An Orthodontic-Surgical Approach to Class II Malocclusion Treatment with Vertical Growth Pattern - A Case Report

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Abstract

The traditional technique for the correction of Class II malocclusion in a growing patient is by growth modification with functional appliances. In adults Class II malocclusions are treated either by orthodontic camouflage or by orthognathic surgery. Class II malocclusions with vertical maxillary excess can be treated surgically by Le Fort I osteotomy. A female patient, age 25, came to the department with the complaint of forward positioned upper front teeth and excessive gingival display on smiling. Examination revealed a Class II molar and canine relationships with excessive overjet, and a retrognathic mandible with skeletal Class II patterns. Intraorally, the patient presented with a Class II molar and canine relationships with excessive overjet. The treatment plan was determined by a combination of orthodontics and orthognathic surgery, which was employed to correct the skeletal and dental discrepancies and also to obtain an aesthetic, harmonious facial profile. Surgery consisted of the Le Fort I osteotomy to accomplish the treatment objectives. Selections and complications in treatment objectives are described to achieve a pleasing result.

Keywords: Le Fort I Osteotomy; Class II Malocclusion; Vertical Maxillary Excess

Introduction

Patients with Class II malocclusions with protrusive maxillary teeth, deficient mandible, excess overjet and normal overbite can sometimes be successfully treated non-surgically. However, when vertical maxillary excess is seen with a gummy smile, orthognathic surgery may be indicated if camouflage treatment would not compensate for the skeletal problem [1]. In vertical maxillary excess, clinically recognizable smile features are manifested by a gummy smile, exposure of the maxillary incisors, incompetent lips, increased lower facial height and high mandibular plane angle. Such cases of skeletal Class II malocclusion require a combination of orthodontics and orthognathic surgical treatment [2]. The treatment of severe dentofacial deformities in adult patients is a challenging task for both the orthodontist and the oral surgeon. Treatment is difficult because of the skeletal and facial disharmony, absence of jaw growth and a tendency toward relapse which can be due to an unstable result after treatment [3]. The surgical orthodontic correction of vertical maxillary excess by superior repositioning of the maxilla is generally an acceptable treatment plan on the basis of skeletal stability and aesthetic soft tissue changes. The goal of present-day orthodontics is not only to bring about dental corrections but also to achieve a balance between the craniofacial structures. Surgical management of patients with significant skeletal deformities has been widely practiced worldwide [4,5]. Facial appearance acceptance is a very important factor in determining social relationships. Significant dentofacial deformities are seen to be less attractive leading to non-acceptance of an individual [6]. Differences of behavior toward attractive and unattractive people has been well documented [7,8]. This case report describes the orthodontic-surgical approach in the treatment of a female patient with vertical maxillary excess, gummy smile and a deficient mandible.

Case Report

Diagnosis

The patient, a female, 25 years of age, came to the department of orthodontics with a complaint of maxillary dental protrusion and gummy smile. Pre-treatment facial photographs showed a convex profile with posterior facial divergence. Intraoral photographs revealed a 9 mm overjet and a 1 mm overbite (Figure 1). Interlabial gap of 7 mm was present. The amount of incisor exposure during rest was 6 mm and on smiling displaying a full incisor. Upon smiling the patient showed buccal corridors caused by the narrow maxillary arch. The right and left molar relationships were Class II. The upper and lower dental midlines coincided with the facial midline. On smiling 7 mm of gingiva was visible. The maxillary lip length of the patient was short being 17 mm. Clinical examination revealed an excessively long lower facial height, large interlabial gap, excessive incisal display at rest, and an excessive incisal and gingival display upon smiling. The panoramic view x-ray showed a horizontally impacted lower right third molar (Figure 2). The maxillary right third molar and mandibular left third molar had erupted completely. The maxillary left third molar was absent. The cephalometric evaluation revealed a Class II skeletal pattern with a steep mandibular plane of 43 degrees relative to the horizontal plane and an ANB angle of 12 degrees (Figure 2 and Table 1). Patient was diagnosed to have a convex facial profile with a retrognathic mandible secondary to the vertical maxillary excess. Orthodontic treatment was recommended as a prerequisite to orthognathic surgery involving maxillary impaction and set back. The study was approved by the Ethics Committee of Saraswati Dental College.

Table 1: Cephalometric analysis.
Treatment objectives

Considering the findings with the diagnosis, it was recommended to first create a stable dentition from right second molar to left second molar in both arches. This would require the removal of the third. The patient was advised about the need to remove the impacted molar but refused this in her treatment. Treatment objectives involved providing orthodontic therapy to level and align the teeth in both arches to prepare for orthognathic surgery. With ideal upper and lower arch, the teeth could be set in an ideal position via a splint with the impaction and distalization of the maxilla when a Le Fort 1 osteotomy was performed. This would reduce the excessive gingival exposure on smiling. It would also lead to autorotation of the mandible which would improve the facial aesthetics. Dental corrections included achieving an ideal overjet, Class I molar and canine relations correct lip incompetency and provide an aesthetic and pleasing profile. A surgical prediction tracing was performed for surgical treatment planning (Figure 3). The surgery required would be maxillary superior repositioning of 6 mm and 4 mm posteriorly by Le Fort 1 osteotomy along with posterior positioning of the whole maxilla by 2 mm.

