

# Midface Distraction Osteogenesis in Cleft Patients: A Case Report

V K L Yeow,\**FRCS*, P K T Chen,\*\**MD*, W Y Lin,\*\*\**DMD*, C Yun,\*\*\*\**BSc*

## Abstract

*We present a case of midface distraction in a bilateral cleft lip and palate patient. The patient was a 10-year-old who underwent a high LeFort I osteotomy followed by placement of the Rigid External Distraction halo. Distraction was commenced on the fifth postoperative day at a rate of 1 to 1.5 mm per day until a total of 17 mm of maxillary advancement had been achieved. There were no complications and follow up was at 9 months post distraction. Results show that the patient had improved facial aesthetics and dental occlusion which was overcorrected to a Class III relationship. Velopharyngeal function was unaffected. Distraction osteogenesis of the midfacial skeleton in cleft patients offers the possibility to remodel not only the underlying bony skeleton but also all the soft tissues of the face and palate.*

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**Key words:** Cleft lip palate, Distraction osteogenesis, Maxillary hypoplasia

## Introduction

The aetiology of midfacial hypoplasia in patients with cleft lip and palate has been attributed in the literature to the surgical procedures used for the primary correction of these deformities. Ross<sup>1</sup> reported that approximately 25% of patients developed maxillary hypoplasia that was refractory to orthodontic management alone.

Orthognathic surgical procedures for the correction of the hypoplastic maxilla and associated Class III malocclusion have been the mainstay of treatment for impaired craniofacial growth in these patients. However, due to the soft tissue deficiency, scarring and the underlying pathology, there is a high rate of relapse giving rise to suboptimal results in the long term.<sup>2</sup> This is more apparent in children with severe Class III deformities at age 6. Longitudinal studies have shown that they typically do not improve despite orthodontic management. With subsequent growth, the clinical severity worsens making conventional osteotomy more difficult and associated with high relapse rates.<sup>1,2</sup>

Distraction osteogenesis in these patients serves to avoid both the psychosocial ramifications of early midface deformities and has the potential to produce stable occlusal and aesthetic dento-facial results.<sup>3</sup>

## Case Report

We report a case of a 10-year-old boy with bilateral complete cleft lip and palate. The lip repair was performed at age 3 months and palate repair was completed at 1 year of age. By the time the patient was ready for secondary alveolar bone grafting, it was noted that he had severe mid-facial retrusion with a negative overjet of 6 mm and a deep overbite (Figs. 1a to 1d). It was anticipated that this already significant dento-skeletal deformity would increase in severity as the child grew older. A decision was made at this point to proceed with midface distraction osteogenesis.

Via an upper buccal incision, subperiosteal exposure of the maxilla was obtained up to the inferior orbital nerve superiorly, and the pterygo-maxillary junction laterally and posteriorly.

A high LeFort I osteotomy was performed, taking care to avoid the unerupted permanent dentition. The pterygo-maxillary junction was fractured using a combination of an oscillating saw and a curved osteotome. Complete downfracture was achieved after careful completion of the osteotomy through the posterior walls. The posterior nasal spine was removed and the maxilla was completely mobilised.

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\* Associate Consultant

Department of Plastic Surgery  
Singapore General Hospital

\*\* Associate Professor and Director

\*\*\* Attending Orthodontist

\*\*\*\* Speech Therapist

Craniofacial Center, Department of Plastic and Reconstructive Surgery  
Children's Hospital, Chang Gung Memorial Hospital

Address for Reprints: Dr Philip K T Chen, Craniofacial Center, Chang Gung Memorial Hospital, 199 Tung Hwa North Road, Taipei, Taiwan.



Fig. 1a.

Fig. 1b.

Fig. 1. Ten-year-old boy with repaired bilateral cleft lip and palate, midface retrusion and severe negative overbite and overjet: a) frontal view; b) profile view; c) frontal occlusal view; d) profile occlusal view.

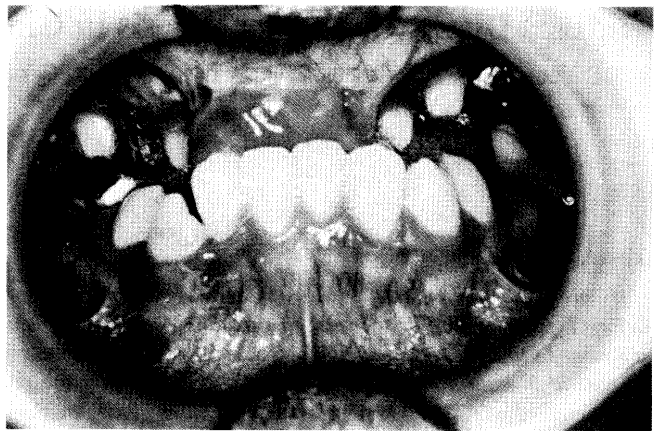


Fig. 1c

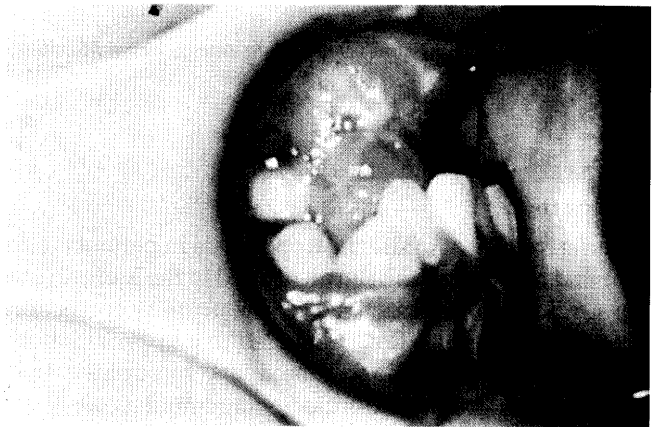


Fig. 1d

The anterior palatal naso-buccal fistula was repaired. However, the alveolar cleft was not bone-grafted. The dental acrylic splint was applied with circumdental and suspension wires. The wound was irrigated and closed.

