



ARTICLE

“CONVENTIONAL MBT MECHANOTHERAPY FOR CORRECTION OF AN UNAESTHETIC SMILE WITH A MIDLINE DIASTEMA AND SPACED DENTITION” – A CASE REPORT

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Abstract

Background: Maxillary midline diastema is one of the most frequently encountered esthetic problems in mixed and permanent dentition. Several causes have been attributed to the midline diastema, including developmental, pathologic or iatrogenic. It can also be seen as a transient malocclusion in which case any intervention is contraindicated. A wide range of possible treatments like restorative procedures, composite build up, surgeries (frenectomies) can be done, based on etiology. Thus, correct diagnosis of etiology and specific early intervention plays a major role in deciding the treatment plan.

Case report: This case report evaluates the management of Class I malocclusion with spaced anterior dentition in a 26 year old male patient with presence of peg shaped lateral incisors and maxillary and mandibular midline diastema. The upper and lower arch midline diastema can be attributed to presence of a thick band of fibrous tissue between the upper and lower central incisors. The case was treated with routine fixed orthodontic therapy and frenectomy was performed at the end of the treatment just before closure of midline diastema space to prevent scar tissue formation. After orthodontic treatment, the patient was referred to an aesthetic dentist for maxillary lateral incisors build-up with composite.

Conclusion: Maxillary and mandibular anterior arch spaces were closed down. The dental changes and treatment results were demonstrated. This case report illustrates the interdisciplinary collaboration of an Orthodontist, Periodontist and Endodontist for treatment of such a case. With proper case selection, planning and good patient cooperation, we could obtain significant results.

Keywords: Midline diastema, spaced dentition, MBT Mechanotherapy, Unaesthetic smile, fixed orthodontic treatment, Class I malocclusion, Aesthetic build-up, Peg laterals, Aesthetic improvement

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1 | INTRODUCTION

In the adolescent, tooth movement is affected by growth while the adult we deal strictly with tooth movement alone. In addition, orthodontic treatment in the adults is often based on symptoms detected by the patient while in children; it is based more often on signs detected by practitioners or parents. Of equal significance is the fact that the adults seeks treatment more often for esthetic reasons and hence is likely to have unreasonable expectations about the outcome of the treatment, is less adaptable to the appliance and is uncompromising in his appraisal of the treatment results. On a brighter note, adult patients are cleaner, more careful more punctual, prompt paying, much less sensitive to pain and treatment time is either the same or less than that of younger patients. A space between adjacent teeth is called a “diastema”. Mid-line diastema (or diastemas) occur in approximately 98% of 6 year olds, 49% of 11 year olds and 7% of 12–18 year olds. The midline 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^[1,19]. In Today’s times, Fixed Appliance treatment can significantly alter and improve facial appearance in addition to correcting irregularity of the teeth. Class I malocclusion is the second most prevalent occlusion after Class II malocclusion.^[2–3,14–15] Over the last few decades, there has been an increase in the awareness about orthodontic treatment which has led to more and more adults demanding high quality treatment in the shortest possible time with increased efficiency and reduced costs.^[4,16–18] There are many ways to treat Class I malocclusions, according to the characteristics associated with the problem, such as anteroposterior discrepancy, age, and patient compliance.^[5–6,20] The indications for extractions in orthodontic practice have historically been controversial^[7–9,21]. On the other hand, correction of Class I malocclusions in growing patients, with subsequent dental camouflage to mask the skeletal discrepancy, can involve either retraction by non extraction means simply by utilizing the available spaces or

by extractions of premolars.^[10–11] Lack of crowding or cephalometric discrepancy in the mandibular arch is an indication of 2 premolar extraction.^[12–13,22–25] Fortunately, in some instances satisfactory results with an exceptional degree of correction can be achieved without extraction of permanent premolars. This case presents the correction of a Bimaxillary dentoalveolar protrusion with a Class I malocclusion in an adult male patient with spacing and severely proclined maxillary and mandibular anterior teeth by executing a non-extraction protocol. The Non-Extraction protocol shown in this case is indicative of how an unesthetic smile can be converted into an aesthetic and pleasant one by routine fixed Orthodontic treatment without need for any extractions simply by utilizing the existing available spaces.

2 | CASE REPORT

2.1 | EXTRA-ORAL EXAMINATION

A 26 year old male patient presented with the chief complaint of forwardly placed upper and lower front teeth with spacing and excessive show of front teeth. On Extraoral examination, the patient had a convex facial profile, grossly symmetrical face on both sides with a retruded chin, incompetent lips, moderately deep mentolabial sulcus and an acute Nasolabial Angle, a Mesoprosopic facial form, Dolicocephalic head form, average width of nose and mouth, minimal buccal corridor space, a non-consonant reverse smile arc and posterior divergence of face. The patient had no relevant prenatal, natal, postnatal history, history of habits or a family history. On Smiling, there was excessive show of maxillary anterior teeth. The patient had a toothy smile. On smiling he

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also showed the presence of spaced anterior dentition and an unaesthetic facial profile and smile. The patient was very dissatisfied with his smile.

2.2 | INTRA-ORAL EXAMINATION

Intraoral examination on frontal view shows presence of an increased overjet and an average overbite with severe spacing in upper and lower anterior region. On lateral view the patient shows the presence of Class II Division 1 incisor relationship and a Class II Canine and molar relationship bilaterally. There was proclined and forwardly placed upper and lower anterior teeth with presence of upper and lower midline diastema.



FIGURE 1: PRE TREATMENT PHOTOGRAPHS



FIGURE 2: PRE TREATMENT RADIOGRAPH

TABLE 1: PRE TREATMENT CEPHALOMETRIC READINGS

PARAMETERS	PRE- TREATMENT
SNA	83°
SNB	80°
ANB	3°
WITS	1mm
MAX. LENGTH	108mm
MAN. LENGTH	99mm
IMPA	113°
NASOLABIAL ANGLE	89°
U1 TO NA DEGREES	41°
U1 TO NA mm	7mm
L1 TO NB DEGREES	37°
L1 TO NB mm	8mm
U1/L1 ANGLE	105°
FMA	24°
Y AXIS	63°

3 | DIAGNOSIS

This 26 year old male patient was diagnosed with a Class II malocclusion with a slightly prognathic maxilla and an average to horizontal growth pattern, increased overjet and average overbite, proclined upper and lower incisors, spacing in the upper and lower anterior region with presence of midline diastema, protruded upper and lower lips, a retruded chin, moderately deep mentolabial sulcus, incompetent lips, a convex facial profile and decreased Nasolabial angle.

3.1 | LIST OF PROBLEMS

1. Proclined maxillary and mandibular anterior teeth
2. Spacing in maxillary and mandibular anterior region
3. Prognathic maxilla
4. Convex facial profile
5. Retruded chin
6. Decreased Nasolabial angle
7. Incompetant lips

8. Increased lip strain

3.2 | 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 maxillary prognathism
4. To correct the posterior divergence of face
5. To correct the retruded chin position
6. To correct the decreased Nasolabial angle
7. To achieve Angles class I Molar relation
8. To achieve a Class I Incisor and Canine relationship
9. To decrease the lip strain
10. To achieve a pleasing smile and a pleasing profile

3.3 | TREATMENT PLAN

- Non Extraction protocol was followed
- Fixed appliance therapy with MBT 0.022 inch bracket slot
- Initial leveling and alignment 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. Absolute anchorage in the upper arch and group A anchorage in the lower arch to achieve a Class I incisor, canine and molar relationship
- Frenectomy in upper and lower midline region for removal of fibrous band of tissues resulting in the midline diastema in the upper and lower arch

- Final finishing and detailing with 0.014" round stainless steel wires
- Composite build- up of the peg shaped lateral incisors.
- Retention by means of Begg's Wrap-around retainers along with lingual bonded retainers in the upper and lower arch.

4 | TREATMENT PROGRESS

Complete bonding & banding in both maxillary and mandibular arch was done, using MBT-0.022X0.028" slot. Initially a 0.012" NiTi wire was used which was followed by 0.014, 0.016", 0.018", and 0.020" Niti archwires following sequence A of MBT. After 6 months of alignment and leveling NiTi round wires were discontinued. 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. Absolute anchorage was needed in the upper arch and group an anchorage in the lower arch to achieve a Class I incisor, canine and molar relationship. Inter-radicular implants were hence placed between 15,16 and 25,26 for the purpose of absolute anchorage. This would enable getting the lower molars ahead and thus ending the case in a Class I incisor, canine and molar relation. Hence anchorage conservation in the upper arch was very important in this case for better results. 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. Frenectomy surgery was performed by the periodontist in upper and lower midline region for removal of fibrous band of connective tissues resulting in the midline diastema in the upper and

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lower arch. Final spaces were closed down after the frenectomy procedure. 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 increased overjet was corrected with an ideal occlusion at the end of the fixed appliance therapy. Also the profile of the patient improved significantly from being convex to now more Orthognathic with a pleasant and consonant smile arc on smiling. The Nasolabial angle improved significantly at the end of treatment. The patient was then referred to the Endodontist at the end of treatment for composite build-up of the peg shaped lateral incisors. There was improvement in occlusion, smile arc, profile and position of chin at the end of the treatment.

