

Surgical Orthodontic Correction of Class II Malocclusion with Vertical Maxillary Excess and Gummy Smile- A Case Report

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INTRODUCTION

Achieving functional efficiency, structural balance, and aesthetics has always been a threefold objective of the correction of dentoskeletal malocclusions.^(1,2) Ortho surgical correction and dentofacial abnormalities has always aimed for facial proportions which are more pleasant and aesthetic alongside normal functional occlusion. One big cosmetic concern for patients and dentists is the Gummy smile, which is the excessive display of gingiva on a full smile.⁽³⁾

In facial analysis, the vertical maxillary excess has the following characteristics: elongated lower third of the face, relative to the upper and middle thirds; exaggerated display of upper incisors at rest; lip incompetence; tendency of class II malocclusion, with or without open bite and marked gummy smile. The nose is elongated, the alar bases are narrow and the zygomatic region is generally flat. The long lower face, results in a retrognathic appearance of the jaw. Clinically, VME is categorized according to the presence or absence of anterior open bite.⁽⁴⁾

Various non-surgical treatment modalities like injection of botulinum toxin, procedures to lengthen crown or use of temporary anchorage devices (TAD's) are not accurate modalities that can treat excessive show of gums caused by vertical maxillary excess and dentofacial disharmony. LeFort I osteotomy can be considered as an ideal management for reducing the maxillary excess by repositioning the maxilla superiorly. If the gummy smile is not because of skeletal disturbance three dimensionally, anterior teeth should be intruded with the help of TADs. This use of TADs should be on the condition that the anterior aesthetic occlusal plane and smile arc are preserved. Based on the condition of the gummy smile as to how severe it is, combined ortho surgical management provides good assurance to provide betterment in the facial aesthetics and stability in the long term.⁽³⁾

"Gummy smile" is a well-known term to the dentists and more to the orthodontists. Slight exposure of the gums while smiling is acceptable most of the times. However, when gingival exposure is too much while smiling or when the lips are at rest, it becomes a matter of aesthetic concern. Gummy smile could be as a result of: excessive vertical growth of maxilla, reduced length of upper lip, incomplete exposure of anatomic crown, and a combination of these. Several nonsurgical orthodontic treatment outcomes which could be benefitted for the treatment of this excessive gingival exposure in adult patients with excessive skeletal facial problems were of no benefit to the skeletal vertical discrepancy. The surgical jaw impaction allows correction of the gingival smile, long face syndrome, certain types of skeletal open bite and labial sealing. The maxillary impaction results in self-rotation of the jaw, the mandible self-rotates to a new anterior and superior position towards the original position. The magnitude of the rotation plays an important role in planning of the treatment.

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DOI: 10.14260/jemds/2020/15

Financial or Other Competing Interests: None.

How to Cite This Article:

Sundrani A, Kamble RH, Ahuja MM, et al.

Surgical orthodontic correction of class II

malocclusion with vertical maxillary excess

and gummy smile- a case report. J.

Evolution Med. Dent. Sci. 2020;9(01):67-70,

DOI: 10.14260/jemds/2020/15

Submission 24-09-2019,

Peer Review 21-12-2019,

Acceptance 27-12-2019,

Published 06-01-2020.



PRESENTATION OF CASE

A female patient of age 22 years reported to the Department of Orthodontics, Sharad Pawar Dental College and Hospital, complaining of poor facial appearance due to forward placement of teeth and a gummy smile (Figure 1). There was no relevant familial history suggestive of skeletal Class II malocclusion, nor any significant medical history.

Clinical Examination

Extra orally in frontal view, the face of the patient was leptoprosopic with a convex profile and retruded chin. Examination of vertical facial proportions showed that there was an increase in lower anterior facial height. During speech and smiling there was full maxillary central incisor exposure with 2 mm and 7 mm of gingival show respectively. Lateral view and oblique view showed retruded mandible, a convex profile, an acute nasolabial angle, hypotonic upper lip. Clinical examination intraorally showed class-II molar relationship with a normal overbite of 2 mm and increased over jet of 12 mm (Figure 1). Her dental and facial midlines were co-incident. Pre-treatment lateral cephalograms (Figure 4a) and orthopantomogram (OPG) were taken. Cephalometric analysis (Table 1) showed a Class II skeletal base with retruded mandible and hyperdivergent vertical growth pattern and maxillary anterior proclination with proclination of lower incisors as compensation.

