

Treatment of Bimaxillary Protrusion Using Frictionless Mechanics - Case Report

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Abstract: An 18-year old female presented with severe bimaxillary proclination. First premolars extraction was planned to correct proclination of anterior teeth and reduce upper lip prominence. Retraction of the upper and lower anterior teeth reduced dental proclination, lip posture. Post treatment incisor inclination improved. As the incisors were retracted, lip prominence, nasolabial angle and mentolabial sulcus depth improved.

Index Terms: bimaxillary proclination, frictionless mechanics.

I. INTRODUCTION:

Bimaxillary protrusion is a condition characterized by protruding, proclined maxillary and mandibular incisors, and increased lip protrusion [1]. Common in African-American and Asian populations, but found in almost all ethnic groups. Many patients with bimaxillary processes seek orthodontic treatment, as protruding teeth and lips are negatively recognized in most cultures [2]. The etiology of bimaxillary protrusion is multifactorial and consists of genetic component as well as environmental factors, such as mouth breathing, tongue thrusting, lip biting habits, and tongue volume [3]. The goals of orthodontic treatment of bimaxillary protrusion include the retraction and retroclination of maxillary and mandibular incisors with a resultant decrease in soft tissue procumbency and convexity.

This is commonly achieved by the extraction of four first premolars followed by the retraction of anterior teeth using maximum anchorage mechanics [4,5].

II. CASE REPORT:

An 18 year old female patient presented with the chief complaint of forwardly placed and spaces in upper front teeth. On clinical examination patient had mesocephalic head, mesoprosopic face with no gross facial asymmetry. Lips were potentially competent with mild lip strain. On smile examination patient had complex type of smile with both upper and lower teeth exposure. On profile examination, patient had convex profile, acute nasolabial angle, protrusive upper and lower lips, reduced chin prominence and average clinical FMA [fig 1].



Figure 1 Pre-treatment extraoral photographs

Intraoral examination revealed Angle's class I molar relation on both sides and canine relation was also in class I. Overjet of 4mm and overbite of 3mm were observed. On maxillary arch examination, generalised spacings in upper anterior region from canine to canine. On mandibular arch examination, mild crowding in lower anterior region with mesiobuccal rotations irt 31,32 & 42. Upper dental midline could not be determined because of midline diastema and lower midline was shifted by 1mm to left wrt. facial midline [fig 2]

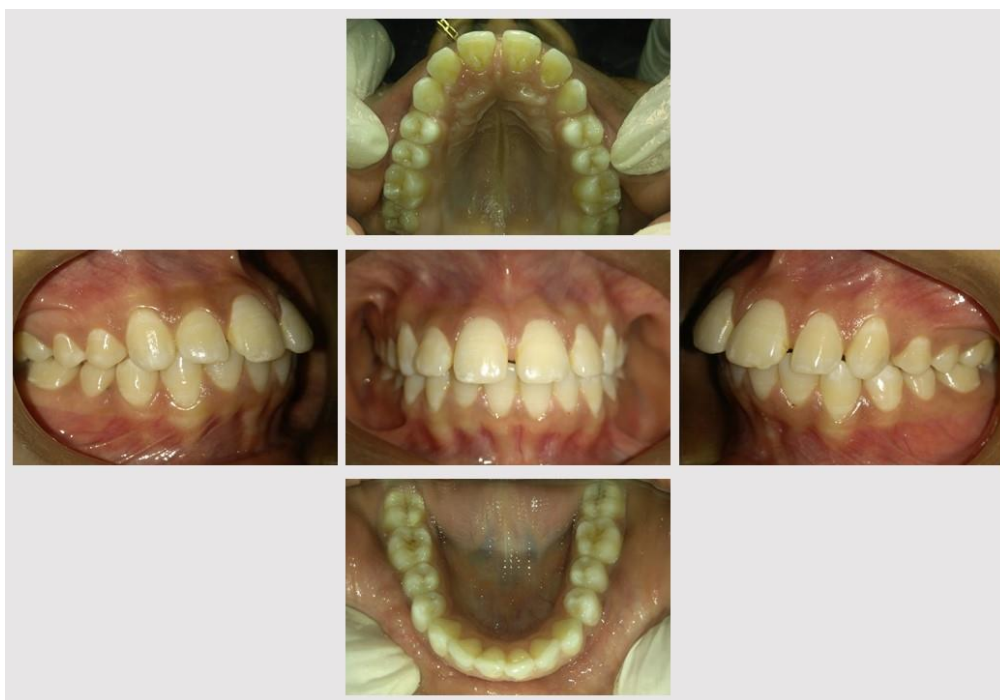


Figure 2 Pre-treatment intraoral photographs

Cephalometric analysis showed, skeletal class I base with an ANB of 3° , Witt's appraisal of -1mm, Normodivergent or average growth pattern with FMA of 23° , proclined and anteriorly placed maxillary and mandibular incisors [fig 3].



Figure 3 Pre-treatment OPG & lateral cephalogram

Upon clinical and radiographic examination, the patient was diagnosed with Angle's class I malocclusion with Bimaxillary protrusion on a skeletal class I base with orthognathic maxilla and mandible.

III. TREATMENT PLAN:

Extraction of all four first premolars was planned to correct the bimaxillary protrusion. The final occlusion was to maintain the molar Neutrocclusion, to achieve ideal overjet, overbite and achieve canine guidance.

IV. TREATMENT PROGRESS:

MBT appliance with 0.022×0.028 " slot was used. Alignment and levelling was accomplished with following sequence of arch wires: (a) 0.014 " nickel-titanium arch wires (b) 0.016 " nickel-titanium arch wires (c) 0.018 " stainless steel arch wires (d) 0.017×0.025 "

nickel-titanium arch wires and (e) 0.017×0.025" stainless steel wires. The arch wires were cinched distal to molar to avoid maxillary and mandibular incisor proclination. After aligning and levelling, the maxillary and mandibular dentition was consolidated on 0.017×0.025" stainless steel wire. The en masse retraction was accomplished by frictionless mechanics using tear drop loops on 0.017×0.025" stainless steel wire. Finishing and detailing was carried out by 0.019×0.025" stainless steel wire.

