

Class III Correction with Bone Anchored Maxillary Protraction: A Case Study

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ABSTRACT

Background: Maxillary protraction is mainly indicated in patients with skeletal class three malocclusion with deficient maxilla. When a conventional face mask therapy, with tooth borne anchorage is used to protract the maxilla, it causes some amount of dental anchorage loss apart from the skeletal effects. Thus, the use of miniscrews and miniplates have become popular as source of anchorage. This case report describes the treatment of 15-year old girl with class three malocclusion due to deficient maxilla, using miniplates. The patient was treated with fixed appliance subsequent to maxillary protraction with miniplates. Two L shaped titanium miniplates were inserted in the anterior part of mandibular in the canine region. Class three elastics were worn from vestibular hook of upper bonded RME appliance to miniplates in the lower arch. The results showed an increase in SNA and ANB angles by 3° and 2° respectively. The occlusion and facial profile also improved. This Orthopaedics treatment provided a satisfactory outcome by improving the overjet. The treatment also eliminated undesirable dentoalveolar effects produced by the conventional facemask therapy. Thus, bone anchored maxillary protraction serves as an efficient method to correct the class three malocclusion.

Keywords: Bone anchored maxillary protraction, miniplates.

INTRODUCTION

Tooth-borne anchorage devices have been used commonly to transfer the protraction force to the maxilla in patients with skeletal Class III malocclusion due to maxillary retrusion. These methods cause tooth movements besides the skeletal effects.[1,2,3,4] However, the major aim of the protraction is to correct maxillary discrepancy with a skeletal alteration rather than the teeth. Skeletal anchorage became popular to transfer orthopedic forces directly to the maxilla.[1] This case report presents the effects of maxillary protraction with miniplates.

Diagnosis: A 15 year old girl reported with a chief complaint of forwardly placed lower jaw with no significant medical or dental history. Clinically, the

patient presented with a concave profile, anterior crossbite, retrusive nasomaxillary area and upper lip. An Angles class III malocclusion and crowding in the upper arch. The cephalogram showed skeletal Class III malocclusion due to retrognathic maxilla and orthognathic mandible, and low mandibular plane angle [Table 1]

CASE REPORT

In this report, a maxillary deficiency case was treated with elastic traction using miniplates for protraction of maxilla and was followed by fixed therapy.

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Table 1: Cephalometric measurements.

PARAMETER	PRE- TREATMENT	POST-TREATMENT
SNA	75°	78°
SNB	81°	79°
ANB	- 6°	- 4°
SND	74°	75°
MANDIBULAR PLANE	20°	27°
Up 1 - NA	6mm,41°	9mm,51°
Low 1 - NB	2mm,11°	2mm,11°
Inter-incisal angle	133°	115°
Facial angle	92°	99°
Angle of convexity	-18°	-12°
AB plane angle	19°	10°
N I Point A	-4mm	+2mm
N I Pog	10mm	9mm
Saddle angle	126°	120°
Articular angle	134°	151°
Gonial angle	122°	116°
Basal plane angle	15°	21°
Upper incisor to A-Pog	4mm	4mm
Upper incisor to SN	117°	125°
Lower incisor to A-Pog	5mm	2mm



Fig 1: Pre treatment photographs.

TREATMENT OBJECTIVES:

Phase I: To bring about maxillary protraction, improve profile and to obtain a positive overjet.

Phase II: Dental corrections with fixed appliance therapy

TREATMENT ALTERNATIVES:

Three treatment options were considered for maxillary advancement. The first option was to take advantage of the sutural growth potential by applying extraoral force with a face mask, the second option was to protract the maxilla via rigid skeletal anchors. And the third option was to delay treatment until growth has ceased and to correct the relationship by orthognathic surgery.

TREATMENT PLAN:

The first option was not considered since the patient was 15 years of age. The second option was more appropriate, as the patient was in the early permanent dentition. Furthermore, compliance is better with skeletal anchors as an extraoral appliance would be eliminated.

TREATMENT PROGRESS:

Rapid maxillary expansion (RME) Protocol:

Treatment began with the placement of a bonded maxillary expander to which were attached vestibular hooks extending in an occlusal direction. The patient was instructed to activate the expander once daily for a period of 10 days prior to the placement of bone anchors in the mandible (Fig 2)



Fig 2: Bonded rapid maxillary expansion appliance.

