Treatment of a periodontally compromised adult patient with severe bimaxillary protrusion
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Abstract
This paper reports the management of a periodontally compromised adult male with convex profile, proclined upper and lower incisors and severe lip incompetency with a combination of orthodontics and orthognathic surgery.

Key Words: Bimaxillary protrusion; Facial profile; Orthognathic Surgery

Introduction
During recent times, the number of adults seeking orthodontic treatment has increased significantly.(1,2) Treatment of periodontally compromised adults with a skeletal Class II occlusion has always been a clinical challenge with alveolar bone loss.(3-7) In addition, the loss of attachment will relocate the center of resistance further apically, which affects the moment generated by a respective force.(8-10) Thus, biomechanics in a periodontally compromised patient differ from a healthy one, requiring lighter forces and relatively larger moments.(11-12)

Treatment alternatives to correct a skeletal Class II in adults are orthodontic camouflage and combined orthodontic-orthognathic surgery therapy.(13) The final decision depends mainly upon the severity of the malocclusion and the amount of required tooth movements.(6,13,14) If the skeletal discrepancy is beyond the boundaries of camouflage, any dental compensation may produce a reasonably good occlusion16 but only at the cost of compromised facial esthetics.(4,15) This paper reports the management of a periodontally compromised adult male with convex profile, proclined upper and lower incisors and severe lip incompetency with a combination of orthodontics and orthognathic surgery.

Case Report
A healthy, 26-year old male reported to the orthodontic clinic with the complaint of forwardly placed upper and lower front teeth. His family history revealed that his mother had a similar malocclusion. On extra oral examination, the patient showed a dolicho facial pattern with convex profile, acute nasolabial angle and severe lip incompetency. Intra oral examination revealed severely flared anterior teeth in both arches. Both sides revealed class I molar and class I canine relationship with an over jet of 5-mm, overbite of 3-mm and a curve of spee of 3mm. Both arches were U-shaped, showing crowding owing to the rotations. The facial and maxillary dental midline coincided, lower midline shifted to left by 2 mm (Figure1). The pretreatment cast also showed the dental relationship.

The panoramic radiograph showed the presence of all permanent teeth except 38 and a horizontal impaction of 48. The cephalogram revealed a skeletal class II relationship with an average growth pattern. The dental analysis showed proclined maxillary and mandibular incisors and an increased anterior dental height in both arches.

Treatment objectives are a) periodontal Flap surgery to eliminate existing pockets and thus achieve a favorable periodontal environment for good oral hygiene with a regular follow up. b) alignment and leveling of both arches, c) on table extraction of the maxillary first premolar with anterior maxillary osteotomy and extraction of mandibular first premolar with sub-apical osteotomy, d) to achieve optimal facial esthetics, and to obtain an optimal over jet-over bite relationship, e) correction of the Bolton discrepancy and f) finishing and detailing.

Treatment: Open flap surgery with root planning was performed on the mandibular anteriors from canine to canine and in mandibular first molars on right and left sides. The patient was motivated for intensive oral hygiene care and recalled periodically for follow-up. When the gingival inflammation was eliminated and the probing depth reduced for three continuous months, orthodontic treatment commenced.

In pre-surgical orthodontics, a fully programmed 0.022 x 0.028-inch ROTH appliance was placed with a non-extraction treatment plan (Maxillary and mandibular arches banding and bonding was done with roth 0.022 slot appliance. The wire sequence was 0.014NiTi, 0.016NiT1, 0.017x0.025NiTi, and 0.017x0.025S.S.followed by 0.019x0.025 S.S wire in both the arches. Second molar banding with 0.017 x 0.025NiTi followed by 0.021 x 0.025 SS wire in place before surgery was
done(Figure2). Mock surgery was done on semi adjustable Hanau articulator for making the surgical splints.

Fig-2 Pre surgical intraoral photographs after alignment of teeth

During surgery, on table extraction of maxillary first premolar was done and anterior maxillary osteotomy cuts were given and the anterior maxilla was set back by 7.5 mm to close down the extraction space using the intermediate splint. Extraction of first premolar was done in mandibular arch and sub apical osteotomy cut was given to take the anterior segment back by 7.5mm to close down the extraction space using the final splint.

