Miniscrew implants. An effective means of absolute anchorage

Akhilesh Belcnandan¹, Eshan Awasthi¹, Ankur Jain¹, Shruti Hatewar¹

¹MDS, Private Practitioner, Raipur, Chhattisgarh, India

DOI: 10.5455/jrmds.20164220

ABSTRACT

Bimaxillary dentoalveolar protrusion is the condition characterized by procumbency of lips due to increased protrusion of maxillary and mandibular incisors. This condition can be due to tooth size arch length discrepancy, weak lip musculature unable to withstand strong tongue pressure. This results in severe labial tipping of incisors, which causes upper and lower lip protrusion. This case report describes the treatment of a 21-year old girl with bimaxillary protrusion and convex profile with incompetent lip seal. The treatment of choice for the patient was extraction of four first premolars and utilization of extraction space to reduce the facial convexity by retraction of anterior teeth. The anchorage requirement was maximum for complete correction of facial profile. Mini implants were used to retract the anterior teeth and improve facial aesthetic. Treatment was completed in 20 months. Patient’s facial profile improved significantly with reduced dental protrusion and lip eversion.

Keywords: Bimaxillary Protrusion, En mass retraction, Mini implant.

INTRODUCTION

Bimaxillary protrusion is a malocclusion commonly seen in Asian population [1]. The clinical picture which is presented is procumbent upper and lower lip due to proclined maxillary and mandibular anterior teeth. This result in lip incompetence, deep mentolabial sulcus, spacing with upper and lower anteriors [1].

The standard treatment protocol for such condition includes extraction of all four 1st premolars and utilization of extraction spaces for reducing convexity of facial profile and correction of proclination. In this case, maximum anchorage of the posterior teeth is of utmost importance for complete retraction of anterior teeth and correcting the profile [2]. Mini-implants prove to be a very effective means of skeletal anchorage with reduced patient compliance and predictable treatment outcome [3].

The current case discusses about a 21-year old female patient with bimaxillary protrusion corrected by extraction of maxillary and mandibular first premolar and using mini implant in maxillary and mandibular arch.

CASE REPORT

A 21 year-old girl reported to the orthodontic clinic with the chief complaint of procumbent upper and lower lips.

Extraoral examination: The patient had mesoprosopic facial form, convex profile, and incompetent lip seal with deep mentolabial sulcus. (Figure 1)

Intraoral examination: revealed all teeth in upper & lower arch present till 2nd molar. U shaped upper & lower arch. Class I molar & canine relationship bilaterally, mandibular crowding (2mm), 3mm of overjet, 3mm of overbite. (Figure 2)

Cephalometric analysis: showed a Class I skeletal pattern (ANB= 1°) with vertical growth pattern (mandibular plane angle 34°). (Figure 6) (Table1)
Table 1: Cephalometric analysis data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>pre-treatment</th>
<th>Post treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>SNA</td>
<td>820</td>
<td>810</td>
</tr>
<tr>
<td>SNB</td>
<td>810</td>
<td>800</td>
</tr>
<tr>
<td>ANB</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>FMA</td>
<td>320</td>
<td>320</td>
</tr>
<tr>
<td>Gonial Angle</td>
<td>1340</td>
<td>1350</td>
</tr>
<tr>
<td>GO GN SN</td>
<td>340</td>
<td>350</td>
</tr>
<tr>
<td>U1-NA</td>
<td>390</td>
<td>210</td>
</tr>
<tr>
<td>U1-NA</td>
<td>15mm</td>
<td>4mm</td>
</tr>
<tr>
<td>UI-SN</td>
<td>1210</td>
<td>1000</td>
</tr>
<tr>
<td>L1-NB</td>
<td>360</td>
<td>220</td>
</tr>
<tr>
<td>L1-NB</td>
<td>11mm</td>
<td>5mm</td>
</tr>
<tr>
<td>IMPA</td>
<td>980</td>
<td>910</td>
</tr>
<tr>
<td>E LINE-U</td>
<td>4mm</td>
<td>-2mm</td>
</tr>
<tr>
<td>E LINE-L</td>
<td>7mm</td>
<td>0mm</td>
</tr>
<tr>
<td>Nasolabial angle</td>
<td>850</td>
<td>930</td>
</tr>
</tbody>
</table>

DIAGNOSIS
- Skeletal Class I malocclusion with vertical growth pattern.
- Dentoalveolar Angle’s Class I, Dewey’s type 1 & 2

TREATMENT OBJECTIVE AND PLANNING
- To reduce convexity of profile
- To correct incompetent lip seal by reducing procumbency of lip
- To correct upper, lower proclination

Based on clinical and cephalometric examination, treatment plan was decided to extract maxillary and mandibular first premolar and reinforce posterior anchorage with mini screw implants.