TABLE 2: POST TREATMENT CEPHALOMETRIC READINGS

PARAMETERS	POST-TREATMENT
SNA	82°
SNB	81°
ANB	1°
WITS	1mm
MAX. LENGTH	105mm
MAN. LENGTH	98mm
IMPA	95°
NASOLABIAL ANGLE	103°
U1 TO NA DEGREES	26°
U1 TO NA mm	2mm
L1 TO NB DEGREES	24°
L1 TO NB mm	3mm
U1/L1 ANGLE	132°
FMA	25°
Y AXIS	64°

5 | DISCUSSION

Treatment of a Spaced Class I malocclusion without extraction of premolars is challenging. 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. Class I malocclusion with Bimaxillary Dentoalveolar protrusion might have any

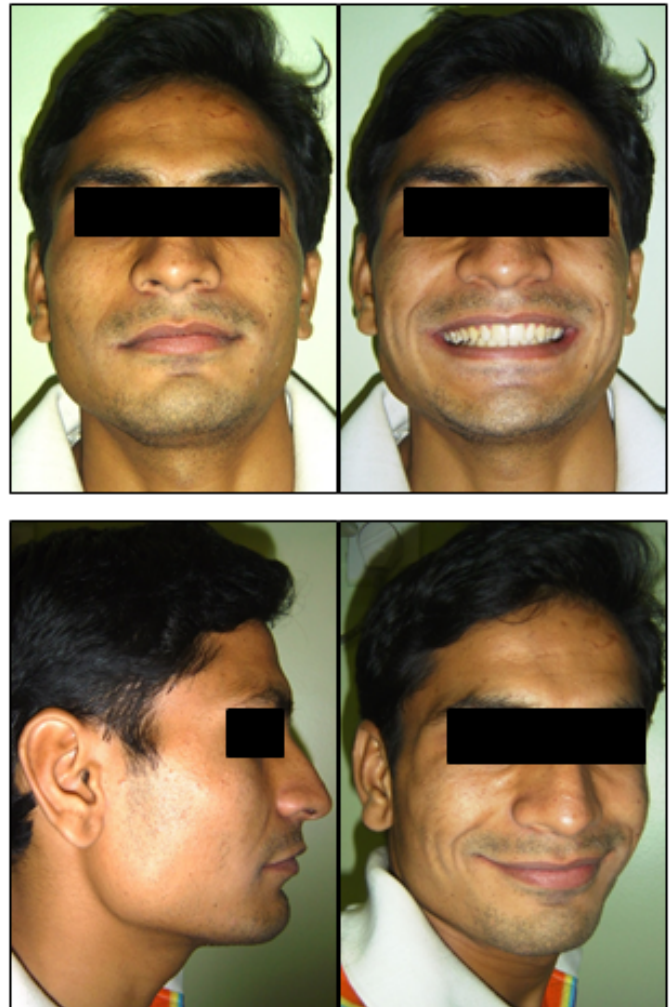


FIGURE 3: POST TREATMENT EXTRA ORAL PHOTOGRAPHS

number of a combination of the skeletal and dental components. Hence, identifying and understanding the etiology and expression of Class I malocclusion and identifying differential diagnosis is helpful for its correction. The patient’s chief complaint was forwardly placed and spaced upper and lower front teeth with excessive show of front teeth. The case was of a clear bimaxillary dentoalveolar protrusion with severely proclined upper and lower anterior 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



FIGURE 4: POST TREATMENT INTRAORALPHOTOGRAPHS

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 profile changing it from being convex to more orthognathic at the end of the treatment. Successful results were obtained after the fixed Pre-adjusted Edgewise appliance therapy within a stipulated period of time. The overall treatment time was 16 months. After this active treatment phase, the profile of this 26 year old male patient improved significantly as seen in the post treatment extra oral photographs. Vacuum formed clear Essix retainers were then delivered to the patient along with fixed lingual bonded retainers in upper and lower arch. One year follow up records were taken and did not

reveal any drastic untoward changes in the patients smile and profile.

TABLE 3: COMPARISON OF PRE AND POST TREATMENT CEPHALOMETRIC READINGS

PARAMETERS	PRE-TREATMENT	POST-TREATMENT
SNA	83°	82°
SNB	80°	81°
ANB	3°	1°
WITS	1mm	1mm
MAX. LENGTH	108mm	105mm
MAN. LENGTH	99mm	98mm
IMPA	113°	95°
NASOLABIAL ANGLE	89°	103°
U1 TO NA DEGREES	41°	26°
U1 TO NA mm	7mm	2mm
L1 TO NB DEGREES	37°	24°
L1 TO NB mm	8mm	3mm
U1/L1 ANGLE	105°	132°
FMA	24°	25°
Y AXIS	63°	64°



FIGURE 5: RETENTION WITH VACUUM FORMED CLEAR RETAINERS

6 | CONCLUSION

Maxillary and mandibular anterior arch spaces were closed down. The dental changes and treatment re-

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sults were demonstrated. This case report illustrates the interdisciplinary collaboration of an Orthodontist, Periodontist and Endodontist for treatment of such a case. With proper case selection, planning and good patient cooperation, we could obtain significant results. 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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