

Case Report

“Correction of Lateral Tongue Thrust, Midline Diastema, Flared Maxillary Anterior Dentition, Incompetent Lips and an Unaesthetic Smile Arc by Fixed Orthodontic Mechanotherapy” – A Case Report

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Abstract: This case report evaluates the management of severely proclined maxillary dentition in a female patient having Class II malocclusion with lateral tongue thrust and multiple over-retained deciduous teeth. The case required extraction of maxillary 1st premolars for correction of the proclined and forwardly placed upper front teeth and was corrected with Pre-adjusted Edgewise bracket system. Clinical and cephalometric evaluation revealed skeletal Class II malocclusion with maxillary anterior proclination and an orthognathic facial profile, an average to vertical growth pattern, potentially incompetent lips, an increased overjet and overbite. Following fixed orthodontic treatment by removal of 1st premolars in the upper arch with retraction of anterior segment, a marked improvement in patient's smile, facial profile and occlusion was achieved and there was a remarkable increase in the patient's 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.

Keywords: Lateral Tongue Thrust, Over-retained deciduous teeth, Pre-adjusted Edgewise bracket system, Fixed Appliance Therapy, Class II malocclusion, Leptoprosopic facial form, Long face, Aesthetic Improvement, Maxillary 1st Premolar Extraction, Orthodontic Camouflage, Therapeutic Extractions.

INTRODUCTION

Recently, the number of adults seeking orthodontic treatment has increased significantly. Orthodontic treatment can significantly alter and improve facial appearance in addition to correcting irregularity of the teeth. Class II malocclusion is the 2nd most prevalent malocclusion after Class I [1, 4, 5]. 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 [2, 3, 7]. There are many ways to treat Class II malocclusions, according to the characteristics associated with the problem, such as anteroposterior discrepancy, age, and patient compliance [6]. The indications for extractions in orthodontic practice have historically been controversial [8]. On the other hand, correction of Class II 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 [9, 10]. Lack of crowding or cephalometric discrepancy in the

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mandibular arch is an indication of 2 premolar extraction. Fortunately, in some instances satisfactory results with an exceptional degree of correction can be achieved without extraction of permanent premolars [11-13]. This case presents the correction of a Class II malocclusion in an adolescent female patient with severely proclined maxillary anterior teeth and lateral tongue thrust merely simply by executing extraction of maxillary 1st premolars followed by fixed appliance therapy using Pre-adjusted Edgewise bracket system. The Extraction protocol shown in this case is indicative of how an unaesthetic smile can be converted into a pleasant one by routine fixed Orthodontic treatment with extraction of 2 premolars followed by retraction and closure of spaces.

CASE REPORT

Extra-Oral Examination

A 15 year old female patient presented with the chief complaint of forwardly placed upper front teeth and excessive show of front teeth. On Extra-oral examination, the patient had an orthognathic facial profile, grossly symmetrical face on both sides, potentially incompetent lips ,moderately deep mento-labial sulcus and an acute Nasolabial Angle, a Leptoprosopic 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 an excessive show of maxillary anterior teeth, a non-consonant smile arc along with an obliterated buccal corridor space. The patient was very dissatisfied with her smile.



Fig-1: Pre treatment extra oral photographs

Intra-Oral Examination

Intraoral examination on frontal view showed presence of a midline diastema with an increased overbite. On lateral view the patient showed presence of Class II Division 1 incisor relationship, an End-on canine relationship bilaterally, a Class II molar relationship on the right side and a Class I molar relationship on the left side with an increased overjet of 5mm, proclined and forwardly placed upper and lower anterior teeth. Patient also showed presence of a lateral open bite with lateral tongue thrust bilaterally. On occlusal view, there was presence of over-retained deciduous maxillary and mandibular 2nd molars and mandibular deciduous left 1st molar. Hence the open bite tendency can be attributed to the un-erupted maxillary and mandibular premolars bilaterally, thus creating a space in the lateral region leading to the patients lateral tongue thrust habit. The upper and lower arch showed presence of a “U” shaped arch form.



Fig-2: Pre treatment intra oral photographs

Table-1: Pre treatment cephalometric readings

| PARAMETERS | PRE- TREATMENT |
|------------------|----------------|
| SNA | 83° |
| SNB | 81° |
| ANB | 2° |
| WITS | 0mm |
| MAX. LENGTH | 102mm |
| MAN. LENGTH | 98mm |
| IMPA | 96° |
| NASOLABIAL ANGLE | 89° |
| U1 TO NA DEGREES | 38° |
| U1 TO NA mm | 7mm |
| L1 TO NB DEGREES | 26° |
| L1 TO NB mm | 2mm |
| U1/L1 ANGLE | 110° |
| FMA | 27° |
| Y AXIS | 72° |

Diagnosis

This 15 year old female patient was diagnosed with a Class II malocclusion on a Class I skeletal base with an average to vertical growth pattern, increased overjet and overbite, proclined upper incisors, maxillary midline diastema, presence of multiple over-retained deciduous teeth, a lateral open bite with a lateral tongue thrusting habit, moderately deep mentolabial sulcus, potentially incompetent lips and an orthognathic facial profile with reduced nasolabial angle, increased lip strain and lip fullness

List of Problems

1. Proclined maxillary anterior teeth
2. Maxillary midline diastema
3. Increased overjet and overbite
4. Over-retained deciduous teeth leading to delayed eruption of permanent teeth
5. Lateral open bite with lateral tongue thrusting habit
6. Decreased Nasolabial angle
7. Potentially incompetent lips
8. Increased lip strain and lip fullness

