

## Surgical, Orthodontic Correction of Vertical Maxillary Excess and Mandibular Deficiency: A Case Report

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### ABSTRACT

**Background:** Skeletal class II malocclusion is considered as one of the most commonly occurring malocclusion in the Indian subcontinent. In adults orthognathic surgery serves as a best option to treat such cases. This is a case report of 22 year old female adult patient who presented with severe skeletal class II malocclusion with excessive vertical growth of maxilla and retrognathic mandible. Patient had a 10 mm gingival display during full smile and convex profile with retrusive chin, proclined upper and lower anteriors with increased overjet and overbite which led to the decision of combined orthodontic and surgical treatment. The surgical procedure for this patient was bijaw surgery which includes Lefort I osteotomy for maxillary superior impaction, bilateral sagittal split osteotomy for mandibular advancement with vertical reduction advancement genioplasty. The surgical-orthodontic combination therapy has resulted in class I skeletal, dental and soft tissue relationship, with marked improvement in the facial esthetics which in turn helped the patient to improve the self-confidence level.

**Keywords:** Class II malocclusion, Bijaw surgery, Genioplasty, Vertical maxillary excess.

### INTRODUCTION

In nongrowing patients with severe skeletal class II malocclusion the only possible solution is to treat with orthognathic surgery so as to improve the self-esteem, achieve normal occlusion and to improve the facial esthetics.<sup>1,2,3</sup> Skeletal class II problems are considered as most commonly occurring malocclusion in India which can be due to mandibular deficiency or downward-backward rotation of the mandible which is caused by excessive vertical growth of the maxilla or a combination of both. Surgical treatment options for skeletal class II malocclusion consists of mandibular advancement, superior repositioning of the maxilla, or a combination.<sup>4</sup> The term vertical maxillary excess (VME) was given by Epker<sup>5</sup> in the year 1972

and it is considered as one of the type of vertical dysplasia which are difficult to treat. Vertical maxillary excess is manifested primarily by gummy smile, exposure of the maxillary teeth, with incompetent lips, increased length of lower face, high mandibular plane angle.<sup>6</sup> Superior repositioning of maxilla serves as a better option in treating the VME<sup>7</sup> and results obtained by this procedure are stable.<sup>8</sup> Bilateral sagittal split osteotomy of mandible (BSSO) is most popularly used surgical method to correct the sagittal, transverse and vertical position of the lower jaw introduced by Trauner and Obwegeser<sup>9</sup> in the year 1957. This case report presents the treatment of an adult female patient with severe skeletal class II malocclusion by bijaw surgery.

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Fig 1: Pretreatment extra and intra oral photographs.

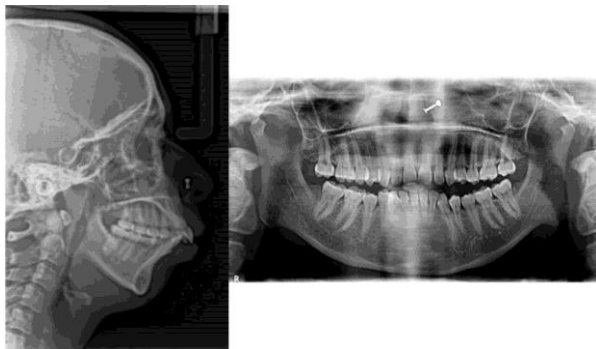


Fig 2: Pre treatment lateral cephalogram and OPG.



Fig 3: Pre surgical photographs and radiographs.

