

Correction of gummy smile with vertical maxillary excess by combined surgical-orthodontic treatment-a case report

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Abstract: Excessive maxillary development in vertical plane is commonly known as vertical maxillary excess (VME). It may involve the posterior maxilla only, anterior dentoalveolar segment only or the entire maxilla. Gummy smile associated with vertical maxillary excess (VME) affect normal aesthetic form as well as function. Well planned approach to the combined orthodontic-surgical treatment is of paramount importance for achieving optimum result.

Key Word: Vertical maxillary excess (VME), gummy smile, anterior maxillary segmental osteotomy, Temporary anchorage device (TAD)

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I. Introduction

Vertical maxillary excess (VME) which was previously termed as vertical maxillary dysplasia is a distinct skeletal deformity where there is excessive inferior maxillary skeletal development. Excess amount of bone(10-15mm) is found in between nasal floor and the root apices of the maxillary teeth. VME may present with or without anterior open-bite in combination with horizontal mandibular deficiency. VME is mainly of three types- total VME, posterior VME & anterior dentoalveolar VME. Excessive vertical development of entire maxilla with characteristic gummy smile both anteriorly and posteriorly is feature of total VME.^{1,2} Whereas downward rotation of posterior maxilla and increased gingival exposure at molar and premolar region is unique to posterior VME. On contrary anterior dentoalveolar VME presents with excessive overeruption of maxillary anterior teeth leading to gummy smile. Increased alveolar bone height, high palatal vault, narrow maxillary arch are common findings of VME. Dental occlusion may of angle's class I, class II or class III where class II relationship is more common. Total VME needs apt orthodontic treatment planning with surgical correction as sole orthodontic camouflage treatment often results in unsatisfactory outcome. Total VME where class II skeletal pattern is more prominent, Lefort I osteotomy followed by setback and superior positioning is treatment of choice. Anterior segmental osteotomy with setback and superior positioning can solve the purpose by selective removal of bone in anterior segment of maxilla and it also eliminates autorotation of mandible around condylar hinge axis. In this case report we present a case of VME without anterior open bite which was treated with combined orthodontic treatment and postero-superior positioning of anterior maxilla by segmental osteotomy.

II. Case Report

Diagnosis: A 22-year female patient came with chief complaints of protruding upper anterior teeth with gummy smile. Initial examination revealed a bilateral class I molar relationship, complete overbite and 13mm overjet. The incisors of upper arch were protrusive relative to the basal bone.

On facial analysis, patient was having a mesoprosopic facial form, with no gross asymmetry of face. She was having a convex profile, huge lip incompetency, a pronounced gummy smile with muscular hypotonia. There was full incisor display along with 6mm gingival show at rest.

The panoramic radiograph confirmed that all permanent teeth were present. Cephalometric analysis confirmed the underlying skeletal problems.



Fig 1: pretreatment photos



Fig 2: Pretreatment radiographs

Treatment planning: The primary treatment objective was to improve the positioning of the maxillary arch, with a reduction in the dental and gingival exposure to achieve Class I canine relationships and to correct the overjet and overbite. It was decided to extract the upper first premolars and close the space by surgically with anterior segmental setback and superior positioning at the time of segmental osteotomy to reduce the overjet. In the mandibular arch the second premolars were planned to be extracted and close the space by means of temporary anchorage device (TAD) to achieve Class I molar occlusion.

Surgical cephalometric planning:

1. Incisor inclination and other presurgical objectives were simulated on an overlay tracing.
2. On another tracing sheet amount of superior repositioning and posterior setback was determined by means of prediction analysis.
3. Surgical osteotomies were simulated on maxilla.
4. Final profile tracing is done along with soft tissue changes.
5. The final expected post-treatment profile was compared with pretreatment tracing.

Treatment progress: Maxillary first premolars were extracted and initial alignment was done. Space between upper canine and first premolar was maintained for surgical closure. Lower arch was treated with minor decompensation and alignment.

Face bow transfer and mock surgery was done on Hanau's adjustable articulator. Surgical splint was made from acrylic. Orthognathic surgery was then performed with anterior maxillary segmental osteotomy.





