, Class I malocclusion, Orthodontic treatment

1. Introduction

A space between adjacent teeth is called a “diastema”.¹The midline diastema is a space (or gap) between the maxillary central incisors.² Midline diastema (or diastemas) occur in approximately 98% of 6 year olds, 49% of 11 year olds and 7% of 12–18 year olds.¹The midline diastema is very often seen to be a routine part of the developing occlusion, due to the natural position of teeth in their bony crypts, the eruption path of the cuspids, and increase in the size of premaxilla at the time of eruption of the maxillary permanent central incisors.¹ It may however persist either because of its width or other associated factors. If it is to be closed satisfactorily by orthodontics an understanding of the aetiology is essential.^{3, 4, 5, 6}

Angle (1907) described the dental midline diastema as a rather common form of incomplete occlusion characterized by a space between the maxillary and – less frequent mandibular central incisors. He also recognized the functional and esthetic implications of the midline diastema. He stated that the interdental diastema “always creates an unpleasant appearance and interferes with speech depending on its width”.⁷ Andrews (1972) also in his classical article “The six keys to normal occlusion” supported the fact that interdental diastemas should not exist and that all contact areas should be tight, so that the patient has “straight and attractive teeth, as well as a correct overall dental occlusion”.⁸

Moyers (1988) ⁹studied 82 patients that presented maxillary midline diastema and reported the following causes:

- Imperfect fusion at midline of premaxilla (32.9%),
- Enlarged or malposed upper labial frenum (24.4%),
- Midline diastema as part of normal growth (23.2%),
- Congenitally missing lateral incisors (11%),
- Supernumerary teeth at the midline (3.7%),
- Unusually small teeth (2.4%), and
- Combination of imperfect fusion and congenitally missing lateral incisors (2.4%).

Other causes for the development of the maxillary midline diastema referred in literature involve:

- Rotated teeth,
- Parafunctional oral habits, such as thumb/finger sucking or abnormal tongue posture
- Orthodontic treatment, as in cases of rapid palatal expansion or false teeth movement.
- Increased anterior overbite,
- Distal or labial inclination of maxillary central incisors
- Generalized spacing, and
- Pathologic teeth migration due to periodontal disease

This case presents the correction of a Class I malocclusion in an adult female patient with spaced upper and lower anterior teeth and presence of maxillary and mandibular midline diastema by executing a non - extraction fixed orthodontic protocol.

2. Case Report

A 20 years old female patient presented with a complaint of spacing between upper teeth. On Extraoral examination (fig - 1), the patient had an orthognathic facial profile, apparently symmetrical face with competent lips, a mesoprosopic facial form and average width of nose and mouth. The patient had no relevant prenatal, natal, postnatal history, history of habits or a family history. On smiling, there was presence of maxillary midline diastema and spaced anterior dentition. She was very dissatisfied with her smile.

Intra oral examination (Fig 1) in frontal view revealed midline diastema in maxillary and mandibular arch, mildly spaced maxillary and mandibular anterior dentition, increased overjet and average overbite. On lateral view thereis presence of class I molar and canine relation on both sides, proclined upper and lower incisors. The upper and lower arch shows the presence of a “U” shaped arch form.

This 20 years old female patient was diagnosed with a I malocclusion on a Class I Skeletal base with an average growth pattern, slightly proclined upper and lower incisors, spacing in the upper and lower anterior region with presence

of midline diastema and coincident dental midlines, increased overjet, moderately deep mentolabial sulcus, competent lips and a reduced nasolabial angle.

List of Problems

1) Proclined maxillary and mandibular anterior teeth

- 2) Spacing in maxillary and mandibular anterior region
- 3) Maxillary and mandibular midline diastema.
- 4) Increased overjet
- 5) Decreased nasolabial angle
- 6) Increased lip strain