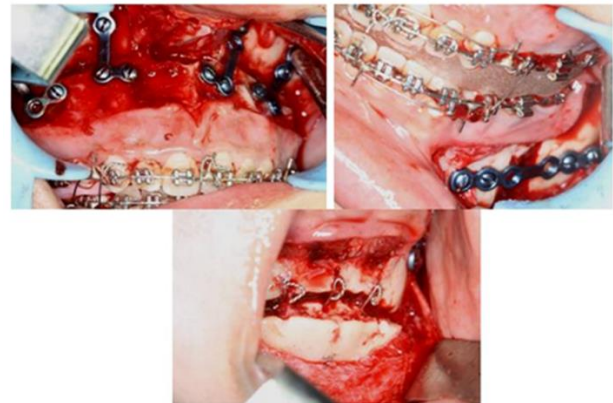


Fig 4: Lefort 1 osteotomy with 5 mm maxillary superior impaction, bilateral sagittal split ostotomy for 6mm mandibular advancement and 5mm vertical reduction advancement genioplasty performed.



Fig 5: Post treatment photographs and radiographs.

### Diagnosis and etiology

A 22 year old female patient reported to the Department of Orthodontics and Dentofacial Orthopedics with a chief complaint of excessive visibility of gums during smile. Extraoral examination of the patient shows mesocephalic head pattern and mesoprosopic facial form. Frontal examination of the patient showed an increased

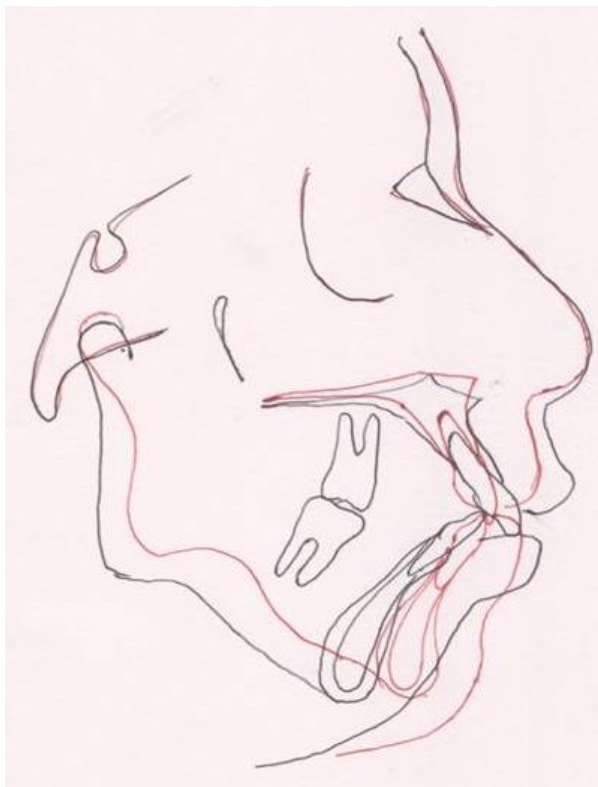


Fig 6: Superimposition on Basion-Nasion at CC point. Black line – Pretreatment, Red line – Post treatment.

