



## Case Report

# Orthodontic management of skeletal Class II malocclusion using three mini-implants- A case report

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### ABSTRACT

Vertical dimension issues are frequently regarded as the most difficult dentofacial problems to treat in clinical practice. The difficulty level increases when vertical dysplasia is paired with sagittal discrepancy. The use of mini-implants in Orthodontics has broadened the scope of orthodontic treatment options. The treatment of a 14-year-old female patient with skeletal Class II malocclusion, slight hyperdivergent profile, and enhanced incisor visibility with four premolar extraction followed by comprehensive orthodontic treatment to correct the convex profile and increased incisor visibility, with two posterior implants for retraction and a midline mini implant for intrusion of the anterior maxillary dentoalveolar segment is described in this case report. The active therapy period was 25 months long.

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## 1. Introduction

Excessive visibility of upper incisors and excessive gingiva display on smiling are symptoms of maxillary vertical excess, which might be skeletal or dentoalveolar in nature (gummy smile).<sup>1</sup> Skeletal Class II malocclusion is treated by growth modification in developing patients and camouflage in adults if the skeletal discrepancy is mild to moderate. The severity of the sagittal disparity, especially when it coexists with maxillary vertical excess, enhances the therapeutic complexity.<sup>2</sup> The skeletal anchorage system, on the other hand, has broadened the scope of Orthodontics and is also accepted by patients.<sup>3,4</sup>

The following case is a moderate skeletal Class II malocclusion with both sagittal and vertical maxillary excess which was treated with mini-implants to achieve better facial and smile esthetics.

## 2. Case Report

The female patient, 14-years of age, reported to the Department with the presenting complaint of forwardly placed and excessively visible upper front teeth. The patient had no significant medical or dental history. Upon facial examination, the patient presented with a convex profile, incompetent lips with increased incisor visibility and deficient chin (Figure 1). Intraoral examination revealed Class II end-on molar relation on both sides and end-on canine relation on the left side. There was increased incisor visibility of more than 4mm at rest. Single tooth scissor bite was present in relation to the upper right first premolar (Figure 1).

Panoramic radiograph revealed all erupted permanent teeth except the third molars (Figure 2) with adequate alveolar bone and normal root morphology. Occlusal radiopacities can be seen in 36 and 46 indicating restorations.

Lateral cephalometric analysis showed a skeletal Class II malocclusion with convex profile, prognathic maxilla and normal mandible, proclined upper and lower incisors and

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potentially incompetent lips (Table 1).

Model analysis revealed a Bolton's ratio showing excess of maxillary overall and anterior tooth material.

**Table 1:**

Measurement	Pre treatment	Post treatment
Anteroposterior Skeletal		
SNA	87°	83°
SNB	79°	79°
ANB	8°	4°
Vertical Skeletal		
GoMe- FHP	29°	27°
FMA	28°	26°
ANS-Me	52mm	50mm
Dental		
Overjet	5mm	2mm
Overbite	3mm	2mm
U1/SN	125°	113°
IMPA	109°	98°
U1-NF	32mm	30mm
U6-NF	27.5mm	26mm
L1-MP	33mm	32mm
L6-MP	20mm	20mm
Interlabial gap	5mm	1mm

### 2.1. Diagnosis

The patient was diagnosed with Angle's Class II Division 1 malocclusion on a Class II skeletal base with vertical maxillary excess, upper & lower anterior proclination and crowding, scissor bite in relation to 14 with lower midline shifted towards left by 2mm.

### 2.2. Treatment objectives

1. Correction of smile esthetics
2. Correction of facial profile
3. Obtaining a harmonious occlusion

This was planned to be achieved by:

1. Reducing the vertical dimension to improve facial esthetics
2. Correcting the incisor proclination to improve the profile
3. Correct vertical incisor position to create an esthetic smile
4. Achieve soft tissue balance and harmony

### 2.3. Treatment plan

As a part of the treatment plan it was decided to extract upper first premolars and lower second premolars. Three mini-implants were placed. A Midline mini-implant was placed close to the labial frenum high up in the vestibule

for intrusion of the maxillary anterior segment to correct the excessive incisor display. Two Mini-implants of 1.4mm x 8mm were inserted between maxillary second premolar and first molar bilaterally and angulated at 70° for retraction of the protruded maxillary anterior segment. Transpalatal and lingual arches were given in conjunction with TADs to control the molars.

### 2.4. Treatment progress

The patient was treated using Ormco Mini 2000 brackets 0.022'' x 0.028'' MBT prescription. Treatment was started with extraction of upper first premolars and lower second premolars. The first molars were banded with soldered transpalatal arch and lingual arch and cemented in place. This was followed by bracket placement in the maxillary and mandibular arches. Upper and lower 0.016'' NiTi wires were engaged for initial leveling and alignment. Subsequent to this maxillary and mandibular 0.017'' x 0.025'' and 0.019'' x 0.025'' NiTi wires were placed. This was followed by maxillary and mandibular 0.019'' x 0.025'' SS wires with brass hooks soldered distal to the lateral incisor (Figure 3).

