

## Case Report

# Management of post midface distraction occlusal discrepancy using temporary anchorage devices in a cleft patient

**N. K. Koteswara Prasad<sup>1</sup>, Syed Altaf Hussain<sup>2</sup>, Arun B. Chitharanjan<sup>1</sup>, Jyotsna Murthy<sup>2</sup>**

Department of Orthodontics, Faculty of Dental Sciences, Cleft and Craniofacial Center, Sri Ramachandra University<sup>1</sup>, Cleft and Craniofacial Center, Department of Plastic Surgery, Faculty of Medicine, Sri Ramachandra University, Chennai, India<sup>2</sup>

**Address for correspondence:** Dr. N. K. Koteswara Prasad, Department of Orthodontics, Faculty of Dental Sciences, Sri Ramachandra University, Chennai - 600 116, Tamil Nadu, India. E-mail: orthoprasad@yahoo.com

## ABSTRACT

Open bite deformity following a successful midface advancement by distraction osteogenesis is a common complication. Temporary anchorage devices can be deployed during the distraction and post-distraction settling phases for restoring the occlusion even in severe cases. The following report describes the management of severe anterior open bite following maxillary distraction.

## KEY WORDS

Maxillary hypoplasia; midface distraction; temporary anchorage devices

## INTRODUCTION

Distraction osteogenesis is an established technique for correcting the hypoplastic cleft midface with its own specific indications.<sup>[1]</sup> However, minor potentially correctable complications are not uncommon during the distraction phase.<sup>[2]</sup> Even minor discrepancies in the distraction vector or an inherent multi-dimensional defect of the cleft maxilla may cause divergence of the occlusal plane and lead to open bite tendency. The management of open bite after maxillary distraction poses a challenge to the surgeon and the orthodontist.

## CASE REPORT

A 21-year-old male with a right-sided complete cleft of primary and secondary palate who had primary surgery

in childhood at another hospital was referred to our craniofacial centre for management of his facial skeletal deformities [Figure 1]. The patient was concerned about his lower jaw being ahead of his upper jaw, misaligned teeth, and flattened face.

### Clinical findings

Examination revealed typical midface deficiency associated with cleft maxilla, which included lack of maxillary projection, flattened malar prominences, depressed nasal supratip and flared ala. Intraorally, the upper arch revealed complete collapse of the two lateral shelves with severe crowding and displacement of the upper dentition, concealing a wide anterior palatal fistula in continuity with an alveolar defect. Overall the maxilla was severely collapsed in all three-dimensional planes [Figure 1]. The discrepancy between the maxilla and mandible was 12 mm in the antero-posterior plane. The clinical and radiographic findings suggested maxillary hypoplasia in transverse and sagittal dimensions resulting in class III malocclusion with double sided cross bite

### Treatment plan

The objective of the treatment was to achieve an acceptable facial profile and dental occlusion with

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positive over jet and overbite. Treatment plan included the following, viz., correction of the maxillary retrusion by Le Fort I osteotomy; rigid external distraction; increasing the width of the collapsed maxillary alveolar arch; aligning the maxillary dentition, and closure of the oro-nasal fistula over the hard palate.

The severity of the dental crowding in the maxillary arch was not conducive for the placement of orthodontic brackets, and the short maxillary arch required lengthening, hence pre operative orthodontics was not carried out. 'Surgery first' method was adopted in this case for the same reasons. Rapid palatal expansion was not possible in this case since the expander could not be placed due to severe constriction of the upper alveolar arch in addition to the severe crowding of teeth. Considering the severity of the maxillary hypoplasia in all dimensions, maxillary distraction was performed using a standard rigid external distractor, the distractor was placed following a low Lefort I level osteotomy and activation of 18 days following a 5 day latency period. The distraction was overcorrected, as per our centre's protocol, due to the noted tendency to relapse after cessation of distraction.<sup>[3]</sup> During the phase of activation, an anterior open bite developed due to anti-clockwise rotation of the maxillary segment [Figure 2]. The anterior movement also created an increase in the transverse dimension, as the posterior wider part of the maxilla was now more anteriorly placed. Once the desired distraction result was achieved by daily monitoring of the distraction process, a consolidation period of 10 weeks was deemed optimal. After the consolidation phase, the patient was taken up for fixed appliance orthodontics, where banding and bonding of the upper arch were performed.

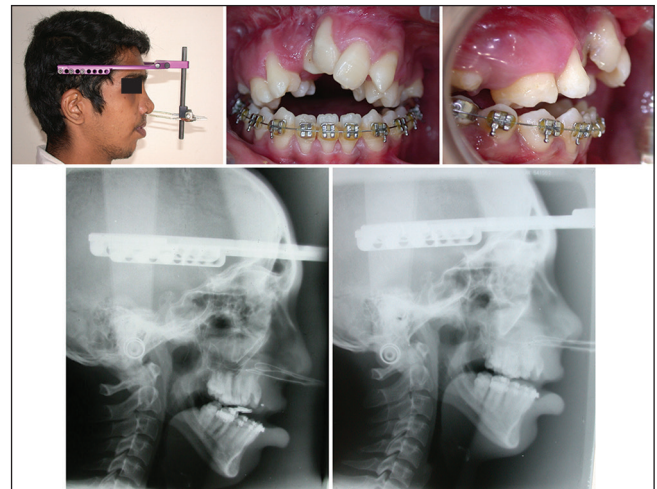
### Open bite management

The 2 mm diameter and 11 mm length temporary anchorage devices (TADs) (LOMAS, GmbH, Germany)<sup>[3-5]</sup> were placed bilaterally in the infrazygomatic crest of the maxilla. The pilot hole was prepared at 60-75° and 13-15 mm above the occlusal plane from the maxillary first molars. The TADs were loaded immediately, and elastomeric chains were engaged from the mini screw to the pre mololars and first molar teeth for intrusion [Figure 3]. The continuous force bilaterally intruded the posterior teeth within a span of 10 weeks thus reducing the divergence of the occlusal plane, and a positive overbite was achieved. [Figure 4]. The palatal fistula was closed using a tongue flap. A reasonable aesthetic and functional outcome was obtained. The maxilla was

overcorrected to 15 mm taking into account the post-treatment relapse of 25%.<sup>[3]</sup>



**Figure 1:** Pre-treatment facial and intraoral clinical presentation



**Figure 2:** Upper row: clinical photographs of post distraction showing lateral, facial and intraoral views. Lower row: pre-operative and postoperative lateral cephalograms



**Figure 3:** Intra oral views after placement and loading of temporary anchorage devices



**Figure 4:** Upper row-open bite reduction following 10 weeks of loading temporary anchorage device lower row-final aesthetic completion of treatment

The biological principles of TAD<sup>[6-8]</sup> in conjunction with management of skeletal deformity associated with cleft lip and palate is reviewed by several authors.<sup>[6-8]</sup>

## CONCLUSION

Severe skeletal and dental deformities, complicated by loss of intraoral soft tissue, pose a challenge for the surgeon and orthodontist for management of the cleft midface. A joint decision has to be taken in unison by the surgeon and orthodontist in sequencing the surgical or orthodontic intervention, anticipating complications and prior planning for its management. In our experience in this case, infrazygomatic miniscrew anchorage for intruding maxillary posteriors to counter the open bite created by external distractor has been described. Clinicians will be able to add this innovative method to

their clinical arsenal and thus minimise potential surgical reintervention.

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