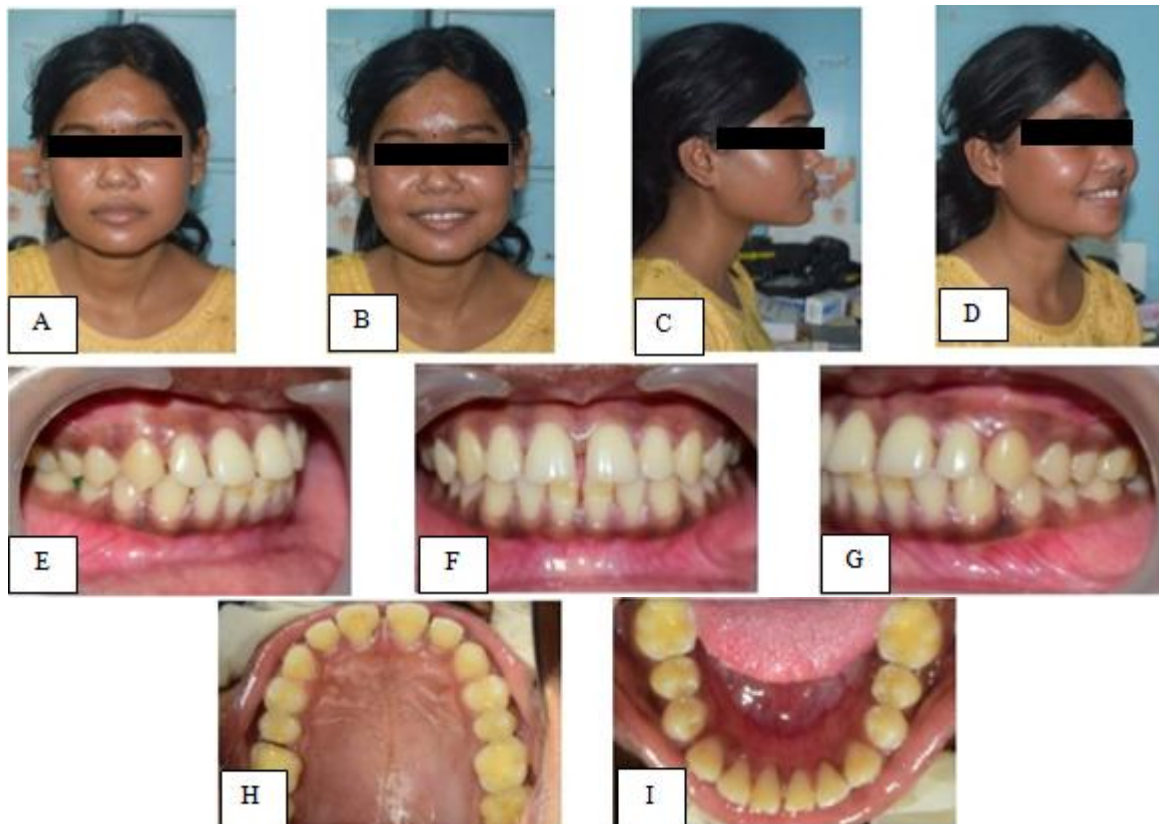


Figure 1: Pre - treatment Extra - Oral (A - D) and Intra - Oral (E - I) Photographs.

Treatment objectives:

- 1) To correct proclined maxillary and mandibular anterior teeth
- 2) To correct spacing in the maxillary and mandibular anterior teeth
- 3) To correct the increased overjet
- 4) To correct the decreased nasolabial angle
- 5) To maintain Angles Class I molar relationship
- 6) To maintain Class I canine relationship
- 7) To decrease the lip strain
- 8) To achieve a pleasing smile and a pleasing profile.

Treatment Plan:

- Non Extraction protocol was followed.
- Fixed appliance therapy with MBT 0.022inch bracket slot used. Initial levelling and alignment done with 0.012", 0.014", 0.016", 0.018", 0.020" Niti archwires following sequence A of MBT.
- Retraction and closure of spaces by use of 0.019" x 0.025" rectangular NiTi followed by 0.019" x 0.025" rectangular stainless steel wires.
- Group A anchorage used in upper and lower arch.
- Final finishing and detailing with 0.014" round stainless steel wires.
- Retention by means of Hawley's retainers along with lingual bonded retainers in the upper and lower arch.

Treatment Progress: Complete bonding & banding in both maxillary and mandibular arch was done, using MBT0.022X0.028" slot. Initially a 0.012" NiTi wire was used which was followed by 0.014", 0.016", 0.018", 0.020" Niti archwires following sequence A of MBT. NiTi round wires were discontinued after alignment and levelling. Retraction and closure of existing spaces was then started by use of 0.019" x 0.025" rectangular NiTi followed by 0.019" x 0.025" rectangular stainless steel wires. Reverse curve of spee in the lower arch and exaggerated curve of spee in the upper arch was incorporated in the heavy archwires to prevent the excessive bite deepening during retraction process and also to maintain the normal overjet and overbite. Anchorage was conserved in the upper and lower arch by using light retraction forces, thus constantly monitoring molar and canine relationship. Group A anchorage was needed in the upper and lower arch to maintain a Class I canine and molar relationship. Retraction and closure of existing spaces was done with the help of elastomeric chains delivering light continuous forces and replaced after every 4 weeks due to force decay and reduction in its activity. Finally, light settling elastics were given with rectangular steel wires in lower arch and 0.012" light NiTi wire in upper arch for settling, finishing, detailing and proper intercuspation. The spacing and midline diastema was corrected with an ideal occlusion at the end of the fixed appliance therapy. The Nasolabial angle improved

significantly at the end of treatment, thus improving the profile even further. There was improvement in occlusion,

smile arc, profile and position of lips at the end of the treatment.

