

## Case Report

### *Ortho-Surgical Management of An Adult Patient with Gummy Smile - A Case Report*

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**How to cite this article:** Ortho-Surgical Management of An Adult Patient with Gummy Smile-A Case Report. *Int J Orthod Rehabil* 2023;14 (1) 26-35.

Doi: 10.56501/intjorthodrehabil.v14i1.764.

Received: 08-03-2023

Accepted: 20-03-2023

Web Published: 22-03-2023

#### **ABSTRACT**

**Aim:** This case report represents the clinical management of a Skeletal Class II adult patient with gummy smile treated by Orthognathic surgery.

**Background:** Vertical maxillary excess (VME) is the most common skeletal deformity in Skeletal Class II which is treated by Anterior Maxillary Osteotomy (AMO) and Gummy Smile is the characteristic feature of VME in which the anterior part of maxilla is superiorly repositioned.

**Case Description:** A 19-year-old patient reported our clinic with the complaint of forwardly placed upper front teeth. On extra oral examination, she had convex profile with posterior divergence and interlabial gap of 10mm and everted upper lip. The patient had a gummy smile of 8mm. Intra orally, she had Class II canine relationship on both sides with missing 16, 36, 46. Cephalometric values showed Class II skeletal base with protrusive upper and lower incisors and acute nasolabial angle. Initially orthodontic treatment was done and extraction of upper first premolars was planned during surgery. AMO was done with superior impaction of 4mm and posteriorly by 6mm. After 4 weeks of post-surgery, the settling of occlusion using intermaxillary elastics was done. At the end of the treatment, the patient had Class I canine relationship on both sides with Skeletal Class I and overjet and overbite was 2mm. Gummy smile was reduced to 4mm which was accepted by the patient. Fixed retention was given in both the arches. The total treatment time was around 30 months.

**Conclusion:** The proper diagnosis and appropriate treatment planning is the main key to achieve stable results in Orthodontics. An interdisciplinary approach with the orthodontist and surgeon will lead to achieve stable, functional and esthetic results.

**Key words:** Orthodontics, Surgery, Malocclusion, Skeletal discrepancy,

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## INTRODUCTION

The correction of dentoskeletal malocclusions has always been the main focus of orthodontic treatment.<sup>[1]</sup> One of the most common dentofacial abnormalities in Asian populations is bimaxillary protrusion associated with dental and soft tissue incompetency.<sup>[2]</sup> Patients with bimaxillary protrusion tend to seek treatment to improve facial aesthetics.

Maxillary vertical excess (VME), formerly known as vertical maxillary dysplasia, is caused by excessive inferior maxillary skeletal growth.<sup>[3]</sup> VME is thought to be characterized by the excessive gingival show. The excessive display of gingiva, also known as the "gummy smile," is a major cosmetic concern for both patients and dentists.<sup>[4]</sup>

Anterior maxillary osteotomy (AMO) is routinely performed in cases of VME, most of them have protruding maxillary incisors and skeletal Class II malocclusion. The anterior dento-osseous segment is primarily repositioned posteriorly using the AMO.<sup>[5]</sup> In VME, superior repositioning of the maxilla results in improvement of both morphological and functional deficits, resulting in normalization of facial aesthetics.

Stability and predictability of outcomes are always associated with proper case selection, treatment planning, and surgical technique.<sup>[4]</sup> When treating maxillary superior impaction, the mandible rotates to a new anterior and superior position. The degree of rotation has a significant impact on treatment planning.<sup>[5]</sup>

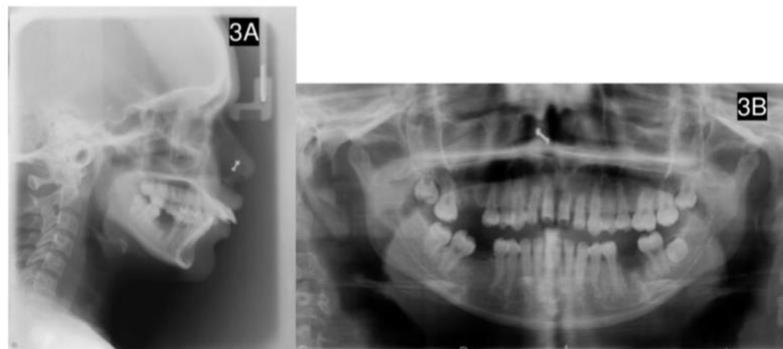
This case report illustrates the Ortho-Surgical management of a 19 year old patient treated with AMO.