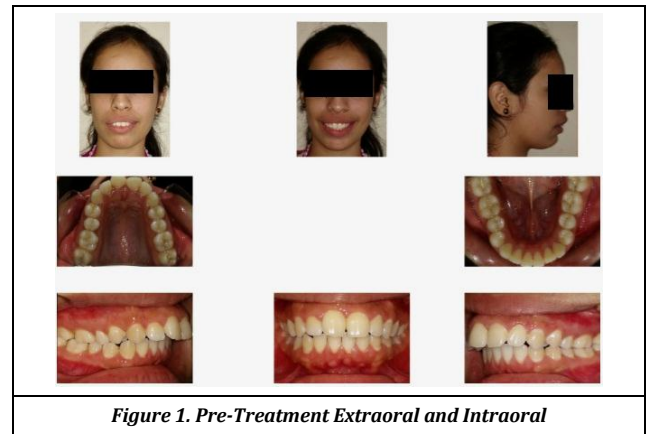


Figure 1. Pre-Treatment Extraoral and Intraoral

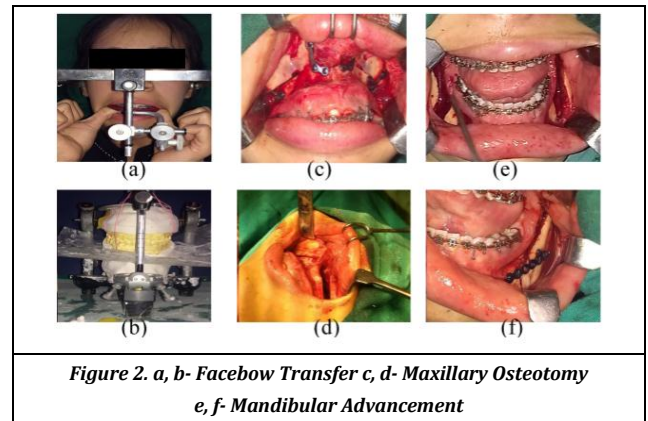


Figure 2. a, b- Facebow Transfer c, d- Maxillary Osteotomy e, f- Mandibular Advancement