Treatment Objectives

1. To correct the proclined maxillary anterior teeth
2. To correct the maxillary midline diastema
3. To correct the increased overjet and overbite
4. To extract over-retained deciduous teeth and promoting eruption of permanent teeth
5. To correct the lateral open bite and lateral tongue thrusting habit
6. To correct the decreased Nasolabial angle
7. To improve the competency of lips
8. To decrease the lip strain and lip fullness
9. To achieve a Class I incisor and canine relationship
10. To End molars in a Class II relationship
11. To achieve a pleasing smile and a pleasing profile

Treatment Plan

- Extraction of 14, 24 and all over-retained deciduous teeth.
- Fixed appliance therapy with Pre- adjusted Edgewise bracket system.
- 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.
- Final finishing and detailing with 0.014” round stainless steel wires.
- Retention by means of Begg’s Wrap-around 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 Pre-adjusted Edgewise bracket system. Initially a 0.012” NiTi wire was used which was followed by 0.014 , 0.016”, 0.018”, 0.020” NiTi arch wires following sequence A of MBT. After 6 months of alignment and leveling NiTi round wires were discontinued. Retraction and closure of 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. Passive eruption of upper 2nd premolars and lower 1st and 2nd premolars was facilitated by extraction of the over-retained deciduous teeth hindering their pathway of eruption. 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 achieve a normal overjet and overbite. Retraction and closure of 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 increased overjet was corrected and an ideal occlusion was achieved at the end of the fixed appliance therapy. A pleasing smile and a pleasing profile was achieved

Table-2: Post treatment cephalometric readings

| PARAMETERS | POST-TREATMENT |
|------------------|----------------|
| SNA | 82° |
| SNB | 81° |
| ANB | 1° |
| WITS | 0mm |
| MAX. LENGTH | 100mm |
| MAN. LENGTH | 99mm |
| IMPA | 95° |
| NASOLABIAL ANGLE | 106° |
| U1 TO NA DEGREES | 25° |

| | |
|------------------|------|
| U1 TO NA mm | 2mm |
| L1 TO NB DEGREES | 25° |
| L1 TO NB mm | 2mm |
| U1/L1 ANGLE | 132° |
| FMA | 27° |
| Y AXIS | 71° |



Fig-3: Post treatment extra oral photographs



Fig-4: Post treatment intra oral photographs

DISCUSSION

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. Treatment of a Class II malocclusion with extractions of maxillary 1st premolars is challenging. Class II malocclusion with proclined maxillary dentition might have any number of a combination of the skeletal and dental components. Hence, identifying and understanding the etiology and expression of Class II malocclusion and identifying differential diagnosis is helpful for its correction. The patient's chief complaint was forwardly placed upper front teeth with excessive show of front teeth. The case showed maxillary dento-alveolar protrusion with severely proclined upper 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. In this case we choose to use Pre-adjusted Edgewise bracket system. The execution of maxillary 1st premolar extraction followed by Fixed appliance therapy appropriately resulted in an improvement in the patient's smile in this case. There was presence of over-retained deciduous maxillary and mandibular 2nd molars and mandibular deciduous left 1st molar. Hence the open bite tendency could be attributed to the un-erupted maxillary and mandibular premolars bilaterally, thus creating a space in the lateral region leading to the patients lateral tongue thrust habit. The most important point to be highlighted here is the decision to extract the upper premolars. After analyzing the case thoroughly and reading all pretreatment cephalometric parameters along with evaluating the patients profile clinically, a decision was made of extracting the maxillary 1st premolars. The patient had excessive proclination of maxillary anterior teeth with presence of midline diastema. Also the patient had an acute nasolabial angle and a decreased Inter-incisal angle. Also, on evaluating the OPG and plaster models, there seemed to be an arch length tooth material discrepancy and hence these findings made it essentially imperative to extract maxillary 1st premolars. There was a marked improvement in occlusion, smile arc, profile and position of chin and successful results were obtained after the fixed Pre-adjusted Edgewise appliance therapy within a stipulated period of time. The maxillary midline diastema with increased overjet and overbite was corrected. The eruption of maxillary 2nd premolars and mandibular 1st and 2nd premolars subsequently reduced the bilateral posterior open bite and thus consequently, the patients lateral tongue thrusting habit. There was a significant improvement in the patients lip competency with reduction in her lip strain and lip fullness. The overall treatment time was 19 months. After this active treatment phase, the smile of this now 16 year old female patient improved significantly as seen in the post treatment extra-oral photographs. Removable Begg's retainers were then delivered to the patient along with fixed lingual bonded retainers in upper and lower arch.

Table-3: Comparison of pre and post treatment cephalometric readings

| PARAMETERS | PRE- TREATMENT | POST-TREATMENT |
|------------------|----------------|----------------|
| SNA | 83° | 82° |
| SNB | 81° | 81° |
| ANB | 2° | 1° |
| WITS | 0mm | 0mm |
| MAX. LENGTH | 102mm | 100mm |
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| L1 TO NB mm | 2mm | 2mm |
| U1/L1 ANGLE | 110° | 132° |
| FMA | 27° | 27° |
| Y AXIS | 72° | 71° |



Fig-5: Smile make-over

CONCLUSION

This case report shows how a case with increased maxillary anterior proclination with lateral tongue thrusting habit can be managed with extraction of 2 premolars by means of appropriate use of Pre-adjusted edgewise bracket system and efficient conservation of anchorage at the same time. The planned goals set in the pretreatment plan were successfully attained. Good intercuspation of the teeth was achieved with a Class II molar relationship and a Class I incisor and canine relationship bilaterally. Treatment of the proclined and forwardly placed upper anterior teeth included the retraction of maxillary incisors with a resultant decrease in soft tissue procumbency and facial convexity. The maxillary and mandibular teeth were found to be esthetically satisfactory in the line of occlusion. Patient had an improved and pleasant smile. 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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