

## Case Report

# “Space Closure with MBT Mechanics for Treatment of Bimaxillary Protrusion in a Hypodivergent Adult Male Patient” – A Case Report on Orthodontic Camouflage

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**Abstract:** The following case report shows management of class I bimaxillary protrusion malocclusion in an adult male hypodivergent patient with extraction of all first premolars. The effective management of space without losing anchorage is itself a big challenge. The results produced a pleasant facial profile with attainment of good occlusion. The case required extraction of 1<sup>st</sup> premolars for correction of the proclined and forwardly placed upper and lower anterior teeth. Clinical and cephalometric evaluation revealed a Class I skeletal pattern and clinical examination revealed presence of a convex facial profile, a horizontal growth pattern, increased overjet and average overbite, mild crowding in mandibular anterior region, potentially incompetent lips, increased lip fullness and lip strain with an unaesthetic smile arc and a decreased nasolabial angle. Following fixed orthodontic treatment by removal of all 1<sup>st</sup> premolars and 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:** Fixed Orthodontic Mechanotherapy, Class I malocclusion, Convex profile, Mesoprosopic facial form, Aesthetic Improvement, 1<sup>st</sup> Premolar Extractions, Orthodontic Camouflage, Unaesthetic smile, Therapeutic Extractions, potentially incompetent lips, Management of Bimaxillary dento-alveolar protrusion, Hypodivergent Case.

## INTRODUCTION

Bimaxillary protrusion is a malocclusion characterized by proclined upper and lower incisors giving a convex facial profile. Management of bimaxillary protrusion in a hypodivergent case requires an efficient anchorage system. This anchorage system should provide effective stability of anchorage unit with minimum discomfort to the patient. This can be managed by efficient use of mechanics along with devices like transpalatal arch, nance palatal arch and sometimes temporary anchorage devices which provides an efficient absolute anchorage in such cases [1]. The etiology of bimaxillary protrusion is multifactorial involving both genetic and environmental causes like mouth breathing, tongue

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and lip habits and tongue volume [2]. The goals of orthodontic treatment in a bimaxillary protrusion patient with hypodivergent growth pattern requires retraction of maxillary and mandibular incisors along with control of vertical dimension of face for esthetic soft tissue profile. This is commonly achieved by extraction of four first premolars followed by retraction of anterior teeth using maximum anchorage mechanics. This case presents the correction of a Class I malocclusion with bimaxillary dento-alveolar protrusion in an adult male patient with proclined maxillary and mandibular anterior teeth, merely simply by executing extraction of maxillary and mandibular 1<sup>st</sup> premolars followed by fixed appliance therapy using conventional MBT fixed appliance mechanotherapy. Temporary anchorage devices were used in this case for the purpose of retraction and also to maintain an absolute anchorage. 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 4 premolars followed by retraction and closure of spaces.

## CASE REPORT

### Extra-Oral Examination

A 26 year old male patient presented with the chief complaint of forwardly placed upper and lower front teeth and excessive show of upper teeth. On Extra-oral examination, the patient had a convex facial profile, grossly symmetrical face on both sides, a Mesoprosopic facial form, Dolicocephalic head form and average width of nose and mouth, potentially incompetent lips with increased lip strain, an acute Nasolabial Angle with increased upper and lower labial fullness. The patient had no relevant prenatal, natal, postnatal history, history of habits, medical or a family history. On Smiling, there was an excessive show of upper front teeth with an unaesthetic non-consonant smile arc. The patient was very dissatisfied with his smile.



**Fig-1: Pre-Treatment Extra-Oral Photographs**

### Intra-Oral Examination

Intraoral examination on frontal view showed presence of proclined maxillary and mandibular anterior teeth with lower dental midline shift towards the patient's right by 1.5mm. On lateral view the patient showed presence of Class II Division 1 incisor relationship, a Class I canine and molar relationship bilaterally with an increased overjet of 4mm and proclined and forwardly placed upper and lower anterior teeth. Occlusal view showed presence of mild mandibular lower anterior crowding with rotated teeth in lower arch and presence of a "U" shaped arch form.



