Case Report

Single phase correction of tongue thrust habit alongside fixed orthodontic treatment for closure of spaced dentition and midline diastema in a male patient with class I malocclusion without need for a two phase appliance therapy - 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. 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. Class I malocclusion is one of the most common problems around the globe affecting around one-third of the patients who come for orthodontic treatment. This case report evaluates the management of Class I malocclusion with spaced dentition and a tongue thrusting habit in a male patient with the help of a single phase appliance therapy without the need for 2 phase correction, i.e, 1st the correction of tongue thrusting with the help of a habit breaking appliance followed by Fixed appliance therapy with braces. This modality not only saves time, but also promotes faster habit breaking as intervention is done in the earlier stages of life when the patient is still growing. Severe maxillary incisor proclination with a convex Orthognathic facial profile, increased mandibular plane angle, incompetent lips and increased overjet was observed on clinical and cephalometric analysis. Orthodontic treatment resulted in a marked improvement of the patient’s smile and a remarkable increase in self-confidence and quality of life. The profile changes and treatment results were demonstrated with proper case selection and good patient cooperation with fixed appliance therapy.

1. Introduction

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 cuspsids, and increase in the size of premaxilla at the time of eruption of the maxillary permanent central incisors. 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.1,2 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.3 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.4,5 The indications for extractions in orthodontic practice have historically been

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controversial.\textsuperscript{6–8} 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.\textsuperscript{9,10} Lack of crowding or cephalometric discrepancy in the mandibular arch is an indication of 2 premolar extraction.\textsuperscript{11,12} 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 Spaced malocclusion in a male patient with a midline diastema, a tongue thrusting habit, increased overjet and a bimaxillary protrusion simply by executing a non extraction protocol by breaking the tongue thrusting habit alongside the progress of Fixed appliance therapy for retraction and closure of existing spaces. The Non Extraction protocol shown in this case is indicative of how a borderline extraction case can be converted into a non extraction case by routine Fixed Orthodontic treatment

2. Case Report

2.1. Extra-oral examination

A 19 year old male patient presented with the chief complaint of forwardly placed, spaced upper front teeth and excessive show of upper front teeth. On Extraoral examination, the patient had a convex profile, grossly symmetrical face on both sides, incompetent lips, moderately deep mentolabial sulcus and an average Nasolabial Angle, a Leptoprosopic facial form, Dolicocephalic head form, Average width of nose and mouth, minimal buccal corridor space, a consonant smile arc and slightly posterior divergence of face. The patient had no relevant prenatal, natal, postnatal history or a family history. However the patient had a tongue thrusting habit, which was diagnosed when the patient was asked to swallow on occlusion. The tongue protruded against the spaced dentition. On Smiling, there was a complete show of maxillary anterior teeth. However, mandibular teeth were not visible on smiling. The patient had a toothy smile. The patient had an unaesthetic flat smile arc and was very dissatisfied with his smile.

2.2. Intra-oral examination

Intraoral examination on frontal view shows presence of a large midline diastema of 3mm. On lateral view the patient shows the presence of Class II div 1 incisor relationship, a Class I Canine relationship on both sides and a Class I molar relationship Bilaterally. Patient has an overjet of 6 mm and an overbite of 2 mm. There is spacing in upper anterior region with flared out anterior teeth, however the lower arch is moderately well aligned. The upper and lower arch shows the presence of a U shaped arch form and both upper and lower anterior region show flared out anterior teeth indicative of a bimaxillary dentoalveolar protrusion. OPG of the patient shows presence of 3rd molars in a developing stage and a spaced anterior dentition with a midline diastema.
Fig. 4: Pre Treatment X-Rays

Fig. 5: Pre treatment cephalometric readings

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Fig. 4: Pre Treatment X-Rays

Fig. 5: Pre treatment cephalometric readings
3. Diagnosis

This 19 years old male patient is diagnosed with Angle’s Class I malocclusion with an average to vertical growth pattern, proclined upper and lower incisors, spacing in the upper and mild crowding in the lower anterior region, protrusive upper and lower lips, incompetent lips, an unaesthetic flat smile arc, an increased overjet and decreased overbite, tongue thrusting habit and presence of a midline diastema.
3.1. Treatment Progress