TREATMENT PROGRESS
After extraction of first premolars, pre-adjusted edgewise appliance (MBT 0.022 slot) was bonded in upper and lower arch. Initial leveling and alignment was done using heat activated Niti wires with sequence 0.014 in, 0.016 in, 0.016 x 0.022 in, 0.017 x 0.025 in. This was followed by proceeding to 0.017 x 0.025” SS, 0.019 x 0.025” Niti, 0.019 x 0.025” SS. After leveling and alignment, four orthodontic mini-implants self-drilling type, conical shape with 1.5 mm diameter and 8 mm length were implanted into the buccal alveolar bone between the maxillary and mandibular first molars and second bicuspids. (Figure 3) The vertical position of mini implant (placed approximately 6mm from the orthodontic wires) was planned to achieve intrusive retraction force vector for torque control. A 0.019 x 0.025” SS arch-wire with mild RCS and 8 mm anterior hooks mesial to canine was placed in maxillary and mandibular arch and Ni–Ti close coil spring was used for retraction.

After space closure finishing was done using 0.021x0.025” TMA archwire. Post debonding fixed lingual bonded retainer in both maxillary and mandibular arch from second premolar to second premolar was placed.

Total treatment duration was 20 months.

TREATMENT RESULT
Facial profile improved
Reduction in procumbency of upper and lower lips
Ideal overjet and overbite achieved

Fig 3: Implant position

Fig 4: Post-treatment extra-oral

Fig 5: Post-treatment intra-oral

Fig 6: Comparative radiographs
The final superimposition revealed the maxillary anterior teeth were bodily retracted (6 mm). The mandibular anterior teeth were retracted (4 mm) with uprighting (IMPA 91°) (Figure 7) The upper and lower lips were retracted by 2 mm and 6 mm, respectively in relation to the E-line, and nasolabial angle had increased (from 85° pre-treatment to 93° post-treatment). (Figure 4, 5)

**DISCUSSION**

Facial aesthetics is an important consideration in orthodontic treatment and it is a well known fact in orthodontics that extraction reduces facial convexity [4].

Passive lace-back was used in initial phase of treatment. Bending the archwire immediately distal to the last banded molar teeth minimizes the forward tipping of the incisors [4-6]. Earlier elastic forces were used to connect anterior and posterior segments to control this flaring effect but this resulted in bite deepening famously known as roller-coaster effect [7]. The elastics were therefore replaced with 0.010" SS ligatures from the posterior segment to the cuspids called lace-backs. This resulted in prevention of proclination of canine and uprighting it.

According to Kocadereli when reduction in lip procumbency is desirable, extracting 1st premolars is a viable option [8].

The mini-screws and mini-plates have been recent advances in the utilizing bone anchorage by taking sites such as interdental area between posterior teeth, retromolar pad, hard palate, maxillary tuberosity etc. For en masse retraction of anterior teeth interdental area between posterior teeth is considered best site both for the operator and the patient [9].

Growth pattern of this patient was hypedivergent. Anchorage control in hyper divergent growth pattern is difficult due to weak facial musculature. To augment anchorage various appliances such as a transpalatal arch, nance holding arch, extra oral traction and mini implant are used. Renfroe stated that, for a stable anchorage unit, it must be more resistant than the teeth being moved [10].

In implant supported retraction, because the force used during retraction is not reciprocal, posteriorly it is negated by miniscrew and not by teeth. As a result, the anterior segment rotates around the centre of resistance, producing posterior open bite and anterior deep overbite. (Figure 8) The use of pre-curved archwire results in reciprocal extrusive force on posterior segment to maintain posterior contact [11].

According to an FEM study done by Shrinivas the optimal position of retraction hook was found to be 8mm for bodily movement of anterior teeth [12]. Consideration has been made in placing the implant high to allow for simultaneous intrusion and retraction.

**CONCLUSION**

Mini-implants as an anchorage unit proved to be a viable option in reducing projection, improvement of profile along with reduction of procumbency of lips, lip strain.

Mini-implants proved to be an effective mean of absolute anchorage by maintaining Class I molar relationship.

The patient compliance required was minimal which adds to its advantage over other conventional means of anchorage.

**REFERENCES**


Corresponding Author:
Dr Eshan Awasthi
MDS
Private Practitioner
Raipur, Chhattisgarh.
Email: eshaan.awasthi33@gmail.com

Date of Submission: 18/02/2016
Date of Acceptance: 05/05/2016