Treatment of Bimaxillary Protrusion Using Frictionless Mechanics - Case Report

1Dr. A. Lakshmi Prasanna, 2Dr. S. Chetan Kumar, 3Dr. Saritha Madham, 4Dr. Vissishta, 5P. Monika

1Professor and HOD, 2Professor, 3,4Senior lecturers, 5PG Student,
Department of Orthodontics and Dentofacial Orthopaedics,
Malla Reddy Institute of Dental Sciences, Hyderabad, India

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 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 of 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].

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].

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 Neutroclusion, 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 in both maxillary and mandibular arches [fig 4]. Finishing and detailing was carried out by 0.019×0.025” stainless steel wire.

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 6: Post-treatment Extraoral photographs

Figure 7: Begg’s retainer and lingual bonded retainer in maxillary and mandibular arch
### Table 1 Pre and post-treatment cephalometric comparison.

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Mean</th>
<th>Pre-Treatment</th>
<th>Inference</th>
<th>Post-Treatment</th>
<th>Post-Treatment Inference</th>
</tr>
</thead>
<tbody>
<tr>
<td>SNA</td>
<td>82º ± 2º</td>
<td>84º</td>
<td>Orthognathic maxilla</td>
<td>83º</td>
<td>Orthognathic maxilla</td>
</tr>
<tr>
<td>SNB</td>
<td>80º ± 2º</td>
<td>81º</td>
<td>Orthognathic mandible</td>
<td>80º</td>
<td>Orthognathic mandible</td>
</tr>
<tr>
<td>ANB</td>
<td>2º ± 2º</td>
<td>3º</td>
<td>Class I</td>
<td>3º</td>
<td>Class I</td>
</tr>
<tr>
<td>SN MP</td>
<td>32º ± 4º</td>
<td>22º</td>
<td>Hypodivergent growth</td>
<td>23º</td>
<td>Hypodivergent growth</td>
</tr>
<tr>
<td>FMA</td>
<td>25º ± 3º</td>
<td>22º</td>
<td>Normodivergent growth</td>
<td>23º</td>
<td>Normodivergent growth</td>
</tr>
<tr>
<td>U1 NA</td>
<td>22º ± 2º, 4.0 ± 1.0</td>
<td>34º, 7.2mm</td>
<td>Proclined and forwardly placed upper incisors</td>
<td>22º, 2.4mm</td>
<td>Uprighted upper incisors</td>
</tr>
<tr>
<td>U1 PP</td>
<td>110º ± 5º</td>
<td>129º</td>
<td>Proclined upper incisors</td>
<td>115º</td>
<td>Uprighted upper incisors</td>
</tr>
<tr>
<td>L1 MP</td>
<td>90º ± 3º</td>
<td>102º</td>
<td>Proclined lower incisors</td>
<td>90º</td>
<td>Uprighted lower incisors</td>
</tr>
<tr>
<td>L1 NB</td>
<td>25º ± 2º, 4.0 ± 1.0</td>
<td>35º, 8.5mm</td>
<td>Proclined and forwardly placed lower incisors</td>
<td>23º, 4mm</td>
<td>Uprighted lower incisors</td>
</tr>
<tr>
<td>E plane</td>
<td>-4.4 ± 2.0mm</td>
<td>-2mm</td>
<td>Normal lip</td>
<td>0mm</td>
<td>Normal</td>
</tr>
</tbody>
</table>

**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 anterior 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 anterior 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 anterior 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.
REFERENCES: