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MIDLINE MINI IMPLANT-ASSISTED CORRECTION OF VERTICAL MAXILLARY EXCESS -A CASE REPORT

Orthodontics

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ABSTRACT

The correction of Vertical maxillary excess is more difficult and challenging than the correction of antero-posterior, or transverse malocclusion. This article describes the orthodontic treatment of a 24-year-old male patient with increased incisor visibility at rest. He was diagnosed as Angle's Class I malocclusion on a Class II skeletal base with sagitto-vertical maxillary excess and orthognathic mandible with proclination and crowding of upper and lower anteriors. Soft tissue parameters revealed convex profile. Fixed appliance treatment was started with four first premolar extraction and alignment and levelling, followed by simultaneous intrusion and retraction of the anteriors with the help of midline mini-implant which resulted in achieving all the treatment objectives. The active treatment period was 18 months. The incisor exposure at rest and upper and lower proclination were corrected and better facial and smile esthetics was achieved.

KEYWORDS

Midline Mini Implant, gummy smile, Mini Implant Assisted Intrusion,vertical Maxillary Excess.

INTRODUCTION

Excessive visibility of upper incisors at rest, normal upper lip length and excessive gingiva display on smiling are salient clinical features of vertical maxillary excess, which might be skeletal or dentoalveolar in nature. If the **gummy smile** is associated with the vertical excess of the maxillary hard tissue, gingival display can be reduced by selective **orthodontic intrusion.** Burstone defined intrusion as "Apical movement of the geometric center of the root with respect to the occlusal plane or a plane based on the long axis of the tooth".[1]

Orthodontic intrusion of the maxillary anterior segment using intrusion arch or orthodontic miniscrews may lead to clinically successful outcome in terms of **gummy smile** correction.[2] Temporary skeletal anchorage system (mini-implants) can be used to effectively intrude the incisors without the need for patient cooperation.[3]

The case described here is a moderate skeletal Class II malocclusion with both sagittal and vertical maxillary excess which was treated with midline mini-implant to achieve better facial esthetics through simultaneous retraction and intrusion.

Case Report

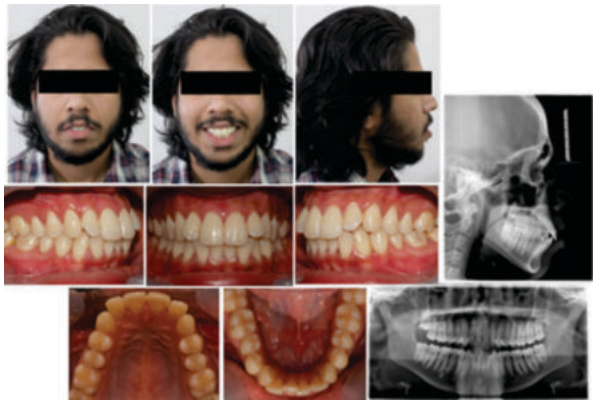

Figure 1: Pre-treatment intra oral, extra oral photographs, OPG and lateral cephalogram

A 24-year-old male reported with the chief complaint of reduced facial esthetics due to proclination of incisors and an associated gummy smile. Extraoral examination revealed an apparently symmetrical face with a convex profile and an acute nasolabial angle. The interlabial gap of 7mm at rest, and gingival exposure of 3mm during smile was suggestive of vertical maxillary excess. Lip length was normal. Intraoral examination revealed bilateral Class I molar and canine relation with overjet 3mm and overbite 3mm and mild crowding was present (Figure 1). Cephalometric examination revealed a skeletal Class II base with an ANB angle of 6° and a hyperdivergent growth pattern. The maxillary and mandibular incisors were proclined with respect to their corresponding bases (Table 1).

Panoramic radiograph revealed all erupted permanent teeth except the right maxillary third molar with adequate alveolar bone and normal root morphology (Figure 2). An irregular radiopacity in relation to 46 was indicative of osteosclerosis.

Table 1: Cephalometric analysis

Measurement	Pre treatment	Post treatment
SNA	85°	83°
SNB	78°	79°
ANB	6°	4°
GoMe- FHP	32°	28°
FMA	34°	30°
ANS-Me	55mm	53mm
UI-PtV (mm)	55mm	49mm
U1 to NA (°)	30°	26°
U1 to NA (mm)	6mm	4mm
U1-NF	34mm	31mm
UI-LI (°)	121°	132°
UI-SN(°)	116°	107°
U6-NF	27	27.5
Interlabial gap	7mm	3mm

Diagnosis

The patient was diagnosed as Angle's Class I malocclusion on a Class II skeletal base with sagitto-vertical maxillary excess and orthognathic mandible with vertical growth pattern. Other associated problems included proclination and crowding of maxillary and mandibular anteriors. Soft tissue parameters revealed convex profile.

Treatment Objectives

The treatment objectives based on the above diagnosis were:

1. Correction of proclination to achieve a better facial profile.
2. Correction of vertical maxillary excess to attain harmonious smile esthetics.
3. To maintain the occlusion with Class I molar and canine relation.
4. To achieve normal overjet and overbite.

Treatment Plan

1. The patient was advised therapeutic extraction of all four first premolars. Banding and bonding of both the arches was done with 0.022" × 0.028" MBT prescription (Mini 2000, Ormco, Glendora, CA, USA).
2. Midline mini-implant (Absoanchor, Dentos SH 1312-07) was placed close to the labial frenum just beneath the ANS for intrusion of the maxillary incisors to correct the excessive incisor display and vertical maxillary excess.
3. Simultaneous intrusion and retraction of the maxillary and mandibular anteriors using the space gained by extraction of maxillary and mandibular first premolars.