### Diagnosis and Treatment Plan:

A 19-year-old female presented with the chief complaint of forwardly placed upper front teeth. On Clinical Examination, the patient had a convex profile with posterior divergence and an interlabial gap of 10mm and an everted upper lip. The patient had a gummy smile of 8 mm while smiling (Figs 1A to D).

On intra oral examination, she had missing 16, 36, and 46. The upper arch and lower arches were U-shaped, symmetrical with anterior spacing. The patient had a midline shift of approximately 3mm to the right in the lower arch, with an increased overjet of 14mm and an overbite of 3mm. She had Class II Canine relationship on both sides (Figs 2A to E).

The Orthopantogram showed missing 16, 36, 46 and 48 (Fig 3A). Cephalometric analysis reveals a Class II skeletal relationship (ANB=6°; Wit's appraisal= +4mm) with protrusive upper incisors (U1-NA=43°; UI-SN=133°) and lower incisors (LI-NB= 30°; IMPA=94°) and a vertical growth pattern (GoGn-SN=37°; FMA=30°) and acute nasolabial angle of 78° (Table 1) (Fig 3B).



*Figures 1A-3B: Pre-treatment extra oral, intra oral photographs along with lateral cephalogram and panoramic radiograph*

### **Treatment Objectives**

Treatment objectives were to level and align the teeth, reduce the proclination of the upper and lower incisors, close the upper and lower anterior spaces and reduce the gummy smile, i.e., improve facial aesthetics and establish good occlusion.

The two treatment alternatives were addressed to the patient. First is Camouflage therapy by extracting the upper first premolars. Second is the orthodontic and surgical plan, which included AMO along with orthodontic treatment, and the results of both treatment plans were explained to the patient.

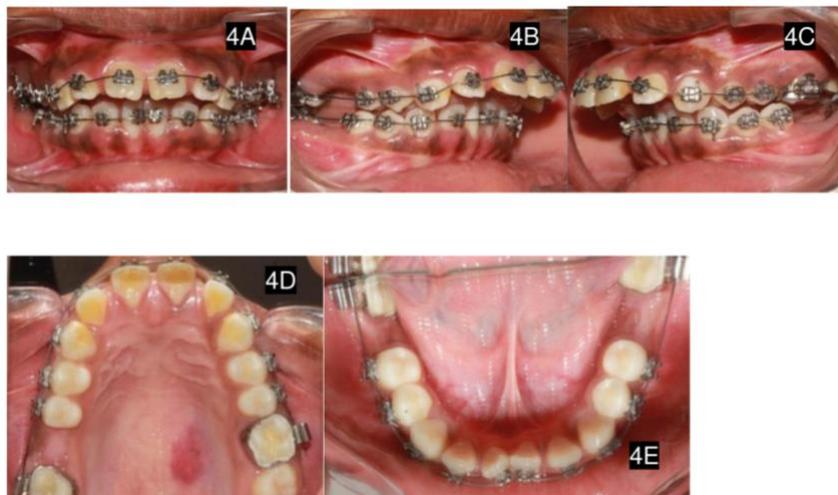
Because the patient was concerned about the proclination of her upper anterior teeth and her esthetics, the second treatment plan was accepted.

### **Treatment Progress**

The entire treatment plan was divided into pre-surgical orthodontics, surgical and post-surgical orthodontics.

### **Pre-surgical Orthodontics**

The goal of pre-surgical orthodontics is to level and align the position of the teeth in order to facilitate the surgical correction of the jawbones in the best possible way. Decompensation of upper and lower arches was done, and closure of anterior spaces in both arches was done. Treatment started with 0.022" x 0.028" slot pre-adjusted edgewise (PEA) Stainless-steel brackets (Metro Orthodontics, India) which were bonded to all teeth, and banding of molars were done using 0.022" x 0.030" buccal tubes (Figs 4A to E).



