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Case Report

"Conventional MBT Mechanotherapy for Management of Bimaxillary Dento-alveolar Protrusion" – A Case Report

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Abstract: 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 bi-maxillary dento-alveolar protrusion in a female patient with a Class I malocclusion. The case required extraction of 1st premolars for correction of the proclined and forwardly placed upper and lower front teeth and also for correction of crowding in upper and lower front teeth. Clinical and cephalometric evaluation revealed skeletal Class I malocclusion with crowding and a convex facial profile, an average to horizontal growth pattern, potentially incompetent lips, a posteriorly divergent face, increased overjet and average overbite. Following fixed orthodontic treatment by removal of 1st premolars in the upper and lower 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: Bimaxillary dentoalveolar protrusion, Fixed Appliance Therapy, Class I malocclusion, crowded dentition, Aesthetic Improvement, 1st Premolar Extraction, Orthodontic Camouflage, Therapeutic Extractions.

INTRODUCTION

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, 13-18]. 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, 19-23]. There are many ways to treat Class I malocclusions, according to the characteristics associated with the problem, such as antero-posterior discrepancy, age, and patient compliance [4, 5, 24-26]. The indications for extractions in orthodontic practice have historically been controversial [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 [9, 10]. Lack of crowding or cephalometric discrepancy in the mandibular arch is an indication of 2 premolar extractions [11, 12, 27]. Fortunately, in some instances satisfactory results with an exceptional degree of

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correction can be achieved without extraction of permanent premolars. This case presents the correction of a Bi-maxillary dento-alveolar protrusion with a Class I malocclusion in an adult female patient with crowding and severely proclined maxillary and mandibular anterior teeth merely simply by executing extraction of maxillary and mandibular 1st premolars. The Extraction protocol shown in this case is indicative of how a convex unaesthetic facial profile can be converted into an Orthognathic pleasant profile by routine fixed Orthodontic treatment with extraction of 4 premolars followed by retraction and closure of spaces.

CASE REPORT

Extra-oral examination

A 26 year old female patient presented with the chief complaint of forwardly placed upper and lower front teeth and excessive show of front teeth. On Extra-oral examination, the patient had a convex facial profile, grossly symmetrical face on both sides with a retruded chin, potentially 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 consonant 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 she also showed the presence of crowded anterior dentition and an unaesthetic facial profile and smile. The patient was very dissatisfied with her smile.

Pre-treatment Extra-oral photographs

Intra-oral examination

Intraoral examination on frontal view shows presence of an increased overjet and an average overbite with coincident dental midlines. On lateral view the patient shows the presence of Class II Division 1 incisor relationship, a Class I Canine relationship bilaterally and a Class I molar relationship bilaterally. There is crowding in the upper and lower anterior region with proclined and forwardly placed upper and lower anterior teeth. The upper and lower arch shows the presence of a "U" shaped arch form.

Pre-treatment Intra-oral photographs

Pre-treatment cephalometric readings

PARAMETERS	PRE- TREATMENT
SNA	83°
SNB	80°
ANB	3°
WITS	1mm
MAX. LENGTH	109mm
MAN. LENGTH	98mm
IMPA	112°
NASOLABIAL ANGLE	92°
U1 TO NA DEGREES	42°
U1 TO NA mm	8mm
L1 TO NB DEGREES	36°
L1 TO NB mm	9mm
U1/L1 ANGLE	106°
FMA	24°
Y AXIS	64°

Diagnosis

This 26 year old female patient was diagnosed with a I malocclusion with a prognathic maxilla and an average to horizontal growth pattern, increased overjet and average overbite, proclined upper and lower incisors, crowding in the upper and lower anterior region, protruded upper and lower lips, a retruded chin, moderately deep mento-labial sulcus, potentially incompetent lips and a convex facial profile.

List of problems

1. Proclined maxillary and mandibular anterior teeth
2. Crowding in maxillary and mandibular anterior region
3. Prognathic maxilla
4. Convex facial profile
5. Retruded chin
6. Decreased Nasolabial angle
7. Potentially Incompetent lips
8. Increased lip strain
9. Non coincident dental midlines

Treatment objectives

1. To correct proclined maxillary and mandibular anterior teeth
2. To correct crowding 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 correct the dental midlines
8. To decrease the lip strain
9. To achieve a pleasing smile and a pleasing profile

Treatment plan

- Extraction of 14, 24, 34 and 44
- 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
- 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 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. 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. 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 and maintaining it in a Class I relation. 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 with an ideal occlusion at the end of the fixed apppliance 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. Also, the Nasolabial angle improved significantly at the end of treatment.

Post-treatment cephalometric readings

PARAMETERS	POST-TREATMENT
SNA	82°
SNB	81°
ANB	1°
WITS	1mm
MAX. LENGTH	105mm
MAN. LENGTH	99mm
IMPA	95°
NASOLABIAL ANGLE	102°
U1 TO NA DEGREES	27°
U1 TO NA mm	2mm
L1 TO NB DEGREES	26°
L1 TO NB mm	3mm
U1/L1 ANGLE	131°
FMA	25°
Y AXIS	64°

Post treatment Extra-oral photographs

Post treatment Intra-oral photographs

DISCUSSION

Treatment of a moderately crowded Class I malocclusion with extractions of all 1st 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 Bi-maxillary Dento-alveolar protrusion 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 forwardly placed upper and lower front teeth with excessive show of front teeth. The case was of a clear bi-maxillary dento-alveolar 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 appropriately resulted in an improvement in the patient's convex profile in this case. The most important point to be highlighted here is the decision to 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 extracting the 1st premolars. Proximal stripping with retraction and closure of spaces could not be executed in this case as this would not address all the patient problems at the end of the treatment. The patient had excessive proclination of maxillary and mandibular anterior teeth along with crowding in the upper and lower arch. Also the patient had a convex profile with an acute nasolabial angle and a severely decreased Inter-incisal angle. All these findings made it essentially imperative to extract all 1st premolars. This case could not be managed by non-extraction or proximal stripping. Extractions also very efficiently improved the patients profile changing it from being convex to more orthognathic at the end of the treatment. There was improvement in occlusion, smile arc, profile and position of chin. Successful results were obtained after the fixed MBT 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 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.

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	109mm	105mm
MAN. LENGTH	98mm	99mm
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FMA	24°	25°
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CONCLUSION

This case report shows how bi-maxillary dento-alveolar protrusion case can be managed with Extraction of 4 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 pretreatment 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 of maxillary and mandibular incisors 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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