# Skeletal Bimaxillary Protrusion: Combined Surgical and Orthodontic Approach – A Case Report

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## Abstract

Bimaxillary protrusion is one of the commonly seen skeletal deformity in Indian population. This skeletal condition is typically characterized by proclined and protruding anterior teeth with everted lips. If this condition is associated with macroglossia or any parafunctional habits like tongue thrusting or thumb sucking, an anterior open bite is often found. Minor discrepancies can be managed by orthodontic treatment alone by extracting all first premolars and retracting the anterior segment. But in severe skeletal cases, orthognathic surgery along with pre-and post-surgical orthodontics is the best option to get the ideal result. This article describes the case of a female patient with bimaxillary protrusion. The patient had a convex profile, anterior open bite, and incompetent lips. Chin had a relative deficiency with hyperactive mentalis muscle. On patients' consent and willingness for a shorter course of the treatment period, surgery first approach was planned. Within seven months of the total treatment period, a remarkable change in facial profile and a pleasing anterior occlusion was achieved.

***Keywords:*** *bimaxillary protrusion, anterior segmental osteotomy*

## Introduction

Bimaxillary protrusion is one of the commonly seen skeletal deformity in Indian population. This skeletal condition is typically characterized by proclined and protruding anterior teeth with everted lips. Lip incompetency, excessive gingival show and hyperactive mentalis muscle may also be found in this condition. Aesthetic correction in this group of patients is of primary concern. Minor discrepancies can be managed by orthodontic treatment alone by extracting all first premolars and retracting the anterior segment back. But in severe skeletal cases, orthognathic surgery is the only option to get the ideal result. Moreover, the conventional orthodontic treatment is more complicated in adult patients due to difficulty in achieving desired tooth movement, longer treatment time, compliance of the patient, different societal requirements from the patients' side and risk of worsening of periodontal status [(1)]. Cohn-Stock has been credited for reporting first anterior segmental osteotomy in the maxilla in the year 1921 [(2)]. After him, various modifications to the procedure depending upon the type of incision, degree of osseous movement and rotation of the osteotomized segment was reported. Until 1942 only anterior maxillary segmental osteotomies were performed. In 1959, Kole popularized this technique for both maxillary anterior and posterior segments [(3)]. Single-stage set-back osteotomy through a vestibular approach was first described by Wassmund [(4)]. Wunderer presented an important improvement of Wassmund's technique by recommending a predominantly palatal approach, which simplified the procedure [(5)]. In his technique, the palatal flap was

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raised and bony cut through the palatal aspect is made. Buccal soft tissue pedicle is kept intact for vascularity of the osteotomized segment. Down-fracturing concept was given by Bell in which the anterior segment was approached through a horizontal vestibular incision [6]. Despite aforesaid modifications, risk of necrosis of the osteotomized segment and devitalization of teeth persist. To overcome these shortcomings, the European craniomaxillofacial surgeon's Congress modified the technique for anterior maxillary osteotomy in the year 1996 in Zurich [7]. According to this modification, a horizontal incision from canine to the canine is given. Maintaining the soft tissue pedicle over the extraction socket, the vertical bone cut is given bicortical and joined by a horizontal cut 5mm above the canine root tip. The osteotomized anterior segment is then pushed back to the extraction space posteriorly. Further, a clockwise rotation of the segment is advised to counter the unaesthetic senile appearance. Choi et al. reiterated a clockwise pivotal rotation along with setback for the maxillary anterior segment to prevent the aged appearance [8].

Hullihen is credited to first describe the anterior mandibular subapical osteotomy in the year 1849[9]. Hofer made this procedure popular by recommending its use for dentoalveolar set-back as well as advancement. Kole advocated this osteotomy to treat anterior skeletal open bite by the interposition of a bone graft taken from the lower border of the mandibular symphysis [3]. McIntosh in the year 1974 described the total mandibular alveolar osteotomy for correction of anterior open bite. [10] In the present case, a bijaw anterior subapical osteotomy with the clockwise pivotal rotation of the maxillary segment was performed and a satisfactory improvement in facial aesthetics post-surgery has been achieved.

## Case Report

A 22-year old adult female reported with the chief complaint of forwardly placed upper and lower front teeth. On extraoral examination, the profile was convex with an acute nasolabial angle, lip incompetence and a deficient chin point. On intraoral examination, maxillomandibular protrusion with anterior open bite was seen. There was Class I molar and canine relationship bilaterally. The excessive display of gingiva was evident in smiling. (Fig.1 and 2) Treatment objectives were alignment and levelling of both arches and surgical retraction of the maxilla and mandible with anterior sub-apical osteotomy. The patient was advised for orthodontic correction of the maxillomandibular protrusion with the extraction of all four first premolars followed by retraction of anteriors in both the arches. Due to social obligations, the patient wanted early results, so the patient was advised for a surgical correction first and brief settlement later.