***Figures 4A-4E: Initial upper and lower complete strap up photographs.***

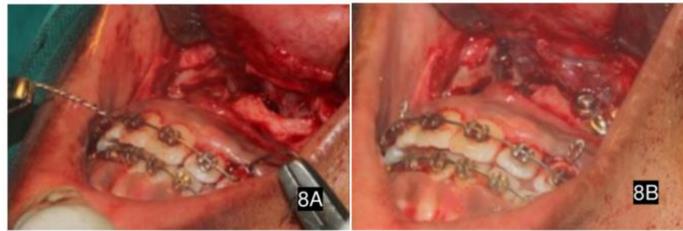
The extraction of the upper first premolars was planned during the surgery. Initially, during leveling and alignment, 0.016" nickel titanium was placed in both the upper and lower arches. Then, followed by 0.018" NiTi, 0.019 x 0.025 stainless steel archwires in both the arches. The upper right second molar was protracted using a mini-implant of size 1.4mm x 8mm (SK Surgicals, India), which was placed between the upper right first and second premolar. After nine months of leveling and aligning, both arches were stabilized using 0.021 x 0.025 SS wires (Figs 5A to D, 6A to E, 7A and B).



*Figures 5A-7B: Completion of levelling and aligning followed by stabilization of arches prior to surgical treatment.*

### **Surgical Orthodontics**

AMO was planned and the surgery was performed under general anesthesia. The upper first premolars were extracted during surgery. Bilateral osteotomies were then performed through the extraction sockets of the upper first premolars, and the superior bone was excised along the pyriform aperture. After the osteotomy, the anterior part was moved 4mm superiorly and 6mm posteriorly. Intermaxillary fixation was done with wires and elastics. The maxilla was fixed in the new position with titanium alloy mini-plates and 2.0 screws in the osteotomy area. Sutures were used for the closure (Figs 8A and 8B).



**Figure 8A, 8B:** AMO carried out and intermaxillary fixation done for stabilization.

### Post-Surgical Orthodontics

After four weeks of surgery, postsurgical orthodontics was started to ensure complete healing. The main goal of this phase is to bilaterally close any remaining space between the upper canines and second premolars and to level the vertical step between them. Settling of occlusion was done by using intermaxillary elastics (TP Orthodontics) of 1/8" size and 3 ½ oz of force. After the treatment was completed, the appliance was debonded. The fixed retainer was bonded in the upper arch from the second premolar on the side to the second premolar on the opposite side. The removable appliance with Hawley on the anterior teeth, Adams on the lower right molar and the lower left molar was replaced in this mandibular appliance in conjunction with the fixed retainer. The gingival display was reduced to 4mm from 8mm. After the completion of treatment, the patient had an overjet of 2mm and an overbite of 3mm (Figs 9A to D, 10A to E, 11A and B).

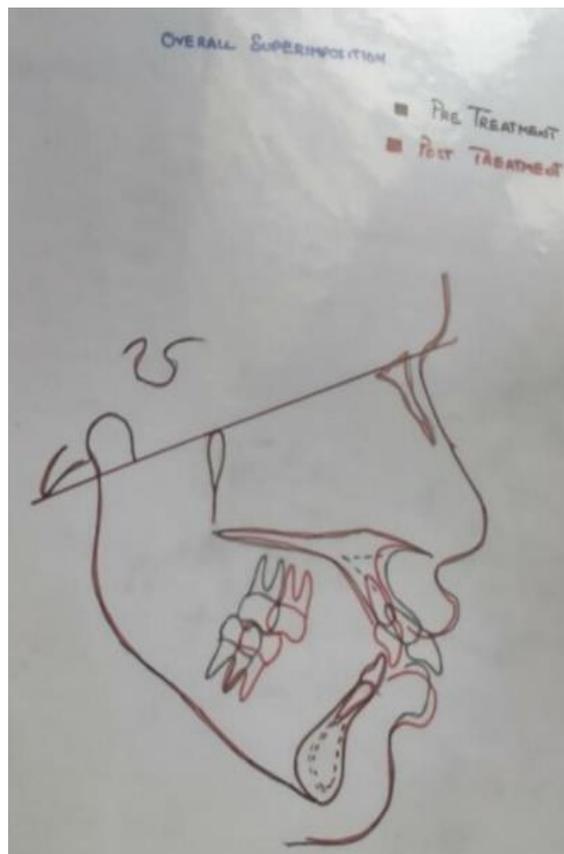


**Figure 9A-11B:** Post-treatment extra oral, intra oral photographs along with lateral cephalogram and panoramic radiograph

## Results

The total treatment time was around 30 months. Post-treatment photos showed symmetrical facial proportions with balanced maxillomandibular sagittal relationship, gummy smile correction, aesthetic smile line and appropriate lip alignment, Class I canine relationship, coincident midlines, a 2 mm overjet and 3mm overbite, and well aligned maxillary and mandibular arch forms. The degree of maxillary impaction and mandibular autorotation was determined by superimposing the cephalometric tracings taken before and after treatment. Skeletally, surgery affected the anterior region of the maxilla, causing the mandible to autorotate in the opposite direction.<sup>[3]</sup>

