



ARTICLE

“CONVENTIONAL STRAIGHT WIRE APPLIANCE FOR CORRECTION OF MIDLINE DIASTEMA AND SPACED DENTITION” – A CASE REPORT

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Abstract

Careful diagnosis and treatment planning on a multidisciplinary basis is required to treat adult patients. In truth, the adult, unlike the child, is a relentless patient who will not cover up deficiencies in the skill of diagnosis or errors in the overall treatment. He presents with no growth, little rebound and meager accommodation to mechanics. 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. The following case report presents treatment an adult male patient having a midline diastema and a spaced upper and lower anterior dentition using conventional straight wire orthodontic technique followed by frenectomy and closure of spaces.

Keywords: Spacing, Midline Diastema, Spaced Dentition, Frenectomy, Interdisciplinary collaboration, Straight wire appliance, Fixed Appliance Therapy, Class I malocclusion, Aesthetic Improvement, Unaesthetic smile

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1 | INTRODUCTION

Bio mechanical modifications made to accommodate orthodontic treatment of adult dentitions are generally minor and adhere to the basic laws of physics as they apply to orthodontic tooth movement. Some adult presentations necessitate changes in treatment strategy from what would otherwise be employed in adolescent patients to achieve similar goals. In other cases, objectives themselves may need to be modified because of lack of growth potential, constraints of treatment mandated by the patient or the presence of multiple missing or compromised teeth. By planning treatment and mechanotherapy taking into account the individual circumstances that may affect the patient's biological response to treatment, realistic goals of orthodontics can be mutually recognized and agreed on by both the provider and the patient before therapy is initiated, resulting in an immensely rewarding experience. A space between adjacent teeth is called a "diastema". Midline 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 dis-

crepancy, 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 Class I malocclusion in an adult male patient with spaced upper and lower anterior teeth and presence of maxillary midline diastema by executing a non-extraction fixed orthodontic 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 spaced upper front teeth and sought treatment for the same. On Extraoral examination, the patient had an almost orthognathic facial profile, grossly symmetrical face on both sides, incompetent lips, moderately deep mentolabial sulcus and an acute Nasolabial Angle, a Mesoprosopic facial form, Dolicocephalic head 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. The patient had a toothy smile, minimal buccal corridor space, a consonant smile arc an unaesthetic smile. The patient was very dissatisfied with his smile.

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FIGURE 1: PRE TREATMENT EXTRA-ORAL PHOTOGRAPHS



FIGURE 2: PRE TREATMENT INTRA-ORAL PHOTOGRAPHS

2.2 | INTRA-ORAL EXAMINATION

Intraoral examination on frontal view showed presence of an average overjet and overbite with non-coincident dental midlines. The patient's lower dental midline was shifted to the left by 1.5mm. There was presence of spacing in the upper and lower anterior region with presence of a maxillary midline diastema. On lateral view the patient showed the presence of Class I incisor relationship, a Class I Canine relationship bilaterally and a Class I molar relationship bilaterally. The upper and lower arch shows the presence of a “U” shaped arch form.

an antegonial notch.

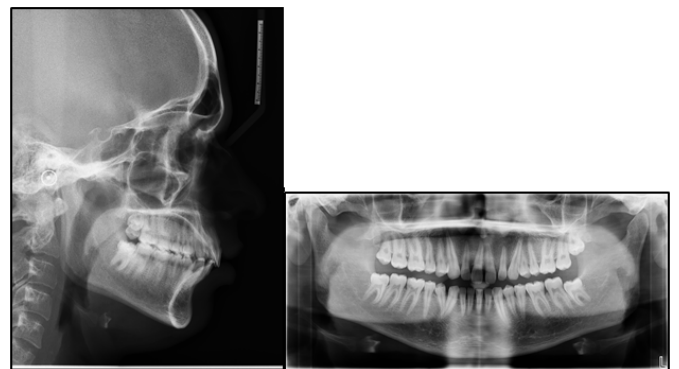


FIGURE 3: PRE TREATMENT RADIOGRAPHS

2.3 | RADIOGRAPHIC EVALUATION

Lateral cephalogram showed presence of slightly proclined upper and lower dentition with an average to slightly vertical growth pattern. OPG shows presence of all completely erupted third molars except 28 and 38 which seem to be partially erupted, adequate height of inter dental alveolar bone and well positioned condyles without presence of any anomaly. OPG also shows presence of a spaced dentition and absence of root parallelism. Ramal width is broad and the mandibular plane is flat without presence of

3 | DIAGNOSIS

This 26 year old male 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 non-coincident dental midlines, moderately deep mentolabial sulcus, incompetent lips and a reduced

TABLE 1: PRE TREATMENT CEPHALOMETRIC READINGS

PARAMETERS	PRE- TREATMENT
SNA	82°
SNB	81°
ANB	1°
WITS	1mm
MAX. LENGTH	88mm
MAN. LENGTH	113mm
IMPA	95°
NASOLABIAL ANGLE	89°
U1 TO NA DEGREES	27°
U1 TO NA mm	4mm
L1 TO NB DEGREES	26°
L1 TO NB mm	5mm
U1/L1 ANGLE	125°
FMA	26°
Y AXIS	72°
L1 TO A-POG	3mm
CONVEXITY AT PT. A	2mm
LOWER LIP- E PLANE	3mm
N-PERP TO PT A	0mm
N-PERP TO POG	-2mm
CHIN THICKNESS	12mm

nasolabial angle with increased lip strain.

