

Miniplate Aided Maxillary Protraction For Correction of A Class III Malocclusion: A Case Report

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Abstract

Class III malocclusion may be a result of maxillary deficiency or mandibular prognathism or a combination of the two. If the problem lies mainly in the maxilla, this problem is usually addressed by treatment modalities like the facemask therapy during growth period, wherein heavy anterior traction is applied on the maxilla to stimulate its growth and restrain or redirect mandibular growth. Although favourable changes can be achieved through this treatment option, there are problems associated with protracting the maxilla with conventional tooth-borne anchorage. These include the loss of dental anchorage, which is of concern, especially in situations in which preservation of arch length is necessary.²

In addition, tooth borne anchorage alone does not permit the application of orthopaedic force directly to the maxillary sutures. The latter effects can be eliminated or minimized by the use of absolute intraoral anchorage devices, such as miniplates.

This case report shows how miniplates can be used effectively in case of a Class III malocclusion for maxillary protraction

Keywords: Class III malocclusion, Miniplates, maxillary protraction

Introduction

Patients with a class III malocclusion involving maxillary retrusion have been conventionally treated with protraction headgear or facemask therapy. Studies have shown that in a treatment duration of 10-12 months, upto 4 mm of maxillary advancement can be achieved. This is the result of a combination of forward movement of the maxilla, downward and backward rotation of the mandible, labial tipping of the maxillary incisors, and lingual tipping of the mandibular incisors.

Tooth-borne anchorage devices are used in most of the cases, which is very likely to cause anchorage loss and this may be a major disadvantage in cases where it is vital to preserve the arch length. Also these devices do not permit the application of orthopaedic forces directly to the upper jaw. Application of force to the teeth results in dental compensation rather than a true skeletal change. It may also cause increased lower facial height. Headgear does not have a positive feedback esthetically by young adults and can be an obstruction in daily routine. Long term follow ups of maxillary protraction indicated a 25% to 33% chance of relapse.¹

In order to develop an absolute anchorage system, so as to avoid anchorage loss, several methods have been tried viz., mini-implants, miniscrews, onplants, miniplates and so on, with different success rates. Miniplates as an anchorage system are gaining popularity in recent times and have been proven successful in wide majority of cases.⁵

In this case report we wish to illustrate the use of miniplates in the mandible for correction of a class III malocclusion in a growing patient.

Case Report

Patient, Grace, a 11 year old boy had reported with the chief complaint of forwardly placed lower anterior teeth.

He showed a brachycephalic head type and a leptoprosopic facial type. The facial profile was concave with an anterior divergence. Intra oral examination revealed Angles Class III malocclusion with a reverse overjet of 1 mm and no overbite. Midline diastema of 2mm was also seen. Cephalometric findings showed a prognathic mandible with an average growth pattern and proclined upper incisors.

Based on these findings the patient was diagnosed with Class III apical bases with an average growth pattern and Angle's Class III malocclusion with proclined upper incisors.



Fig 1. Pre-treatment extra oral photographs



Fig. 2. Pre-treatment intraoral photographs.

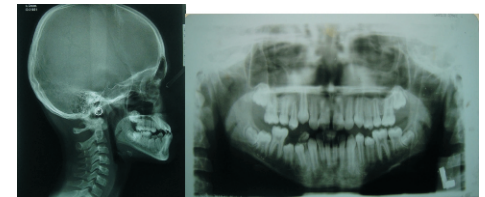


Fig. 3. Pre-treatment lateral Cephalogram and OPG

Table 1. Pre-treatment cephalometric values.

Cephalometric Values	PreTreatment
SNA	79o
SNB	81o
ANB	-2o
Angle of Convexity	-3o
Wits	6 mm
FMA (Tweed's)	28o
SN - GoGn	29o
Jarabaks	65.5%
Bjorks sum	3910
Upper Incisor to NA	38o / 6mm
Lower Incisor to NB	22o / 4mm
Lower incisor to Mand.Plane	82o
Nasolabial Angle	90o
Upper lip to E line-	1mm
Lower lip to E line	2mm

Treatment Objectives

- Achieve good esthetics and functional occlusion.
- Achieve Class I Molar and canine Relationship.
- Achieve correct overjet and overbite.