The post-surgical orthodontics involved the positioning of final splint and stabilizing arch wires with intermaxillary fixation done for three weeks and patient advised to wear elastics. 0.021x0.025 TMA wire with mild artistic bends was placed and settling of occlusion done with vertical elastics. For retention in both arches, a 0.018 inch coaxial 3-to-3 retainer was bonded. Active treatment lasted 16 months (Figure3).

Fig-3 Posttreatment intraoral photographs revealing class 1 molar and canine relationship with optimal over jet and over bite and mild gingival recession in mandibular anterior region

The overall changes were as follows. There was a decrease in maxillary and mandibular length, as well as a reduction of facial convexity with competent lips. Optimal overbite and over jet were achieved, crowding relieved, and all spaces were closed. Acceptable root parallelism was attained and no further bone loss occurred during the treatment. Cephalometrically there was a significant decrease in maxillary prognathism by 4 degree and mandibular prognathism by 1 degree with an ANB angle of 3 degrees. Reduction in proclination of upper incisor by 10 mm and 13 degree and in lower incisor by 14 mm and 17 degree was appreciated. Inter-incisal angle also increased to 32 degree. The soft tissue changes showed the upper lip retraction by 5 mm and lower lip retraction by 9 mm. The profile of the patient changed from convex to straight. There were no significant changes in vertical skeletal relationship. Superimpositions of the pre and post treatment cephalometric tracings show the decrease in proclination of upper and lower anterior teeth with a normal inter-incisal angle without any change in molar relationship.

Discussion

The facial changes resulting from treatment were profound and improved the patient’s self-image significantly. Many retrospective studies have been done to evaluate soft and hard tissue changes following anterior segmental osteotomy on the maxilla and mandible. The results were as follow.(16,17) a) through segmental osteotomy technique, the upper lip was moved backward at a ratio of 67% to the upper incisor with the posterior movement of the anterior maxilla, b) the lower lip moved at a ratio of 89% to the lower incisor, c) the nasolabial angle was increased by an average of 14.1°, d) although the nasal change could be kept as small as possible, slight widening of the nasal width and anti-tip rotation of the nasal tip were observed and e) the philtrum length was increased, while lip thickness and lip width were decreased.

The same amount of upper lip changes are not possible with first premolar extraction and camouflage treatment because point A does not move back by the same distance as the teeth. Moreover, some premolar extraction space can also be lost due to mesial movement of the posterior segment, although use of absolute anchorage has removed this limitation to a great extent. In contrast to camouflage, the entire premolar extraction space can be utilized for retraction of anterior segment through anterior segmental osteotomy. The posterior impaction of the entire maxilla through Lefort I osteotomy would have changed the molar relation, which was undesirable in the present case. So for optimum changes in the nasolabial angle and upper lip-lower lip relation, anterior maxillary osteotomy with anterior segmental setback was the ideal procedure for this case.

Even in the mandibular arch, first premolar was extracted and subapical osteotomy cut given to take the anterior segment posteriorly. The lower lip followed the incisors and was retracted by a considerable distance. In general, adults1 with normal periodontal tissues but also those with reduced but healthy periodontal tissues can undergo comprehensive orthodontic treatment without incurring any greater risk for accelerated periodontal breakdown. However this requires that these patients first receive periodontal treatment before orthodontic therapy to arrest active disease. Secondly monthly recalls for plaque removal during orthodontic treatment and finally a subgingival debridement at 3-month intervals during
orthodontic treatment to maintain gingival tissue health is necessary. (1, 11, 18-20)

The rationale for a 3-month periodontal maintenance schedule is based on the observation that repopulation of subgingival pathogenic bacteria generally occurs 6 to 8 weeks after all pockets were thoroughly cleansed. A problem arises during the 6 to 8-week period of intermaxillary fixation where plaque removal is more difficult. This patient was highly motivated and maintained his periodontal health with various plaque control measures including chlorhexidine mouthwash.

**Conclusion**

Periodontally compromised adult patient with severe bimaxillary protrusion beyond the boundaries of orthodontic camouflage treatment was treated successfully by orthodontic-orthognathic surgical therapy. There was drastic improvement in facial profile with decreased proclination of upper and lower incisors to the jaw bases. Profound improvement in patient psychology with an improved functionally stable occlusion was achieved.

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