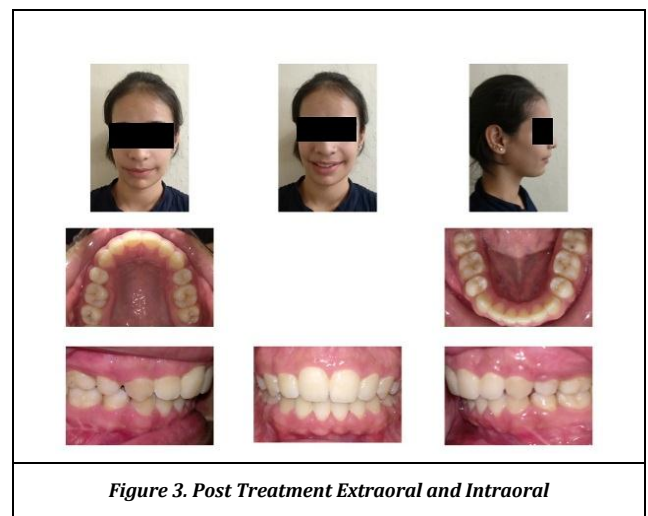


Figure 3. Post Treatment Extraoral and Intraoral

Variable	Clinical Norm	Pre-Treatment	Post-Treatment	Description
Horizontal Skeletal				
N-A-PG	0°	13°	5°	Convexity
N-A	-2.0 ± 3.7 mm	-6 mm	-4 mm	Position of Maxilla
N-B	-6.9 ± 4.3 mm	-26 mm	-15 mm	Position of Mandible
N-PG	-6.5 ± 5.1 mm	-27 mm	-19 mm	Chin position
Vertical Skeletal and Dental				
N-ANS	50.0 ± 2.4 mm	50 mm	44 mm	Anterior maxillary facial height
ANS-GN	61.3 ± 3.3 mm	70 mm	65 mm	Anterior mandibular facial height
PNS-N	50.6 ± 2.2 mm	47 mm	47 mm	Posterior maxillary facial height
MP-HP	24.2 ± 5°	35°	30°	Angle of mandible to horizontal plane
U1-NF	27.5 ± 1.7 mm	35 mm	35 mm	Distance of incisal edge of upper incisor to palatal plane
L1-MP	40.8 ± 1.8 mm	28 mm	28 mm	Distance of incisal edge of lower incisor to mandibular plane
U6-NF	23.0 ± 1.3 mm	28 mm	29 mm	Distance of mesial cusp of upper first molar to palatal plane
L6-MP	32.1 ± 1.9 mm	32 mm	32 mm	Distance of mesial cusp of lower first molar to mandibular plane
Maxilla and Mandible				
ANS-PNS	52.6 ± 3.5 mm	61 mm	61 mm	Length of maxilla
AR-GO	46.8 ± 2.5 mm	35 mm	36 mm	Length of ramus
GO-PG	74.3 ± 5.8 mm	73 mm	78 mm	Length of mandible
B-PG	7.2 ± 1.9 mm	5.5 mm	9 mm	Chin Prominence
AR-GO-GN	122.0 ± 6.9°	118°	129°	Gonial angle
Dentition				
A-B	-0.4 ± 2 mm	9 mm	0 mm	Distance of A to B on occlusal plane
MAX1-NF	75° ± 5°	63°	74°	Angle of axis of upper incisor to palatal plane
MAND1-MP	95.9 ± 5.7°	103°	94°	Angle of axis of lower incisor to mandibular plane
Cephalometric Table				

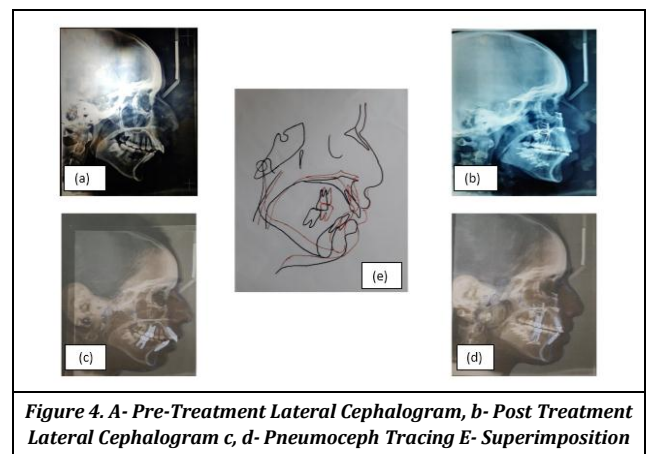


Figure 4. A- Pre-Treatment Lateral Cephalogram, b- Post Treatment Lateral Cephalogram c, d- Pneumoceph Tracing E- Superimposition

DISCUSSION OF MANAGEMENT

Treatment Objectives

1. To correct vertical maxillary excess and reduce excessive gingival display. 2. Correction of Class II jaw relationship. 3. To create a better facial profile and bring about a competent lip seal. 4. To achieve functional Class I molar and canine relationship.

Treatment Alternatives

There were two treatment options which were considered for the patient in order to reduce vertical maxillary excess- 1. Orthodontic treatment with surgical correction, 2. Orthodontic treatment without surgical correction combined with TADs for intrusion of the dental arch. As the defect in this case was large, the first alternative was selected for her.