Fig 3: Pre surgical orthodontics photos

Surgical procedure: Epker's modification³ of Cupar's method⁴ was followed for Osteotomy. The surgical procedure was carried under general anesthesia with oro-tracheal intubation. Standard vestibular incision was given in anterior maxillary region after local infiltration of Lignocaine Hydrochloride (1:200,000). The anterior wall of maxilla up to canine fossa along with pyriform aperture was exposed after subperiosteal dissection. Osteotomy was done from the first premolar region to the pyriform aperture bilaterally keeping the gingivo-periosteal flap intact and well retracted. After completing the osteotomy, the anterior segment was down fractured and superior (3mm) and posterior (5mm) repositioning was done. The osteotomized segment was fixed by means of miniplates and screws. Closure was done with absorbable sutures. No post-operative complications were observed on immediate follow-ups.



Fig 4: Photos of surgical procedure

Postsurgical orthodontics: after removal of intermaxillary fixation, surgical splint was trimmed to reduce deep interdigitations and was secured to upper arch only. Patient was advised to wear Class II settling elastics to guide mandible into position after autorotation for 4 weeks. Spaces in between upper canine and first premolar were closed and were consolidated. In lower arch the spaces of second premolars were utilized for achieving Class I molar occlusion. Temporary anchorage devices were utilized for this purpose.

Presurgical treatment took 8 months and postsurgical treatment lasted for 5 months.

Treatment results: post-treatment records demonstrated facial symmetry with proportional facial thirds, correction of gummy smile, a balanced maxillomandibular sagittal relationship and improved lip positioning. Treatment produced Class I canine and class I molar relationships, coincident midlines, a 2 mm overjet, an overbite of one-third of the incisors, and well-aligned arch forms. Skeletally, the maxillary anterior region was impacted by surgery and the mandible got auto-rotated in counterclockwise direction.

	Pre treatment	Pre surgical	Post treatment
SNA (°)	94	93	87
SNB (°)	83	82	82
ANB (°)	11	11	5
FMA (°)	26.5	26.5	25
Y-AXIS (°)	57	57	56
Lower anterior facial height (ANS-ME) (mm)	58	58	57
Upper anterior facial height (N-ANS) (mm)	40	39	36

Witt's appraisal (mm)	+2	+2.5	-2
U1-NA (°/mm)	18/4	16/4	15/3
L1-NB (°/mm)	40/10	38/9	36/6
Interincisal angle (°)	111	115	125
Nasolabial angle (°)	69	70	85
Upper lip to S-line (mm)	8	7	5
Lower lip to S-line (mm)	9	8.5	6

Cephalometric data



Fig 5: Post treatment photos

III. Discussion

Meticulous treatment planning and its execution with an appropriated treatment plan is key of success for the treatment of vertical maxillary excess. Surgical superior impaction of the maxilla is a modality chosen in cases where the vertical excess of the maxilla has caused a downward and backward rotation of the mandible and an excessive tooth exposure at rest while the lip length is within the normal range. The above patient was clearly a case for superior impaction of the maxilla. Though the length of the upper lip was normal, the patient still had excessive incisor and gingival exposure at rest. This effected the esthetics negatively. The superiorly positioned anterior maxillary segment altered the position of the mandible with changes in occlusion forces.⁵⁻⁸ Which is responsible for prevention of relapse and stability of the surgical movement.⁹ Retraction of lower anterior teeth were required to gain ideal overjet after posterior and superior positioning of anterior maxillary segment. After calculating the space, it was found that extraction of lower second premolars were sufficient for that purpose. But the entire space had to be utilized by lower anterior retraction thus making the anchorage requirement high. So, a TAD of 1.5mm x 8mm was placed mesial to the lower first molar for the aforesaid purpose. Apart from providing anchorage it helped to retract the anterior segment bodily with proper control of force vector. The upper incisor exposure of the patient at rest was much less post-operatively. But the excessive exposure of gingiva during smiling negatively affected the aesthetics.

IV. Conclusion

The case report highlights the importance of diagnosis and apt treatment planning so that problem is identified and treated accordingly. The esthetic improvement is appreciable with this approach and it requires co-ordination between surgeon and orthodontist for execution of the treatment plan.

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