Treatment progress

Orthodontic therapy was started with an 0.022 × 0.028 Edgewise orthodontic appliance with banding of the first molars and MBT (Liberal Centron series) brackets bonded from 5-5. Second molars were not banded. Levelling and alignment was started using Niti wires. The arch-wire size in the maxilla and mandible was gradually sequenced until 0.019 × 0.025" stainless steel wires were placed. This resulted in a decrease in the maxillary anterior teeth proclination and deepening of the bite. After 10 months of pre-surgical orthodontics, a face-bow transfer was...
performed and the casts transferred to an articulator (Figure 4). A surgical splint was fabricated out of acrylic (Figure 5) and then surgery was performed. The Le Forte I osteotomy positioned the maxilla superiorly and posteriorly. The maxilla was positioned superiorly so that 2 to 3 mm of maxillary incisor exposure at rest would be seen. Surgery was performed without any complications. Correction was maintained by rigid fixation (Figure 6). Post surgery the patient recovered well and was pleased with her appearance (Figure 7, 8). After 8 months of post-surgical finishing and detailing, the patient was retained (Figure 9, 10). Total treatment time was 18 months. Permanent retention was using fixed lingual bonded retainers in both arches.

**Treatment results**

After completion of eight months of post-surgical orthodontics, an improved facial symmetry with more balanced facial thirds, an aesthetic smile and lip fullness were seen. Due to the short upper lip length lip seal was not achieved. Incisor display on rest and on smiling was improved. Superimposition of the pre and post surgical cephalometric tracing (Figure 11) showed the amount of setback of the maxillary segment and dental changes. It also highlighted the amount of superior repositioning of the maxilla along with the autorotation of the mandible. Relapse was seen with the molar and canine relation between the post surgical photos and photos after debonding. The molar relation had

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**Figure 3:** Surgical prediction tracing. Maxilla need to be placed superiorly by 6 mm from its anterior half, 4 mm superiorly from posterior half and 2 mm forwardly.

**Figure 4:** Face bow transfer and articulation of pre-surgical casts.

**Figure 5:** Surgical splint fabrication.
relapsed to end on relation as it was at the start of treatment. The canine relation after surgery was Class I but after debonding it relapsed to end on. The overjet after the surgery was ideal 1 mm but after debonding relapse took place and a significant increase in overjet was seen. This shows the limitations of orthognathic surgery in relation to dental corrections. Some amount of relapse may occur after any surgical procedure. In this case, it occurred between the surgery and debonding. Planning over-correction would be a possible treatment objective to overcome the possible relapse but this is difficult to determine.

Discussion

Two treatment plans were presented prior to beginning treatment. The first plan was orthodontic therapy alone by the extraction of all first premolars and retraction of incisors. The main drawback of this plan was dental goals would have been achieved
Figure 8: Four months post surgery lateral cephalogram and panoramic radiograph.

Figure 9: Post treatment extra oral and intra oral photos.

Figure 10: Post treatment lateral cephalogram and panoramic radiograph.
but the gummy smile along with the vertical maxillary excess would not be corrected. The second plan was not to extract any teeth, do levelling and alignment of both the arches followed by orthognathic surgery for superior and posterior repositioning of the maxilla.

Handelman [9], reported that patients with narrow alveolar arches or severe skeletal discrepancies are difficult to correct and they demonstrate limitations in orthodontic treatment and require surgical intervention. Thin alveolar arches are found both labially and lingually to the mandibular incisors of patients with a high mandibular plane angle. It is also seen lingually to the maxillary incisors in class II high angle cases. This patient presentation had severe skeletal discrepancy along with a narrow maxillary arch. Handelman* also stated that a narrow alveolus is seen in patients with high mandibular plane angle which was seen in this case. Orthodontic correction would have been difficult in this case especially in the mandibular anterior region and chances of iatrogenic damage would have been high.

Wessberg et al [10], mentioned that occlusal programming feedback mechanism operates within the CNS mediating the compensatory autorotation of the mandible after surgical superior repositioning of the maxilla. When planning for superior repositioning of maxilla the orthodontist must decide based on aesthetics and cephalometric prediction criteria, the amount of autorotation required and the effect of this rotation towards the desired ideal occlusal and aesthetic results.

Superior repositioning of the maxilla is frequently performed. It is a useful method for treating patients with vertical maxillary excess. The relationship of the upper lip line to the incisor is the most important factor in planning treatment that will achieve an attractive smile. Superior repositioning of the maxilla will lead to autorotation of the mandible with the condyle as the centre of rotation. In this case, superior repositioning of the maxilla autorotated the mandible which lead to an improved facial profile, without performing mandibular surgery like of mandibular advancement (BSSO) or genioplasty. In treating a patient surgically the retention and stability of the surgical procedure is essential. With rigid fixation (IMF), the maxilla is very stable during the first year after superior repositioning to prevent any clinically significant relapse [11]. In this case, however dental relapse was evident in the molar; canine relations. This indicated the limitations of orthognathic surgery having the possibility of relapse even though superior repositioning of the maxilla falls into the more stable category of surgeries. Also, soft tissue changes noted after one year of surgery are likely to remain stable for the next six years [10]. This stability is hopeful for the results achieved in this case.

**Conclusion**

This case report highlights the importance of careful diagnosis, appropriate treatment planning, surgical methods and techniques so that the malocclusion is identified and treated in the right manner. There were some limitations in the treatment result. The patient’s short upper lip was a factor in achieving a more improved lip seal. Relapse in many dental parameters such as overjet canine and molar relation occurred. The aesthetic improvement achieved with this treatment approach is acceptable and it requires a good understanding between the orthodontist, the maxillofacial surgeon and, most importantly, the patient.

**References**


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