**Fig-2: Pre-Treatment Intra-Oral Photographs**

**Table-1: Pre Treatment Cephalometric Readings**

PARAMETERS	PRE- TREATMENT
SNA	82°
SNB	80°
ANB	2°
WITS	1mm
MAX. LENGTH	93mm
MAN. LENGTH	111mm
IMPA	99°
NASOLABIAL ANGLE	88°
U1 TO NA DEGREES	36°
U1 TO NA mm	5mm
L1 TO NB DEGREES	32°
L1 TO NB mm	4mm
U1/L1 ANGLE	114°
FMA	24°
Y AXIS	65°
L1 TO A-POG	4mm
CONVEXITY AT PT. A	1mm
LOWER LIP- E PLANE	3mm
N-PERP TO PT A	2mm
N-PERP TO POG	1mm
CHIN THICKNESS	11mm

**Diagnosis**

This 26 year old male patient was diagnosed with a Class II malocclusion on a Class I Skeletal base with a horizontal growth pattern, proclined upper and lower incisors, non-coincident dental midlines, increased overjet, mild crowding in lower anterior region, potentially incompetent lips with increased lip fullness, a non-consonant smile arc, reduced nasolabial angle with increased lip strain.

**List of Problems**

1. Proclined maxillary and mandibular dentition.
2. Non-coincident dental midlines.
3. Crowding in mandibular anterior region.
4. Decreased Nasolabial angle.
5. Potentially incompetent lips.
6. Increased lip strain.
7. Non-consonant smile arc.

**Treatment Objectives**

1. To correct proclined maxillary and mandibular anterior dentition.
2. To achieve congruent dental midlines.
3. To correct crowding in mandibular anterior teeth.
4. To correct the decreased Nasolabial angle.
5. To improve the lip competency.
6. To decrease the lip strain.
7. To correct the smile arc.
8. To achieve a Class I incisor relationship.
9. To maintain a Class I canine and molar relationship.
10. To achieve a pleasing smile and a pleasing profile.

**Treatment Plan**

- Extraction of 14, 24, 34 and 44 with banding [24], bonding and fabrication of trans-palatal arch in the maxilla
- 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.
- Inter-radicular implants between 15 and 16, 25 and 26, 35 and 36, 45 and 46.
- 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 with TADs in the upper and lower arch to maintain a Class I molar relationship bilaterally and for en-masse retraction of the proclined anterior teeth.
- 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.

### 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 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. Anchorage was conserved in the upper and lower arch with the help of temporary anchorage devices, thus constantly monitoring the already existing Class I molar relationship bilaterally. 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. Retraction with the help of inter-radicular implants enabled getting the incisors from Class II Division 1 relationship to a Class I incisor relationship. Thus an ideal overjet and overbite was achieved at the end of the treatment. 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 upper and lower anterior proclination 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 and profile at the end of the treatment and the patient's chief complaint of forwardly placed and excessive show of anterior teeth was addressed.

### Treatment Result

All the pre-treatment goals were achieved at the end of this fixed appliance therapy. The change in the patient's facial esthetics was the most imposing part of the treatment. With extraction of the first premolars, 4 mm retraction of upper anteriors was achieved. Correction of crowding, lower incisor inclination and 4mm retraction was achieved in lower anterior region. The soft tissue revealed an aesthetic smile, reduced lip incompetency with improvement in nasolabial angle and mentolabial sulcus, reduced lip strain and labial fullness. Ideal overjet and overbite was established.