Post-treatment cephalometric measurements revealed SNA of  $80^\circ$ , SNB of  $77^\circ$  with ANB of  $3^\circ$  indicating a Class I skeletal base. The I-NA was reduced to  $26^\circ$  and a linear measurement of 4mm. The inclination of the lower incisors, i.e., I-NB, increased to  $32^\circ$  with a linear measurement of 4mm. The Wits appraisal showed +1mm, and the nasolabial angle increased to  $93^\circ$ , which is normal (Table 1). Soft tissue analysis revealed that upper and lower lips are in relation to each other with respect to E-Line and Holdaway ratio (Fig 12A).



**Figure 12A: Overall superimposition photograph**

At the end of the treatment, the patient had a 4mm gummy smile that need further reduction. However, it was aesthetically acceptable to the patient. The retention regimen consisted of a bonded 3-3 palatal bar in the upper arch and lower arches, and a removable Hawley's appliance is given with an artificial tooth in the appliance as a replacement for 36.

**TABLE 1: CEPHALOMETRIC ANALYSIS**

Parameters	Pre- Treatment	Mid-Treatment	Post-Treatment
SNA	81°	80	80
SNB	75°	74	77
ANB	6°	6	3
Wit's appraisal	+4mm	+2mm	+1mm
Convexity	12°	14	9
1-NA	43°	30	26
1-NA	5mm	4mm	4mm
1-NB	30°	40	32
1-NB	4mm	4mm	4mm
GoGn-SN	38°	40	39
Occlusal plane	10°	20	18
Nasolabial angle	78°	82	93
IMPA	94°	104	95
FMA	30°	33	32
UL: E Line	-1mm	-1mm	+1mm
LL: E Line	-2mm	1mm	+1mm
Holdaway ratio	3.5mm	4mm	4mm

**Discussion**

VME is one of the most common dentofacial deformities treated with orthognathic surgery. Careful treatment planning and executing it with an appropriate treatment plan is the key to success in the treatment of VME.<sup>[3]</sup> Superior impaction of the maxilla through surgery is a modality chosen in cases where vertical excess of the maxilla has caused downward and backward rotation of the mandible and excessive tooth exposure at rest.<sup>[6]</sup>

The patient in the above case had an excessive gummy smile and incisor exposure when at rest. This negatively affected the aesthetics. An interdisciplinary approach with the orthodontist and the surgeon, where both contribute before the starting the treatment, is the best way to achieve stable, functional and aesthetic results.<sup>[7]</sup> The superior

repositioning of the anterior portion of the maxilla is the best method to reduce the excessive gummy smile associated with VME.

In the present case report, the patient had a gummy smile of 8mm with an overjet of 14mm and an overbite of 3mm with a Class II canine relationship on both sides with missing 36,46,16. The upper right second molar was protracted after leveling and alignment with TADs.

AMO with superior impaction of 4mm and posterior setback of 6mm is performed. The gummy smile was reduced to 4mm, which was accepted by the patient after post-treatment. Overjet and overbite were 2mm and 3mm respectively, achieving a Class I canine relationship on both sides. Conventional fixed bonded lingual retainer wire was bonded in both the upper and lower arches and removable Hawley's appliance with artificial tooth 36 in the lower arch.

In the current case, no surgical complication was observed. Orthognathic surgery has an unpredictably high incidence of relapse. Relapse can be skeletal, dental, or both. The amount of anterior movement, the inferior repositioning of the maxilla, the amount of mobilization of the downwardly fractured maxilla during surgery, the amount of bone contact in the newly established position of the maxilla, and the type of fixation all affect the stability of maxillary osteotomies. Superior repositioning of the maxillary procedure is the most stable, and forward movement is also reasonably stable.<sup>[7]</sup> Six months after the end of treatment, there was no sign of relapse in the present case.

### **Conclusion**

The case study highlights the importance of accurate diagnosis and treatment planning to ensure that the problem is addressed and treated appropriately. With this method, there is a noticeable improvement in facial aesthetics; nevertheless, the treatment plan must be coordinated between the surgeon and the orthodontist. This example demonstrates the reliable, practical, and aesthetically pleasing results of AMO orthodontic treatment.

### **Source Of Funding:**

Nil

### **Conflict Of Interest:**

The authors have no conflicts of interest to declare.

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