Complete bonding & banding in both maxillary and mandibular arch 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 wires were discontinued. A Fixed Nance Palatal Button Appliance was given for correction of tongue thrusting habit alongside fixed orthodontic braces treatment. Retraction and closure of spaces was then started by use of 0.019” x 0.025” rectangular NiTi with accentuated Anchor sweeps in the upper and lower stiff archwires for opening of bite to prevent the bite deepening during retraction followed by 0.019” x 0.025” rectangular stainless steel wires. Anchorage was conserved by light retraction forces constantly monitoring the already well settled molar relation. This is the most important step in a borderline extraction case wherein anchorage conservation is of utmost importance. 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. Midline Diastema closure was achieved. The smile of the patient changed from being flat and unaesthetic to a more pleasing and consonant.
Table 2: Pre Debonding Cephalometric Readings

| Parameters               | Post-treatment |
|--------------------------|----------------|
| SNA                      | 82°            |
| SNB                      | 80°            |
| ANB                      | 2°             |
| WITS                     | 1mm            |
| MAX. LENGTH              | 99mm           |
| MAN. LENGTH              | 138mm          |
| IMPA                     | 92°            |
| NASOLABIAL ANGLE         | 106°           |
| U1 TO NA DEGREES         | 30°            |
| U1 TO NA mm              | 3mm            |
| L1 TO NB DEGREES         | 27°            |
| L1 TO NB mm              | 2mm            |
| U1/L1 ANGLE              | 130°           |
| SADDLE ANGLE             | 119°           |
| ARTICULAR ANGLE          | 144°           |
| GONIAL ANGLE             | 125°           |
| FMA                      | 28°            |
| Y AXIS                   | 64°            |

Fig. 11: Pre debonding extraoral photographs

4. Discussion

It is important for an Orthodontist to consider contributing factors before determining an optimal treatment plan. These include normal growth and development, tooth size discrepancies, excessive incisor vertical overlap of different causes, mesiodistal and labiolingual incisor angulation, generalized spacing and pathological conditions. 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 the midline diastema. It is challenging to treat Class I malocclusion and bimaxillary protrusion without extraction of premolars. 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 spacing might have any number of a combination of the skeletal and dental component. Hence, identifying and understanding the etiology and expression of Class I spaced malocclusion and identifying differential diagnosis is helpful for its correction. The patient’s chief complaint was forwardly placed, spaced and excessive show of upper front teeth. 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 only Fixed appliance therapy appropriately resulted in an improvement in the patient’s profile in this case. Alongside fixed orthodontic treatment, a habit breaking Fixed Nance Palatal Button appliance was given to the patient for correction of his severe tongue thrusting habit. The SNA value showed a significant decrease from 84 to 82 degrees, the SNB value changed from 82 to 80 degrees thus addressing the major problem of maxillary and mandibular bidental protrusion. The mandibular incisor proclination reduced from 98 to 92 degrees, the nasolabial angle changed from 102 degrees to 106 degrees thus moderately improving the patient’s profile and the Frankfurts mandibular plane angle showed changes from being vertical to more towards average growth pattern of patient due to the counterclockwise rotation of the mandibular plane. Successful results were obtained after the fixed MBT appliance therapy within a stipulated period of time. The overall treatment time was 12 months. After this active treatment phase, the profile of this 19 year old male patient improved significantly as seen in the post treatment Extra oral photographs. Removable Vacuum formed clear retainers were then delivered to the patient. Midline Diastema was corrected, spacing was corrected and the smile arc of the patient improved drastically to being consonant and pleasant. The patient was very happy and satisfied with the results at the end of the treatment.

5. Conclusion

This case report shows how a Tongue thrusting habit in a patient whose growth has nearly completed can be managed alongside fixed orthodontic treatment, thus saving time that is spend during a 2 phase appliance therapy with 1st correcting the inborn habit and then proceeding towards fixed braces treatment. The planned goals set in the pretreatment plan were successfully attained. Good intercuspsation of the teeth was maintained with class I molar relationship by carefully conserving anchorage. Treatment of bimaxillary protrusion and localized spacing with midline diastema included the retraction and retroclination of maxillary and mandibular incisors with a resultant decrease in soft tissue procumbency and convexity. The maxillary and mandibular teeth were found to be esthetically satisfactory in the line of occlusion with a pleasing
Table 3: Comparison of pre-treatment and pre debonding cephalometric readings

| Parameters                  | Pre-treatment | Post-treatment |
|-----------------------------|---------------|---------------|
| SNA                         | 84°           | 82°           |
| SNB                         | 82°           | 80°           |
| ANB                         | 2°            | 2°            |
| WITS                        | 1mm (BO ahead of AO) | 1mm          |
| MAX. LENGTH                 | 104mm         | 99mm          |
| MAN. LENGTH                 | 140mm         | 138mm         |
| IMPA                        | 98°           | 95°           |
| NASOLABIAL ANGLE            | 102°          | 106°          |
| U1 TO NA DEGREES            | 38°           | 30°           |
| U1 TO NA mm                 | 11mm          | 3mm           |
| L1 TO NB DEGREES            | 32°           | 27°           |
| L1 TO NB mm                 | 7mm           | 2mm           |
| U1/L1 ANGLE                 | 106°          | 130°          |
| SADDLE ANGLE                | 118°          | 119°          |
| ARTICULAR ANGLE             | 148°          | 144°          |
| GONIAL ANGLE                | 126°          | 125°          |
| FMA                         | 32°           | 28°           |
| Y AXIS                      | 62°           | 64°           |

The overjet became near ideal and normal overbite was found. 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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None.

7. Conflict of Interest

None.

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