Treatment Progress

In the present case, all four first premolars were extracted at the initial stage of treatment. Banding of first and second molars was done along with transpalatal arch and lingual arch to reinforce the anchorage. Bonding of both the arches was done with 0.022" × 0.028" MBT prescription (Mini 2000, Ormco, Glendora, CA, USA). Initial alignment and leveling was done with the wire sequence of 0.016" NiTi, 0.016" × 0.022" NiTi, 0.017" × 0.025" and 0.019" × 0.025" NiTi archwires. Space closure was done with 0.019" × 0.025" SS posted arch wire for simultaneous retraction and intrusion. The mini-implant was placed in the midline of the anterior surface of the maxilla between and above the root tips of central incisors just beneath the ANS after anterior space closure. The screw was loaded with an active SS ligature tie with intrusive force of 80gms (Figure 2). Review appointments were given after every 4 weeks. Extraction space closure was completed after 18 months of active treatment followed by finishing and detailing. Maxillary and mandibular Hawley's retainers with a long labial bow were delivered to the patient after debonding.

Figure 2: Retraction with 0.019x0.025" SS with soldered brass hooks. Mini-Implant can be seen in the midline

TREATMENT RESULTS

The patient's smile aesthetics and facial balance improved at the end of the procedure. Profile became less convex and the lower anterior face height was decreased by 2mm. After the treatment, the lips and chin appeared more esthetic (Figure 3). Interlabial gap decreased to 3mm. Mandibular plane angle decreased by 4^{o}. Post-treatment cephalometric values revealed a decrease in SNA angle of 2^{o}. There was a decrease in proclination of maxillary anteriors as evidenced by the maxillary incisor angular and linear cephalometric parameters. The overjet reduced by 2mm and maxillary incisor intrusion of 3mm was achieved. Molar and canine relation were maintained in Class I relation throughout the active treatment period. The panoramic radiograph taken after the procedure showed overall parallelism of roots. Little to no root resorption was noted on the OPG (Figure 3).

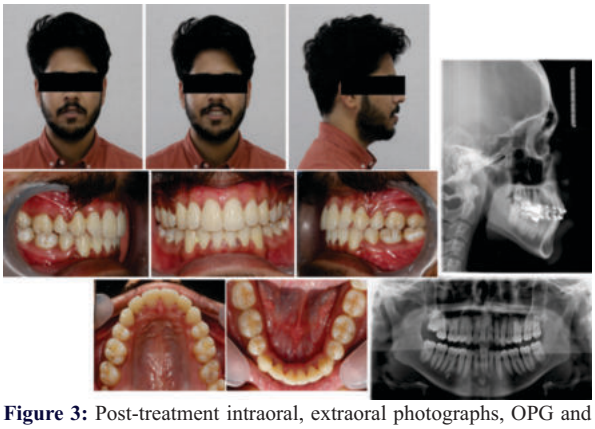

Figure 3: Post-treatment intraoral, extraoral photographs, OPG and lateral cephalogram

DISCUSSION

The causes for a gummy smile include excessive maxillary vertical growth, over-eruption of the maxillary incisors, incomplete anatomic crown exposure, hyperactivity of the elevator muscles of the upper lip, or a combination of these factors.[4,5] Orthognathic surgery is mandatory to resolve a gummy smile that has skeletal origins. Gummy smile due to over eruption of the maxillary incisors can be treated by intruding the maxillary incisors.[6] Appliances used for the intrusion of maxillary incisors include utility arch by Ricketts, Burstone intrusion arch, Connecticut intrusion arch, and J-hook headgear.[7] Tipping of posteriors, need of extensive skill in wire bending and patient co-operation are the major drawback of these appliances.[7]

In Orthodontic practice, although both titanium miniplates and dental implants have been successfully used for tooth intrusion,[8] the mini-implant has the advantage of immediate loading, multiple placement sites, uncomplicated placement and removal procedures and minimal expense for patients.[9] The implant should be easily removable after Orthodontic treatment.[10]Many authors have reported the use of mini-implants for intruding upper incisors and have documented statistically significant amount of incisor intrusion using Mini-implants.[11-14] Nowadays mini-implants are commonly utilized for simultaneous anterior intrusion and retraction for the correction of deep bite and vertical maxillary excess.

This patient showed a skeletal Class II with ANB of 6^{o}, vertical maxillary excess and proclination of maxillary anteriors with increased incisor visibility. The molar and canine relation was Class I. Space obtained by extraction of first premolars was utilized for simultaneous retraction and intrusion of maxillary anteriors. SNA reduced from 85^{o} to 83^{o} and the ANB reduced from 6^{o} to 4^{o}. At the end of treatment, the reduction in incisor visibility and the interlabial gap supported an overall improvement in smile and facial aesthetics. The mini-implants were found to be an excellent choice of anchorage for the orthodontic treatment of a patient with enhanced incisor visibility and a gummy smile during the active treatment period. Furthermore, there was no requirement for patient cooperation.

CONCLUSION

Mini-implants are an excellent tool to achieve maxillary incisor intrusion and sagittal correction of malocclusion with good control over the direction and amount of force without depending on patient cooperation. True intrusion was achieved with mini-implants improving the patient's excessive incisor visibility and gummy smile.

Declaration Of Patient Consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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