Treatment Plan

- Functional therapy
- RME in maxilla and miniplates in the anterior mandible connected with intermaxillary elastics for correction of class III malocclusion
- Leveling and aligning.
- Finishing and detailing.
- Retention

Treatment Progress

The patient was treated with a bonded rapid expansion device (HYRAX) in the maxillary arch which was cemented. This also had a bite effect opening effect simultaneously.

The miniplates were fixed to the bone in mandibular incisor- premolar area with 2 or 3 titanium screws (2.3 mm in diameter and 5 mm in length) after predrilling with a 1.6-mm-diameter bur. This procedure was done under local anaesthesia. A three week interval was given before applying elastic traction to the miniplates. Initially a force of 100g was applied to either side which was later increased to 200g/side. The patient was asked to replace the elastics daily once and wear it full time. After a period of about 9 months, the expansion device was removed.

Fixed orthodontic treatment was commenced to address the dental irregularities. Currently the patient is under chin cup therapy to counter any late mandibular growth which could reverse the favourable changes achieved, as the patient is still in growing age

Fig.4 Maxillary expansion device in place
Miniplate placement in mandible



Fig. 5. Intermaxillary elastic traction



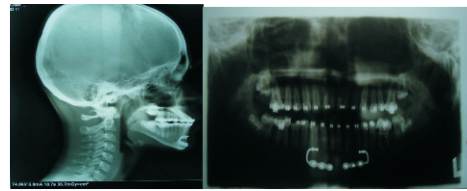
Fig. 6. Post- functional extr-oral photo-graphs.



Fig. 7. Post-functional intra-oral photo-graphs.



Fig. 8. Post-functional lateral cephalogram and OPG



Discussion

Individual growth and the timing of orthodontic or orthopaedic intervention greatly influence the success of orthodontic treatment in patients with a developing Class III malocclusion. Although mild cases of class III malocclusion, or those with mandibular shift can be successfully treated with routine orthodontic appliances, it is often difficult to decide whether to intervene early or to wait until the growth is completed, in cases of moderate to severe Class III. It is also challenging to precisely predict the extent of growth modification that can be achieved. This necessitates accurate diagnosis of the skeletal discrepancy that exists and to formulate a treatment plan accordingly.⁵

In young patients with maxillary deficiency, a combination of maxillary protraction and rapid maxillary expansion has been long used. In face mask therapy, mostly tooth borne appliances have been used which tend to apply forces along the occlusal plane and not to the centre of resistance of maxilla. The side effect of protracting along the occlusal plane is the loss of arch length due to mesial movement of the posterior teeth. Although orthodontists have tried to apply orthopaedic forces applied to the jaws, dentoalveolar compensations rather than alterations in growth were mostly responsible for the improvement seen in the dental arch relationships. To eliminate the dental side effects, titanium miniplates, shown to be well tolerated by patients, can now be used to apply the orthopedic forces.

The advantage of using miniplates as anchorage is that the maxilla as a whole moves forward with minimal tooth movement, as demonstrated in this case report. The skeletal changes with the use of miniplates are shown to be much greater and can be retained better than conventional maxillary expansion and protraction headgear combination.⁵

CONCLUSIONS

In patients with oligodontia or older patients or those in their mixed dentition, the demand on anchorage is generally high. In such cases, maxillary protraction with miniplates as anchorage is a viable skeletal anchorage system wherein when critical anchorage is demanded for orthodontic orthopaedic treatment.

Undesirable effects of conventional facemask therapy such as proclination of upper incisors and retroclination of lower incisors can be overcome at least to a certain extent with the use of miniplates. Ease of oral hygiene maintenance is facilitated and patient comfort is ensured due to the relatively simple design of the appliance

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