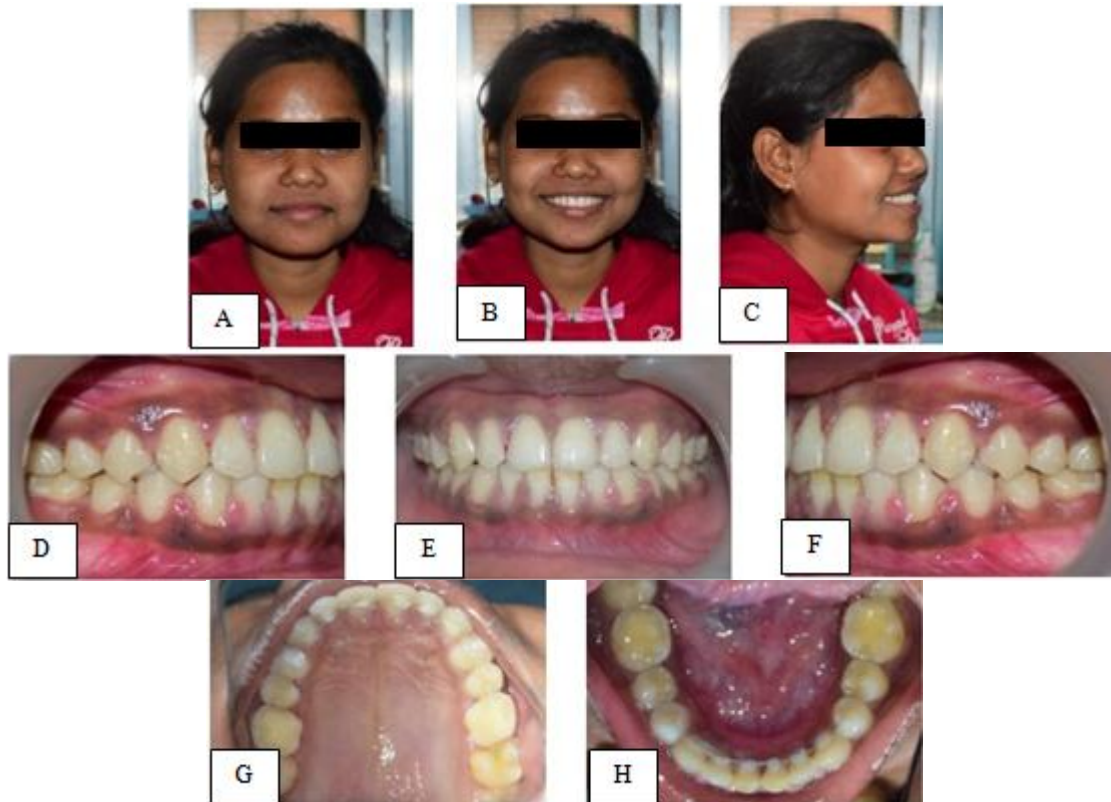


Figure 2: Post - treatment Extra oral (A - C) and Intra oral (D - H) photographs

3. Discussion

It is important for an Orthodontist to determine contributing factors before determining an optimal treatment plan. A carefully developed differential diagnosis enables the practitioner to choose the most effective orthodontic and/or restorative treatment. Restorative and prosthetic treatment is usually employed to treat diastemas based on tooth - size discrepancies. The most appropriate treatment often requires orthodontically closing of the midline diastema. A well - chosen individualized treatment plan, undertaken with sound biomechanical principles and appropriate control of orthodontic mechanics to execute the plan is the surest way to achieve predictable results with minimal side effects. The patient's chief complaint was forwardly placed and spaced upper and lower front teeth. The case was of a bimaxillary dentoalveolar protrusion with proclined upper and lower anterior dentition and maxillary and mandibular midline diastema and anterior spaced dentition. The selection of orthodontic fixed appliances is dependent upon several factors which can be categorized into patient factors, such as age and compliance, and clinical factors, such as preference/familiarity and laboratory facilities. The execution of all 1st premolar extraction followed by Fixed appliance therapy could be executed for improvement in the patient's convex profile in this case. The most important point to be highlighted here is the decision to not extract the premolars. After analysing the case thoroughly and reading all pretreatment cephalometric parameters along with evaluating the patients profile clinically, a decision was made of proceeding with the treatment without extracting the 1st premolars as the patient presented with severe

spacing and the existing spaces would be enough to correct the proclined anterior teeth. This case could be managed by non - extraction and hence we proceeded with the same. The treatment and closure of existing spaces very efficiently improved the patients smile at the end of the treatment. Successful results were obtained after the fixed Preadjusted Edgewise appliance therapy within a stipulated period of time. The overall treatment time was 12 months. Fixed lingual retainers placed in upper and lower arch.

4. Conclusion

This case report shows how Bimaxillary Dentoalveolar Protrusion with spacing case can be managed without extraction of premolars by means of appropriate use of simplified fixed orthodontic treatment and efficient conservation of anchorage at the same time. The planned goals set in the pre - treatment plan were successfully attained. Good intercuspation of the teeth was achieved with a Class I molar, incisor and canine relationship. Treatment of the proclined and forwardly placed upper and lower anterior teeth included the retraction and retroclination of maxillary and mandibular incisors utilizing the existing spaces with a resultant decrease in soft tissue procumbency and facial convexity. The profile changed from convex to orthognathic. The maxillary and mandibular teeth were found to be esthetically satisfactory in the line of occlusion. Patient had an improved smile and profile. The correction of the malocclusion was achieved, with a significant improvement in the patient aesthetics and self - esteem. The patient was very satisfied with the result of the treatment.

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