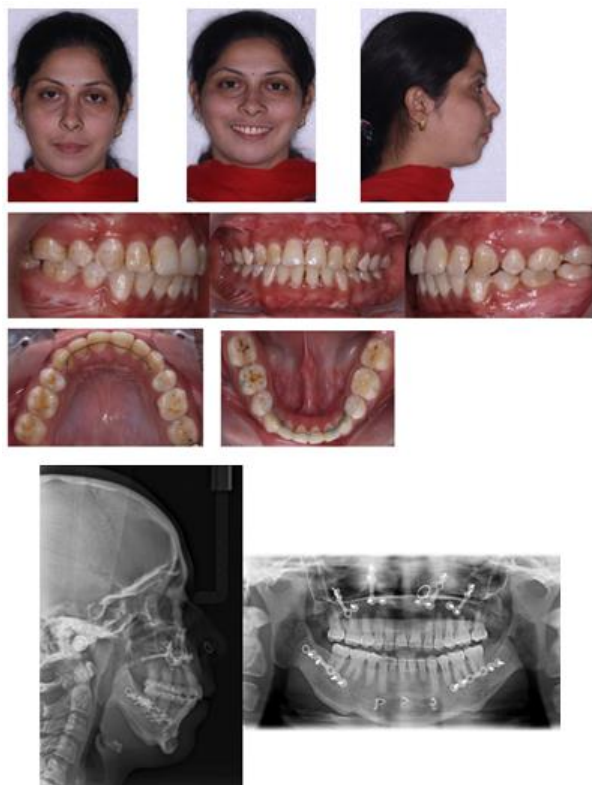


Fig 7: 20 months follow up photographs and radiographs

interlabial gap of 8mm and 10 mm of gingival display during smile. Profile was convex with recessive chin. Intraoral examination of the patient revealed proclined upper and lower anteriors with class II molar and canine relation bilaterally with increased overjet of 7mm and overbite of 4mm (Figure 1). Cephalometric examination revealed severe class II skeletal jaw bases with retrognathic mandible (SNB 70°, ANB 10°, N-A +3mm, N-B -12mm), vertical maxillary excess (Angle of inclination -92°) and hyperdivergence (FMA-38°) (Figure 2).

### Treatment alternatives

Treatment objectives were to reduce the gingival exposure on smiling and at rest, to achieve class I skeletal, dental and soft tissue relationship with an ideal overjet and overbite. Based on the objectives one of the treatment options would be extraction of all first premolars reducing the upper and lower anterior proclination, creating sufficient amount of overjet and surgically advancing the mandible however this option does not reduce the gummy smile and improve the patient profile which is patients chief concern. Another treatment option is extraction of all first premolars followed by presurgical decompensation into full fledged class II and bimaxillary surgery with 5mm maxillary superior impaction, 6mm mandibular advancement and vertical reduction advancement genioplasty by 5mm. This treatment option significantly reduces the gummy smile and improves the facial profile. Because the patient is chiefly concerned about the gummy smile and backward placement of chin we choose the second option.

### Treatment progress

Preadjusted edgewise appliance (0.022" X 0.028" slot MBT appliance) was used in the patient. Upper and lower bonding and banding was done and initial leveling and alignment was for about 7 months. In upper arch space closure was done by placing double key hole loop mesial and distal to canine bilaterally with 45° palatal root torque to prevent the torque loss during retraction. The total time taken for the completion of presurgical orthodontics was around 14 months (Figure 3). After presurgical orthodontics the patient presented with bilateral class II molar and canine relation with an overjet of 7mm. Later facebow

Table 1: Comparison of Pre and Post treatment cephalometric values.

| Hard tissue parameters    | Normal     | Pre – R x | Pre Surgical | Post – R x | Post-retention |
|---------------------------|------------|-----------|--------------|------------|----------------|
| SNA                       | 82°        | 80°       | 81°          | 83°        | 83°            |
| SNB                       | 80°        | 70°       | 68°          | 77°        | 77°            |
| ANB                       | 2°         | 10°       | 12°          | 6°         | 6°             |
| N-A                       | 2mm        | 3mm       | 2mm          | 3mm        | 3mm            |
| N-B                       | -2mm       | -12mm     | -16mm        | -6mm       | -6mm           |
| AO to BO                  | 0-1mm      | 7mm       | 8mm          | 1mm        | 1mm            |
| NA-Pog                    | 0-5°       | 23°       | 24°          | 10°        | 10°            |
| FMA                       | 25°        | 38°       | 40°          | 32°        | 32°            |
| Go-Gn-SN                  | 32°        | 45°       | 47°          | 32°        | 32°            |
| Y-axis FH-S-Gn            | 59°        | 68°       | 70°          | 78°        | 78°            |
| Jarabak's ratio           | 62-65%     | 54%       | 57.4%        | 67%        | 66%            |
| Angle of inclination      | 85°        | 92°       | 92°          | 86°        | 86°            |
| U1 – SN                   | 102°       | 105°      | 103°         | 99°        | 100°           |
| U1 – NA °/mm              | 22°,4mm    | 25°,8mm   | 23°,6mm      | 20°,3mm    | 21°,4mm        |
| L1 – MP(IMPA)             | 90°        | 106°      | 95°          | 84°        | 84°            |
| L1 – FH(FMIA)             | 65°        | 37°       | 45°          | 54°        | 54°            |
| L1 – NB °/mm              | 25°,4mm    | 32°,10mm  | 29°,9mm      | 25°,5mm    | 25°,5mm        |
| U1 – L1                   | 131°       | 100°      | 126°         | 132°       | 130°           |
| Soft tissue profile angle | 161°       | 142°      | 144°         | 155°       | 155°           |
| Nasolabial angle          | 102± 8°    | 107°      | 107°         | 100°       | 100°           |
| Mentolabial angle         | 122±10.7 ° | 140°      | 142°         | 150°       | 150°           |