Before surgery, the patient's radiograph and articulated casts were evaluated. As the patient had class I molar and canine relationship without vertical maxillary excess, with anterior open bite, so the problem area to be addressed was anterior segment only. The occlusal plane was divergent from the canine region leading to anterior open bite. Despite having a potentially competent lip patient was unable to close her lip. Anterior sub-apical osteotomy (ASO) was planned with the extraction of all four first premolars with set back and clockwise rotation of the maxillary and counterclockwise rotation of the mandibular anterior segment to correct open bite and protrusion.

The above treatment plan was discussed with the patient and her relatives highlighting a probable course of postoperative events like swelling, temporary paresthesia due to nerve injury, and a period of intermaxillary fixation. Psychological counselling of the patient was done with Visual Treatment Objective (VTO) for better acceptance of postoperative results.

The maxillary vestibular incision from canine to canine region was given, the mucoperiosteal flap was being raised superiorly. Buccal and palatal tunnelling was done on both the sides as in Wassmund's technique. Osteotomy cut was given 5 mm above the canine root apex up to the first premolar region. Buccal and palatal cuts were given through the mucoperiosteal tunnels. With fine osteotome, all the cuts were completed, and down fracture of the maxillary anterior segment was done. Around 6-7 mm of bone was removed from both the posterior aspect of the osteotomized maxilla, and it was repositioned posteriorly with a slight amount of clockwise rotation. In the mandibular arch, the above procedure was repeated with counter-clockwise rotation to correct the open bite (Fig.3)

After completion of the treatment, there was no anterior open bite with nearly ideal overjet and overbite. There was a reduced amount of gingival show on rest and smiling. Preoperatively patient was unable to seal her lip due to the skeletal defect, which improved drastically thus improving the facial esthetics. (Fig. 4 and 5)