The Rigid External Distraction halo<sup>4</sup> was then applied to the temporal regions and screwed into place.

On the fifth postoperative day, distraction of the mobilised LeFort I segment was begun via elastics attaching the dental splint to the halo frame (Fig. 2). Distraction was performed at a rate of 1 to 1.5 mm per day until maxillary advancement with an overcorrected Class II occlusal relationship was obtained. This amounted to a total of 17 mm. The appliance was left in place as an external fixator until bony consolidation was evident, radiographically 10 to 12 weeks post-surgery.

After consolidation, the halo was removed and the Class II relationship maintained by the application of a face mask worn only at night for 2 months (Fig. 3). The anterior open bite and the labial inclination of the maxillary teeth (Figs. 4a & 4b) were then corrected by orthodontia in the following months. At 9 months post-surgery, an optimal aesthetic and occlusal dento-skeletal result was achieved (Fig. 5). Velopharyngeal function was evaluated perceptually and instrumentally and was not adversely affected by the maxillary advancement.

## Discussion

Early aesthetic and functional rehabilitation is the major goal in the management of patients with cleft lip and palate. Surgical advancement of the midface by distraction osteogenesis presents an exciting and alternative treatment option in the management of severe midfacial hypoplasia in these patients. The bone growth induced by this type of maxillary advancement has the potential to provide a stable and adequate dento-facial

profile without the need for bone grafts, rigid internal fixation or intermaxillary fixation.

However, an important but as yet undefined parameter is the optimal timing of this procedure. A possible outcome of performing midface distraction early is the effect on growth of the maxilla, resulting in a Class III jaw relationship developing as normal mandibular growth continues. Therefore, in this patient, overcorrection of the deformity resulting in a Class II relationship was performed to counteract the effect on maxillary forward growth and the tendency to relapse.

In common conventional orthognathic surgery, maxillary advancement by distraction has the potential to affect velopharyngeal function. While present reports on this issue are mixed, long-term monitoring of velopharyngeal function is important.<sup>3,5</sup> Similarly, the naso-labial soft tissue changes that occur from the maxillary advancement result in a dramatic improvement of the naso-labial aesthetics.

An important feature of distraction osteogenesis is that it remodels not only the bony skeleton but also the overlying soft tissues of the face as well as the soft tissues of the palate. The simultaneous distraction of the soft tissues has the potential to reduce the relapse rate.



Fig. 2. Distraction phase showing the Rigid External Distraction halo in place.

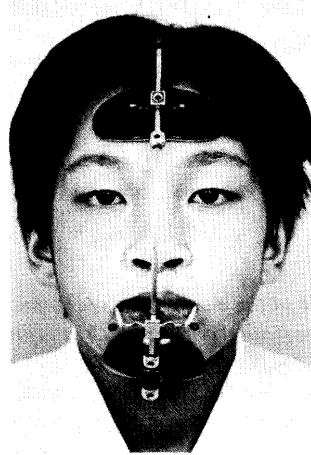


Fig. 3. Post-distraction phase with the face mask in position



Fig. 5a



Fig. 5b

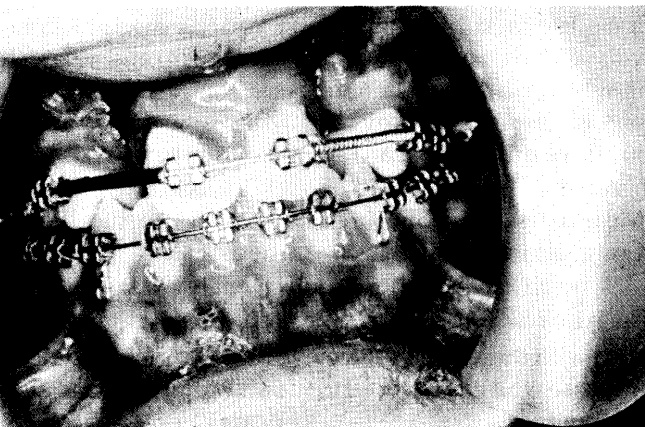


Fig. 5c.

Fig. 5. Nine months post surgical result showing good aesthetic and occlusal results: a) frontal view; b) profile view; c) frontal occlusal view; d) profile occlusal view.

As distraction techniques improve and long-term outcomes become known, the role of conventional orthognathic surgery may diminish and become



Fig. 4a.



Fig. 4b.

Fig. 4. Lateral cephalogram showing a) presurgical occlusion with dento-skeletal deformity and b) immediately post-distraction skeletal changes.

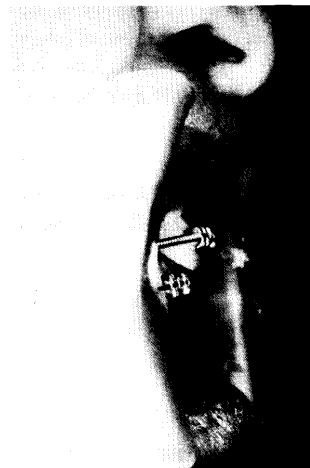


Fig. 5d.

limited to addressing distraction failures.

### Conclusion

Surgical advancement of the midface by distraction osteogenesis presents an exciting and alternative treatment option in the management of severe midface hypoplasia in cleft patients with cleft lip and palate. The surgically-induced bone growth associated with gradual maxillary advancement, has the potential to provide a stable and adequate dento-facial profile without the need for bone grafts, rigid fixation or intermaxillary fixation.

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