3.1 | LIST OF PROBLEMS

1. Spacing in maxillary and mandibular anterior teeth
2. Maxillary midline diastema
3. Decreased Nasolabial angle
4. Incompetant lips
5. Increased lip strain
6. Non coincident dental midlines

3.2 | TREATMENT OBJECTIVES

1. To correct spacing in maxillary and mandibular anterior teeth
2. To correct maxillary midline diastema

3. To correct the decreased Nasolabial angle
4. To correct the non-coincident dental midlines
5. To decrease the lip strain
6. To maintain Class I incisor, canine and molar relationship
7. 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. Group A anchorage in the upper and lower arch to maintain a Class I incisor, canine and molar relationship
- Frenectomy in upper midline region for removal of fibrous band of tissues resulting in the mid-line diastema in the 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.

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", 0.020" Niti archwires following sequence A of MBT. After 6 months of alignment and leveling NiTi round

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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 already existing 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 incisor, 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. Frenectomy surgery was performed by the periodontist in upper midline region for removal of fibrous band of connective tissues resulting in the midline diastema in the upper 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 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 chin at the end of the treatment.

5 | DISCUSSION

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

TABLE 2: POST TREATMENT CEPHALOMETRIC READINGS

PARAMETERS	POST- TREATMENT
SNA	82°
SNB	81°
ANB	1°
WITS	0mm
MAX. LENGTH	87mm
MAN. LENGTH	110mm
IMPA	92°
NASOLABIAL ANGLE	102°
U1 TO NA DEGREES	24°
U1 TO NA mm	2mm
L1 TO NB DEGREES	23°
L1 TO NB mm	2mm
U1/L1 ANGLE	132°
FMA	26°
Y AXIS	73°
L1 TO A-POG	1mm
CONVEXITY AT PT. A	1mm
LOWER LIP- E PLANE	1mm
N-PERP TO PT A	0mm
N-PERP TO POG	0mm
CHIN THICKNESS	12mm



FIGURE 4: POST TREATMENT EXTRA-ORAL PHOTOGRAPHS

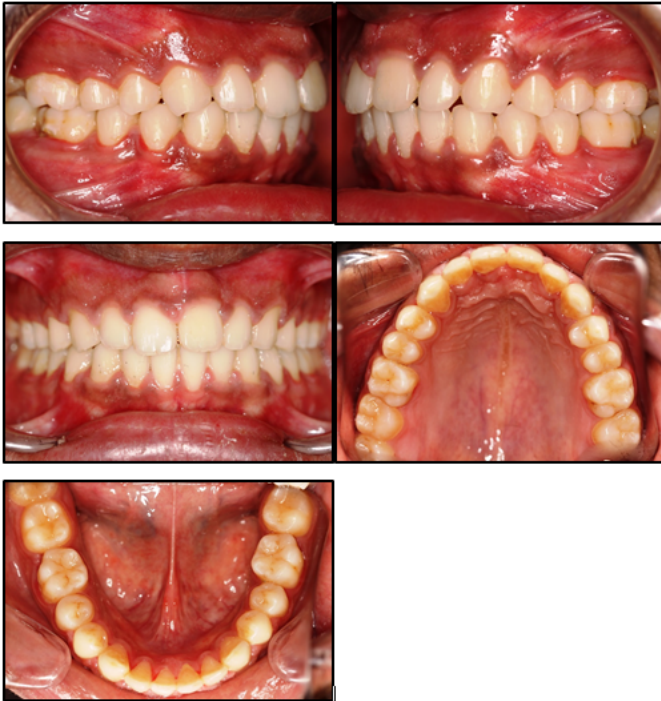


FIGURE 5: POST TREATMENT INTRA-ORAL PHOTOGRAPHS

of the treatment, is less adaptable to the appliance and is uncompromising in his appraisal of the treatment results. Treatment of a Spaced Class I malocclusion without extraction of premolars in an adult patient 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 might have any 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 spaced upper front teeth and sought treatment for the same. 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 most important point to be highlighted here is the decision to not extract the premolars. After analyzing 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 spacing and the existing spaces would be enough to correct the spaced 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 the Nasolabial angle from acute to average 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 maxillary midline diastema was closed towards the end of the treatment after performing frenectomy in the upper arch to excise the thick band of fibrous connective tissue. The overall treatment time was 13 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. Hawley's retainers were then delivered to the patient along with fixed lingual bonded retainers in upper and lower arch. Patient was very happy and satisfied with the results of the treatment

6 | CONCLUSION

This case report illustrates the interdisciplinary collaboration of an Orthodontist and Periodontist 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 a simple Class I 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. 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.

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TABLE 3: COMPARISON OF PRE AND POST TREATMENT CEPHALOMETRIC READINGS

PARAMETERS	PRE-TREATMENT	POST-TREATMENT
SNA	82°	82°
SNB	81°	81°
ANB	1°	1°
WITS	1mm	0mm
MAX. LENGTH	88mm	87mm
MAN. LENGTH	113mm	110mm
IMPA	95°	92°
NASOLABIAL ANGLE	89°	102°
U1 TO NA DEGREES	27°	24°
U1 TO NA mm	4mm	2mm
L1 TO NB DEGREES	26°	23°
L1 TO NB mm	5mm	2mm
U1/L1 ANGLE	125°	132°
FMA	26°	26°
Y AXIS	72°	73°
L1 TO A-POG	3mm	1mm
CONVEXITY AT PT. A	2mm	1mm
LOWER LIP- E PLANE	3mm	1mm
N-PERP TO PT A	0mm	0mm
N-PERP TO POG	-2mm	0mm
CHIN THICKNESS	12mm	12mm

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