transfer, bite registration and articulation of models were done for intermediate splint fabrication for 5mm maxillary superior impaction and final splint fabrication for 6mm mandibular advancement.

Orthognathic surgery was performed when the patient was on 0.019"x 0.025" SS wire with 5mm of maxillary superior impaction, mandibular advancement by 6mm and advancement and reduction genioplasty of 5mm. Rigid internal fixation was done with titanium miniplates and screws and intermaxillary fixation with ligature wires (Figure 4). Postsurgically the patient presented with straight profile, bilateral class I molar and canine relation and deviated upper midline to left by 2mm. Midline elastics were given to correct the midlines followed by settling the occlusion (Figure 5).The total treatment duration was 19 months with 14 months of presurgical orthodontics and 5 months of post surgical orthodontics. After treatment the patient has a significant improvement in the facial profile and

smile with 2mm of gingival display. Class I molar and canine relation bilaterally with ideal overjet and overbite of 2mm and matching upper and lower midlines were achieved. Upper and lower fixed retainers were given (Figure 6).

## DISCUSSION

Severe skeletal malocclusions especially Class II, are commonly seen among the southern part of Indian population. By combining Orthodontics and Orthognathic surgery a refined and better treatment alternative can be provided to the patients with severe skeletal deformities. In the present case report the patient presents with severe skeletal class II malocclusion with hyperdivergent growth pattern and vertical maxillary excess. Most of the patients with severe gummy smile experience an excessive vertical maxillary growth<sup>10</sup> which causes excessive display of maxillary teeth and gingival tissue, in spite of a normal upper lip length.<sup>11</sup> The excessive vertical maxillary growth is associated with a progressive backward rotation of

the mandible, which makes the face longer with an increased lower facial height. This condition is further worsened in patients with mandibular deficiency. In the present case presurgical orthodontics was planned with extraction of all first premolars to correct the proclination of upper and lower anteriors and to obtain an ideal axial inclination of upper and lower anteriors. Later orthognathic surgery was performed with Lefort I osteotomy for 5mm maxillary impaction and Bilateral sagittal split osteotomy for 6mm mandibular advancement and vertical reduction advancement genioplasty. Rigid internal fixation was done with titanium miniplates and screws. Superior repositioning of maxilla is considered as the most stable orthognathic surgical procedure followed by mandibular advancement in patients with increased lower anterior facial height. The combination of moving the maxilla upward and the mandible forward is significantly more stable when rigid internal fixation is used in the mandible.<sup>12</sup> This procedures which are typically used to treat Class II/long face problems are quite stable in the first year but long term studies have shown that large number of patients experience skeletal changes from one to five years post-surgically when healing is complete which are statistically insignificant<sup>13</sup>. Pretreatment and post-treatment lateral cephalograms values and superimpositions showed a dramatic skeletal and dental improvement. (Table 1, Figure 6). 20 months follow up of the patient showed stable results (Figure 7).

## CONCLUSION

Class II malocclusions require careful diagnosis and treatment planning for a successful results. In the present case report the Class II malocclusion was treated surgically by maxillary superior impaction and mandibular advancement. Significant improvement in the soft tissue profile was obtained in this case by combined orthognathic surgical procedure which added to the aesthetic value and improved the confidence level of the patient.

## CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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