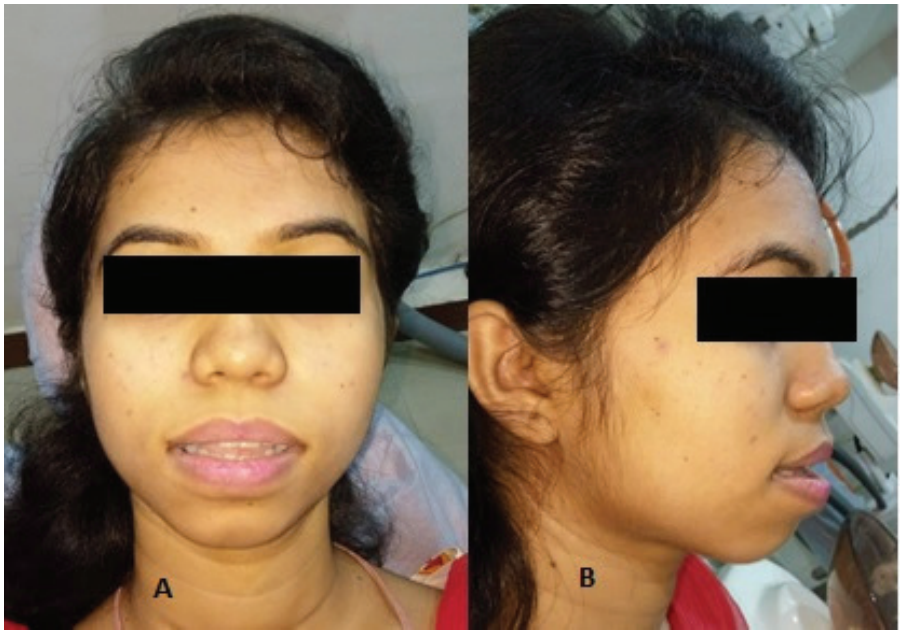


**Figure 1 Preoperative view. (A) Frontal (B) Profile.**

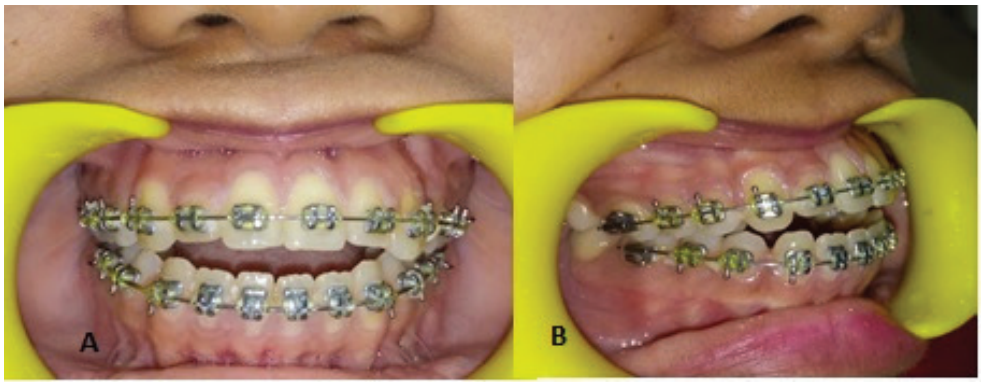


**Figure 2 Preoperative intraoral view (A) Frontal (B) Profile**

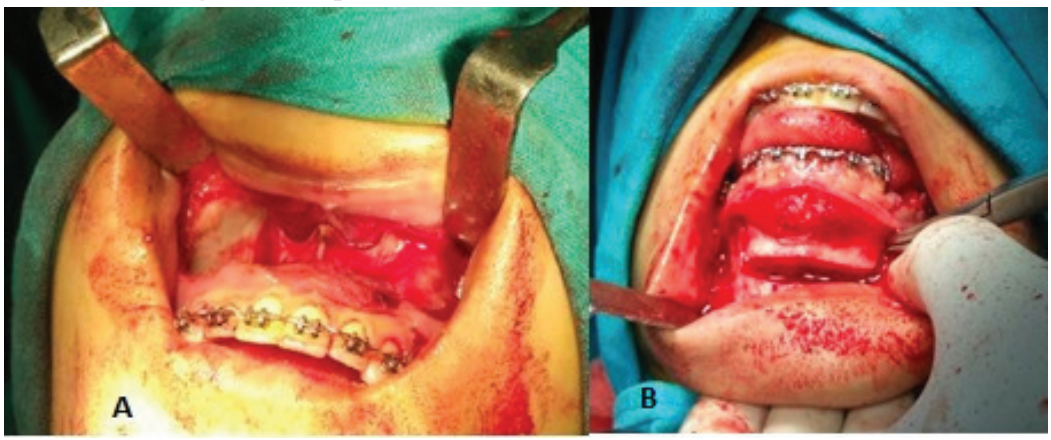


**Figure 3 Intraoperative View**

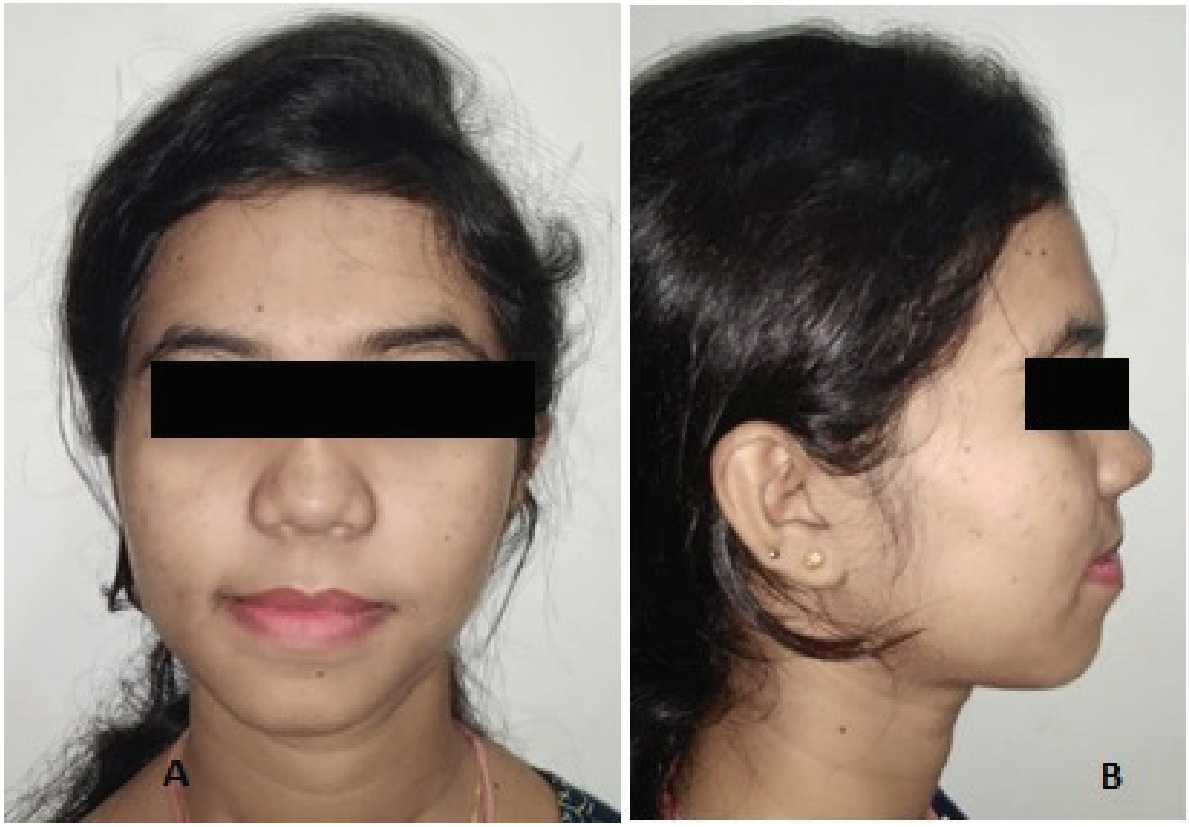


**Figure 4 Postoperative view. (A)Frontal (B) Profile**

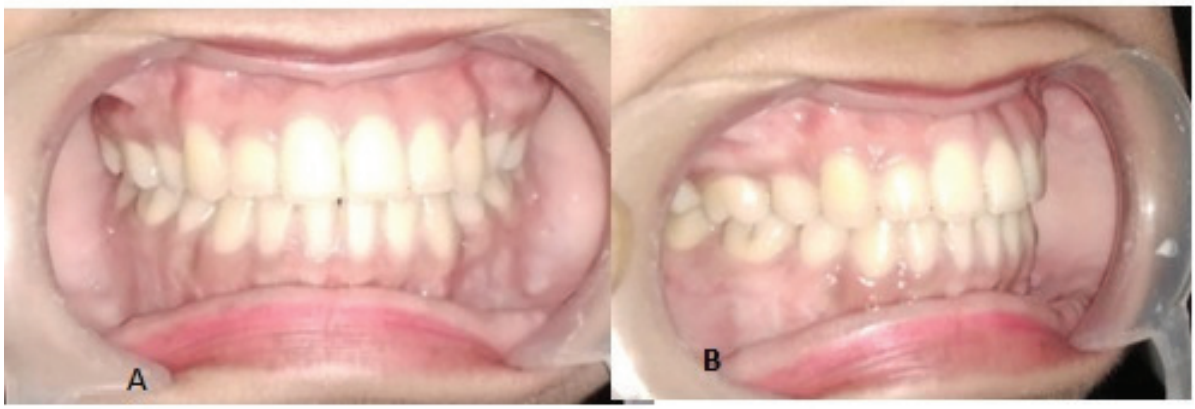


**Figure 5 Postoperative intraoral view (A) Frontal (B) Profile**

## Discussion

Anterior segmental osteotomy is prescribed in cases where the considerable movement of the anterior tooth segment is required, but tooth repositioning by orthodontic treatment alone is not possible. Reason for the difficulty in orthodontic treatment alone being the age of the patient making the physiologic movement of teeth considerably difficult, the extent of tooth movement required, periodontal status and duration of treatment [6,11]. In our case although all parameters were favourable for the orthodontic treatment, the patient insisted on fast treatment results, so she was advised for surgical correction. As the patient has anterior open bite along with bimaxillary protrusion, the osteotomized segments were counterclockwise rotated as suggested by Choi et al [8].

Any orthognathic surgical procedure deals with the facial harmony between soft tissue and hard tissue, thus the basic understanding of the facial musculature and effect of change in bony architecture should be considered in treatment planning. The changes anticipated after the surgery should be analyzed on macro as well as the micro aesthetic level to obtain pleasant and harmonious anatomy. The effect of age change on the soft tissue drape on the face is of vital importance. As we grow older, the lip coverage on the anterior teeth increases and teeth exposure decreases. Due to loss in tissue turgidity, the lips become saggy and muscles