## DISCUSSION

Bimaxillary proclination is characterized by severe proclination of anterior teeth of both the arches and is common among various ethnic groups, like Asians and Americans of African descent [3]. According to Drobocky and Smith the patients treated with first premolar extraction show an average reduction of 3.4 mm and 3.6 mm in upper and lower lip procumbency in relation to Rickett's E-line [4]. With extraction of premolars, the treatment plan must account for closure of extraction space which requires adequate anchorage maintenance, since mesialization of the posterior segment may compromise retraction of anterior teeth [13-20]. It has been reported that when canine retraction is done with some adjunctive appliance for anchorage control only 0 to 2.4 of molar mesialization is observed [5]. Group A anchorage has been considered effective in such cases. Absolute anchorage may be provided by various means including headgear and implants, etc [6]. In our case, we used TADs as it is considerably economical and the most reliable method to augment anchorage. Leveling by intrusion can be skilled with continuous archwires that bypass the premolar and segmented archwires with auxiliary depressing arch [7, 21-25]. Anchor bends in Begg's technique and Rickett's utility arch are example for the continuous method [8, 9, 26-32] Burrstone three piece intrusion [26, 33-38] and mini-implant assisted intrusion are an example for the segmented method. Since the patient was hypodivergent, molar intrusion was avoided and upper anteriors were intruded with inter-radicular mini-implants. Ebru Senisik [10] and Esen Aydogdua [11] observed 0.31mm/month of intrusion by utility arch. Frank J. Weiland (1996) [12] concluded that for intrusion low forces of segmented arch technique is better than continuous arch technique. The patient's chief complaint was forwardly placed upper and lower front teeth and excessive show of 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 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 by extracting all four 1<sup>st</sup> premolars as the patient presented with severe maxillary and mandibular proclination, hence the case could not be managed without extractions. The treatment after closure of extraction spaces improved the patients profile changing the Nasolabial angle from acute to average at the end of the treatment. There was a significant decrease in the lip strain and lip fullness with increased competency of lips. Lower anterior crowding was unraveled, an ideal overjet and overbite was achieved, smile arc was consonant and the pre-treatment excessive show of upper front teeth was corrected. Successful results were obtained after the fixed appliance

therapy within a stipulated period of time. The overall treatment time was 17 months. After this active treatment phase, the profile of this 26 year old adult 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.

**Table-2: Post-Treatment Cephalometric Readings**

PARAMETERS	POST - TREATMENT
SNA	82°
SNB	80°
ANB	2°
WITS	0mm
MAX. LENGTH	89mm
MAN. LENGTH	108mm
IMPA	93°
NASOLABIAL ANGLE	107°
U1 TO NA DEGREES	24°
U1 TO NA mm	1mm
L1 TO NB DEGREES	22°
L1 TO NB mm	1mm
U1/L1 ANGLE	131°
FMA	24°
Y AXIS	65°
L1 TO A-POG	1mm
CONVEXITY AT PT. A	0mm
LOWER LIP- E PLANE	1mm
N-PERP TO PT A	1mm
N-PERP TO POG	0mm
CHIN THICKNESS	12mm



**Fig-3: Post-Treatment Extra-Oral Photographs**



**Fig-4: Post-Treatment Intra-Oral Photographs**

**Table-3: Comparison of Pre and Post Treatment Cephalometric Readings**

PARAMETERS	PRE- TREATMENT	POST-TREATMENT
SNA	82°	82°
SNB	80°	80°
ANB	2°	2°
WITS	1mm	0mm
MAX. LENGTH	93mm	89mm
MAN. LENGTH	111mm	108mm
IMPA	99°	93°
NASOLABIAL ANGLE	88°	107°
U1 TO NA DEGREES	36°	24°
U1 TO NA mm	5mm	1mm
L1 TO NB DEGREES	32°	22°
L1 TO NB mm	4mm	1mm
U1/L1 ANGLE	114°	131°
FMA	24°	24°
Y AXIS	65°	65°
L1 TO A-POG	4mm	1mm
CONVEXITY AT PT. A	1mm	0mm
LOWER LIP- E PLANE	3mm	1mm
N-PERP TO PT A	2mm	1mm
N-PERP TO POG	1mm	0mm
CHIN THICKNESS	11mm	12mm

## CONCLUSION

This case report illustrates how a case with bimaxillary dentoalveolar protrusion with mild lower anterior crowding can be managed with Extraction of 4 premolars by means of appropriate use of conventional MBT prescription along with 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 of maxillary and mandibular 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 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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