Presurgical Orthodontics

Orthodontic treatment prior to surgery was started with 0.022×0.028 MBT prescription appliance. Levelling and aligning of both arches were done, and spaces were consolidated in both the arches. To achieve sufficient decompensation and ideal inclination of the incisors therapeutic extractions of all first premolars in both the arches were carried out, following which there was controlled retraction of upper and lower arch anterior segment with friction mechanics. Upper and lower arches were aligned up to 0.017× 0.025 SS (stainless steel wire). Lateral cephalogram was retaken and prediction tracing was done using computer image prediction. This was done by digitizing the cephalometric reference points or landmarks and the simulation of surgical repositioning. All the measurements, calculations, and analyses were carried out using Pneumoceph software. The resultant data which was obtained was included into prediction algorithms which provided single-line profile drawings that predicted the ultimate treatment objective. (Figure 4c, d). In the Maxilla, a 6 mm of superior repositioning was apt to reduce the gingival display. In the lower arch, 5 mm of anterior advancement produced a profile which was aesthetically pleasing and also lead to achievement of good posterior intercuspation. The upper and lower dental casts were mounted on a semi adjustable articulator with the help of a facebow transfer. (Figure 2a, b) Model surgery was carried out next. After repositioning the dental casts, the movements of the jaws were simulated as shown by the digital prediction. An intermediate occlusal splint made of acrylic was fabricated first with the repositioning of upper cast followed by the mandibular cast simulating the final position of the jaws at surgery. A final occlusal splint was fabricated in relation with this position.

Surgical Procedure

Le Fort I maxillary impaction was carried out initially. Modified hypotension was maintained during surgery in order to reduce blood loss. (5) (Figure 2c, d). BSSO with short buccal split was performed and mandible was advanced by 5 mm (Figure 2e,f) after compensating for the mild autorotation due to maxillary impaction.(6,7) The resected bone from the maxilla was grafted in the deficient mandible during advancement. The fixations used were of rigid type in upper and lower jaws

with the aid of miniplates and screw on either side. Intermaxillary guiding elastics were engaged on the archwire hooks for fourteen days in the immediate postoperative phase. Strict follow up was observed after the procedure.

Postsurgical Orthodontics

After achieving a satisfactory range of movement of jaw and observing adequate bone healing and tolerance, active orthodontic treatment was continued. During postsurgical orthodontics consolidation and settling of occlusion was carried out with light pink Class II elastics tied in W pattern. Arch wires were sequentially changed from 0.017× 0.025 NiTi to 0.019× 0.025 SS wires with continuation of the elastics. The amount of intercuspation present prior to surgery determines the duration of final phase of the orthodontic treatment.⁸ The treatment was completed within 7 months post-surgery (Figure 3). Post treatment radiographs were taken (Figure 4 b) and evaluated for treatment changes by superimposition (Figure 4 e). Pre- and post-treatment cephalometric values have been compared in Table 1. After detailed assessment the phase of orthodontic treatment prior to surgery was initiated with the aim of attaining ideal inter- and intra-arch coordination. Anterior face height shows variation in bimaxillary osteotomy in comparison with single jaw osteotomies, easing and stretching of the soft tissues may affect it. In most patients, such as in this case, this is performed because of an excessive lower facial height.⁽⁷⁾ Excellent surgical results have been observed when the maxilla was placed in a more superior position combined with BSSO advancement. In the long-term soft tissues follow the hard tissue during relapse so keeping this in mind and also keeping the desired profile changes in mind the amount of impaction and advancement should be planned. In this case since there was an evident VME it was decided to impact maxilla by 6 mm and BSSO advancement of the mandible was done by 5 mm as the defect present was large and good amount of overjet was present even after closure of extraction spaces. After mandibular advancement the facial profile was improved and due to impaction of maxilla the aesthetic correction was also taken care of. During the postsurgical phase there was a considerable degree of variation seen in the soft tissue contour of the nose and lip. Postsurgical orthodontics primarily involves finalization of the occlusion and retention. The amount of preparation attained during presurgical treatment governs the duration of the final orthodontic phase.⁽⁹⁾ It is extremely important to know that the dental retention achieved during presurgical orthodontics is one of the most important factors that aid in maintaining the final occlusion post-surgery, which will have positive impacts on the final hard tissue stability.

CONCLUSIONS

When the treatment is formulated in such ortho surgical cases, the most important aspect is to achieve the common objectives and also to have the outcome as expected. In order to achieve this, a multidisciplinary team approach is essential.

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