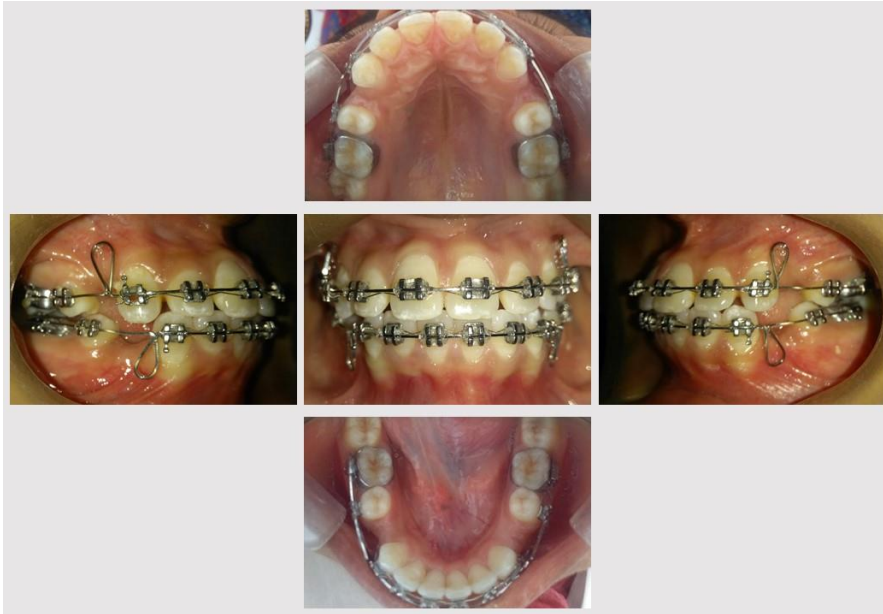


Figure 4 Retraction using tear drop loops

V. TREATMENT RESULTS:

Space closure and final occlusion were satisfactory with class I canine and molar relation. The upper and lower dental midlines also coincided [fig 5]. The reduction in incisor inclinations and lip prominence greatly enhanced facial esthetics. The smile of the patient also improved [fig 6]. Post treatment cephalometric findings showed increase in interincisal angle from 107° to 132° i.e., normal inclinations were achieved [table 1]. The lower facial height and the divergence of the face were maintained [fig 8]. Overall the case was finished in class I molar and canine relation with 2mm of overjet and overbite. Canine guidance was also achieved. The case was debonded and maxillary and mandibular anterior bondable lingual retainer along with Begg's retainers were placed [fig 7]. The treatment was finished in twenty months.

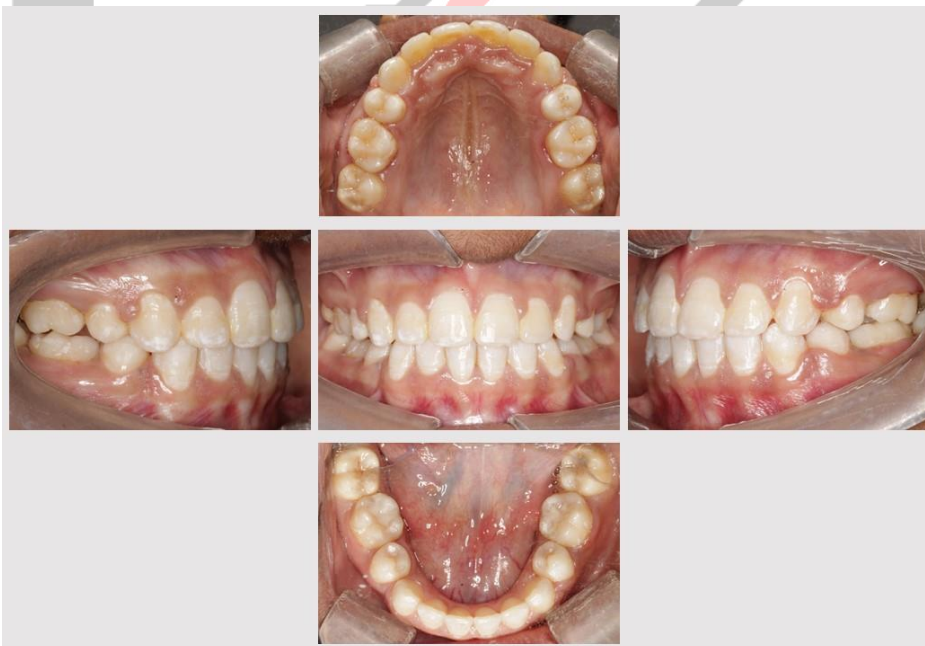


Figure 5 Post-treatment intraoral photographs



Figure 6 Post-treatment Extraoral photographs



Figure 7 Begg's retainer and lingual bonded retainer in maxillary and mandibular arch

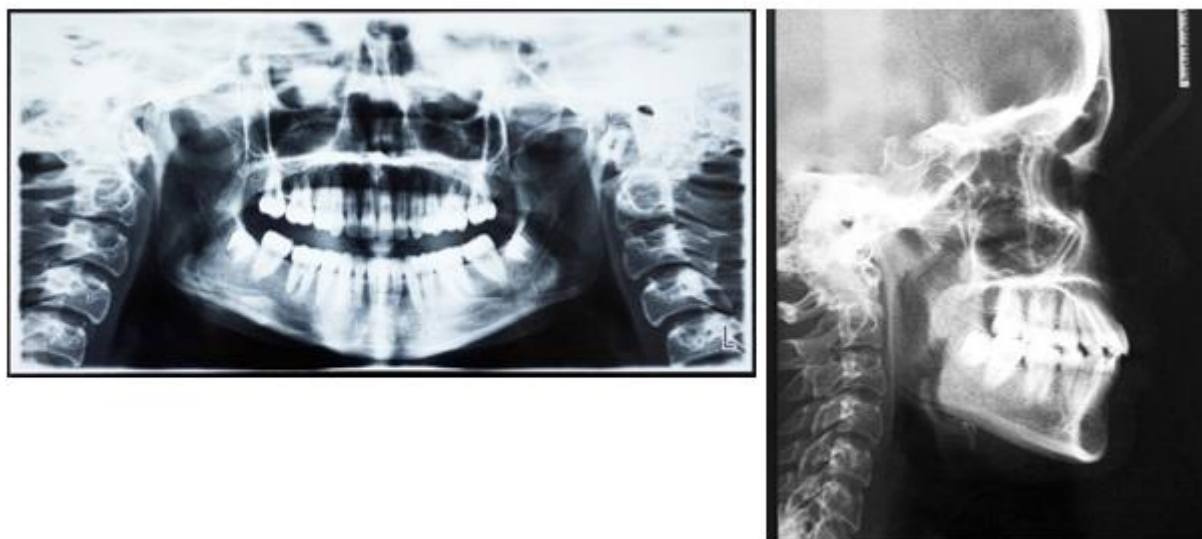


Figure 8 Post-treatment OPG & lateral cephalogram

Table 1 Pre and post-treatment cephalometric comparison.

Measurement	Mean	Pre-Treatment	Inference	Post-Treatment	Post-Treatment Inference
SNA	$82^{\circ} \pm 2^{\circ}$	84°	Orthognathic maxilla	83°	Orthognathic maxilla
SNB	$80^{\circ} \pm 2^{\circ}$	81°	Orthognathic mandible	80°	Orthognathic mandible
ANB	$2^{\circ} \pm 2^{\circ}$	3°	Class I	3°	Class I
SN MP	$32^{\circ} \pm 4^{\circ}$	22°	Hypodivergent growth	23°	Hypodivergent growth
FMA	$25^{\circ} \pm 3^{\circ}$	22°	Normodivergent growth	23°	Normodivergent growth
U1 NA	$22^{\circ} \pm 2^{\circ}$, 4.0 ± 1.0	34° , 7.2mm	Proclined and forwardly placed upper incisors	22° , 2.4mm	Uprighted upper incisors
U1 PP	$110^{\circ} \pm 5^{\circ}$	129°	Proclined upper incisors	115°	Uprighted upper incisors
L1 MP	$90^{\circ} \pm 3^{\circ}$	102°	Proclined lower incisors	90°	Uprighted lower incisors
L1 NB	$25^{\circ} \pm 2^{\circ}$, 4.0 ± 1.0	35° , 8.5mm	Proclined and forwardly placed lower incisors	23° , 4mm	Uprighted lower incisors
E plane	-4.4 ± 2.0 mm	-2mm	Normal lip	0mm	Normal

VI. DISCUSSION:

Bimaxillary protrusion is the most common malocclusion observed in Asians and Negros. It can be treated most of the times by extraction of all first premolar extractions. However, the extraction pattern can vary based on the treatment objectives for every patient. The retraction of the anteriors can be done by using either friction or frictionless mechanics. In frictionless mechanics various loops can be used in segmental or continuous form for space closure. We have used tear drop loop in this case because of its simplicity in design and fabrication. The moment to force ratios were optimum for retraction. It was activated by 1mm for every 6-8 weeks. The space closure was achieved in 6 months with no anchorage loss. Frictionless mechanics with loops built in with proper alpha and beta bends provide good anchorage in the posterior unit and provides sufficient moment to force ratios to retract the anteriors maintaining the anterior torque. Although it takes more chair side time in the initial appointment for loop fabrication, it hardly takes time for evaluation and subsequent activations in the later appointments. But it requires good knowledge of biomechanics and hand skills to understand and predict the tooth movement and fabrication of loops respectively.

VII. CONCLUSION:

Case was treated by four first premolars extraction. Upper and lower anteriors were retracted using frictionless mechanics. The incisor inclinations and nasolabial angle was reduced. The patient smile and profile was improved. Having proper knowledge of biomechanics is a must for loop fabrication and evaluating the treatment progress.

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