become relatively inelastic. These tissue changes result in the lengthening of the philtrum and deepening of the nasolabial fold. In any maxillofacial surgery, if the teeth exposure is severely decreased, then the face will look older [12,13]. In anterior segmental osteotomies, these soft tissue changes pose a significant challenge and thorough planning of the case before the surgery is mandatory.

Substantial increase in nasolabial angle and prominence of mentolabial fold was evident after correction of maxillary protrusion and open bite. A relative deficiency of chin was not addressed during surgery, as a setback and counter-rotation of the mandibular anterior segment made the lower lip fall back from its original position thus accentuated the chin prominence. With the correction of bimaxillary protrusion, there was a change in facial profile from convex to straight. The patient was satisfied with the change in esthetics and the result of treatment. The patient's psychological and social wellbeing was improved.

## Conclusion

Anterior subapical osteotomy is a versatile orthognathic procedure which can correct the severe dentoalveolar discrepancy in a shorter period. Thorough preoperative planning between the surgeon and the orthodontist is crucial in formulating an effective, patient-specific treatment plan. Adult patients with severe malocclusion, poor periodontal health and desire to have a shorter course of treatment can be good subjects for this surgical procedure. The surgery is simple, with minimal complications and relapse rate. Soft tissue changes in response to the surgery are also very predictable and remarkable. In our case, the result obtained was highly favourable concerning interarch relationship, aesthetic outcome and patient satisfaction.

**Conflicts of Interest:** NIL

**Source(S) Of Support:** NIL

**Ethical Issues**: NIL

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