Surgical and Orthopaedics protocol of bone-anchored maxillary protraction

L-shaped titanium miniplates were inserted in the anterior mandibular region and stabilized with 3-titanium screws (diameter 1.2 mm; length 10 mm) per side [Figure 3]. The curved arm of the miniplate was exposed to the buccal side between lateral incisor and canine for elastic traction. One month after insertion of miniplates, the patient was instructed to wear eight ounce elastics extending from the vestibular hook in the posterior maxillary segment to the miniplates in the anterior mandibular region. The force exerted was 200 grams per side. Lateral cephalogram was taken before treatment (T1) (fig 4) and after a positive overjet was obtained (T2).



Fig 3: OPG showing L shaped miniplates between mandibular lateral incisor and canine bilaterally.



Fig 4: Pre-treatment lateral cephalogram.

TREATMENT RESULTS:

Forward movements of A-point by three mm was observed. While intermaxillary relationship was

improved mainly by maxillary protraction, restraining effects on mandibular growth was also recorded in the case. Mandibular plane angle increased slightly. Overjet improved to one mm. Position of maxillary incisors remained unaffected while mandibular incisors were retruded. Slight mesialization of maxillary molars was also observed.



Fig 5: Post protraction intraoral photographs.



Fig 6: Post fixed appliance treatment extra oral and intraoral photographs.

Miniplates have been widely used for the treatment of skeletal Class III malocclusions and can be placed in several areas. Some researchers applied protraction forces from miniplates at the lateral nasal wall of the maxilla to the facemasks. In contrast, Cevitanes et al and De Clerk et al accomplished maxillary protraction using intraoral elastics from miniplates placed at the infrazygomatic crests to the miniplates placed in the mandibular symphysis area bilaterally.[1,5] The lack of need for extraoral appliances in this study might have favorably affected compliance to wearing intermaxillary elastics. The comparison of the pre and post protraction cephalometric data showed highly significant maxillary advancement (approximately three mm). This suggests that the maxillary bone as a whole moved forward as a result of treatment. The combination of the changes in both jaws resulted in marked improvement of the intermaxillary relationships.

Over several years, bone anchored maxillary protraction (BAMP) without corticotomy or osteotomy with the use of class III elastics between miniplate skeletal anchorage in the upper and lower jaw was introduced. With this approach, an extraoral face mask is no longer needed and intermaxillary traction can be applied 24 hours a day. Vertical changes were better controlled with bone-anchored maxillary protraction which was concomitant with bone-anchored facemask studies.[1] In contrast with this, some authors reported significant posterior rotation of mandible and decrease in SNB angle by the conventional facemask treatment. This difference may relate to significant anterior rotation of the maxilla.[2]

Changes in the maxilla and the mandible resulted with increases in ANB angle. This result is in accordance with the results of previous studies which aimed to correct the skeletal Class III relation. [1,4,6] Proclination of maxillary incisors and mesialization of maxillary molars are undesirable effects of the conventional facemask therapies. [3,4,6] Favorable results were achieved with bone-anchored maxillary protraction although lower protraction force was used in relatively older patients. The later start of treatment in the BAMP protocol also leads to a shorter duration of treatment because of a shorter interval between

Phase I and Phase II treatments. At the completion of BAMP therapy, the patients are ready to start comprehensive orthodontics. Further, BAMP may allow clinicians to treat patients who had not been seen at an earlier age for orthodontic consultation or for whom face mask therapy had not been successful. [7] Skeletal Class III malocclusions might be treated with bone- anchored maxillary protraction combined with fixed appliances to reduce treatment time. Yan et al. suggested that, the protraction force should be at angle of should be 20 degree to the occlusal plane in bone anchored maxillary protraction of pure translatory movement of maxilla.[8]

CONCLUSION

Bone anchored maxillary protraction (BAMP) is an alternative to surgical correction of maxillary deficiency. BAMP is an efficient method to protract the retrusive maxilla in class III patient. This orthopedic treatment provided satisfactory maxillary advancement, improvement in the overjet along with reduced unwanted dentoalveolar changes produced by facemask therapy.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

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