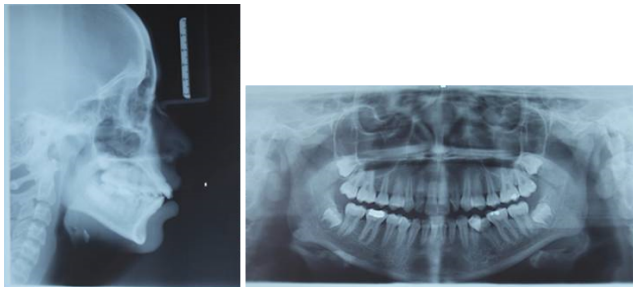
Mini implants of 1.4 mm x 8 mm were inserted in the maxillary midline lateral to the frenum and also interdental between maxillary second premolar and first molar bilaterally. Retraction was started with active tie backs in both upper and lower arches and took about 10months. Finishing and detailing was done with 0.016'' NiTi followed by 0.017'' x 0.025'' NiTi wire. The entire treatment period lasted around 25 months.



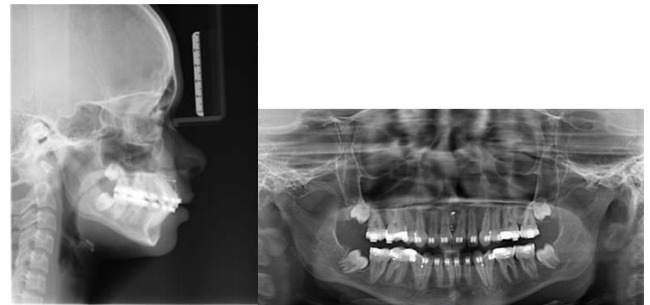
**Fig. 1:** Pre treatment extraoral and intraoral photographs

### 2.5. Treatment results

At the end of treatment, the patient's smile aesthetics and facial balance improved, and the lower anterior facial height was reduced by 2 mm. The lips and chin appeared more



**Fig. 2:** Pre treatment Lateral cephalogram and OPG



**Fig. 5:** Post treatment Lateral cephalogram and OPG



**Fig. 3:** Retraction with 0.019x0.025” SS with soldered brass hooks. Implants can be seen in the midline and in the posterior region



**Fig. 4:** Post treatment extraoral and intraoral photographs

esthetic (Figure 4). Mandibular plane angle decreased by 2° (Table 1).

Post-treatment cephalometric values showed a decrease in SNA angle of 4°. This was most likely due to decrease in proclination of upper anteriors. The overjet reduced by 4mm. Intrusion of upper anteriors occurred by 2mm and upper molars by 1.5mm resulting in an overall LAFH reduction by 2mm. Superimposition of cephalometric tracings showed superior movement of the maxillary



**Fig. 6:** Cephalometric Superimposition

Pre-treatment and Post-treatment cephalometric values

dentition and posterosuperior movement of upper incisors and mandibular counterclockwise rotation. Lower molar showed favourable anteroposterior change and minimal vertical change (Figure 6).

The post treatment panoramic radiograph showed overall parallelism of roots. No significant root resorption was noted (Figure 5).

### 3. Discussion

A gummy smile can be caused by vertical maxillary excess, significant gingival overgrowth, altered passive eruption, anatomically short upper lip, hyper mobile upper lip muscles, or a combination of these factors.<sup>5-7</sup> Orthodontic mini-implants have altered orthodontic anchoring and biomechanics by making anchorage completely stable.<sup>8</sup> Since Creekmore and Eklund reported utilizing a metal implant to remedy a deep over bite in 1983, mini-implants have been utilized to intrude incisors. Mini-implants are commonly utilized nowadays for anterior intrusion and

retraction to treat deep bite and vertical maxillary excess.

Our patient was a skeletal Class II patient with ANB of 8° and proclined and vertically excess maxillary anteriors with increased incisor visibility. The molar relation was end-on but the canine relation was Class I on right side. Space obtained by extraction of first premolars was utilized for both retraction and intrusion of anteriors of the maxillary arch as a result of which, SNA reduced from 87° to 83° and the ANB reduced by 4°. At the end of treatment, the reduction in incisor visibility and the interlabial gap supported an overall improvement in smile and facial aesthetics.

In the Orthodontic clinic, although both titanium miniplates and dental implants have been successfully used for tooth intrusion,<sup>9</sup> the mini-implant has the advantages of immediate loading, multiple placement sites, uncomplicated placement and removal procedures, and minimal expense for patients.<sup>10</sup> The implant should be easily removable after Orthodontic treatment.<sup>11</sup> The mini-implants were found to be an adequate anchorage choice 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.

#### 4. Conclusion

Mini-implants were employed to achieve large maxillary incisor intrusion and sagittal correction of malocclusion with good control over the direction and amount of force without relying on patient cooperation. There was no extrusion of the posterior teeth during intrusion, resulting in 100 percent anchoring. This demonstrated that the mini-implant anchorage method improved the patient's excessive incisor visibility and gummy smile.

#### 5. 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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#### 7. Conflicts of Interest

There are no conflicts of interest.

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