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Long term stability following maxillary distraction osteogenesis using rigid external distractor in cleft lip and palate patient: Case report

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ABSTRACT

Cleft lip and palate resulting in midface hypoplasia requires distraction of the midface. Rigid External Distractor (RED) has been used successfully for correction of this hypoplasia with stable results. This case reports highlights the long term followup of stability of DO using RED in a patient with cleft lip and palate.

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1. Introduction

Maxillary hypoplasia resulting in skeletal class III malocclusion is common among patient with cleft lip and palate (25%).[1] The standard approach for correction of midface hypoplasia is maxillary advancement with or without mandibular setback. Midface distraction osteogenesis (DO) as described by Polley and Figueroa,[2] advances the maxilla according to Ilizarov's principles and is employed for longer advancement especially in patients with cleft lip & palate. Because of difficult stabilization along with large discrepancies and surgical scaring, the stability of maxillary advancement with Le Fort I surgery is unpredictable and is known for high percentage of relapse (4–40%).[3]

The purpose of this case report is to highlight the stability of midface distraction in a patient with cleft lip and palate managed with Rigid External Distractor (RED) device. The results were compared immediately after distraction and in the retention phase past 1 year.

2. Case report

16 yr old patient with unilateral cleft lip & palate (left) reported tertiary care hospital for improvement in facial aesthetics. Patient had undergone lip repair, soft tissue closure of palate and alveolar grafting previously at different time intervals. Patient had concave profile with retruded and hypoplastic maxilla. Maxillary arch was constricted with missing 14, 22 & 24 (Fig. 1). Presurgical orthodontics was initiated to decompensate and level & align the arches with 022 MBT Preadjusted edgewise appliance. After 04 months, the reverse overjet increased to 6 mm (Figs.1 and 2) and midface distraction using RED device was planned. High level Le Fort surgery was performed under general anesthesia and traction wires were placed. RED device (Rigid External Distraction II System, Martin Medical, Tuttlingen Germany) was fixed after 3 days of surgery (Fig. 3). Distraction was initiated at a rate of 1 mm/day for 10 days. Consolidation period was kept for 3 weeks following which face mask traction at night was given for 6

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Fig. 1 – Pre-treatment.



Fig. 2 – Pre-surgical.

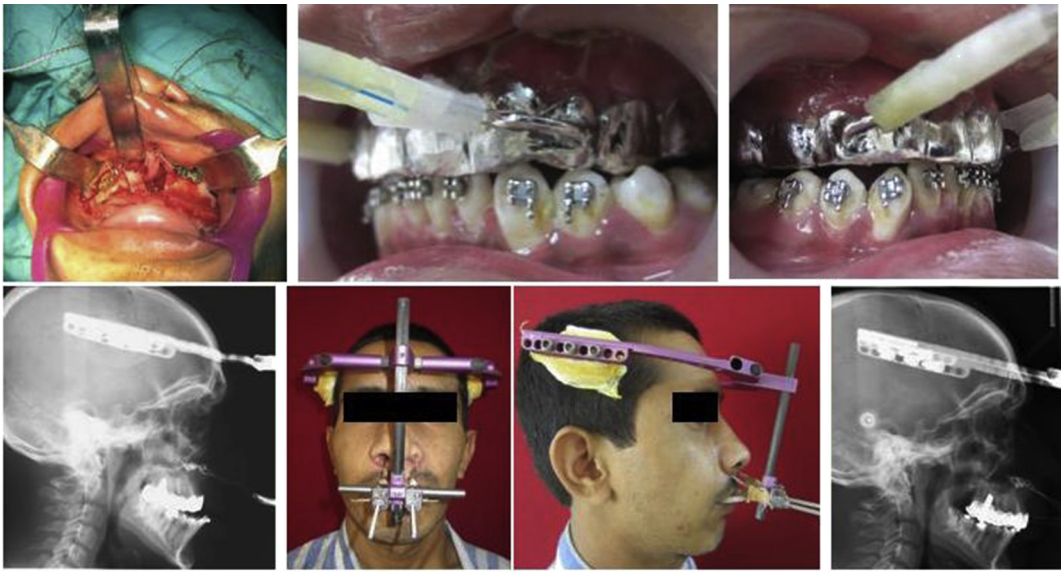


Fig. 3 – Surgical phase.



Fig. 4 – Postdistraction osteogenesis.

weeks. Postsurgical orthodontic treatment was continued for settling the occlusion. Total duration of treatment was 13 months.

3. Cephalometric evaluation

Standard lateral cephalograms were recorded after presurgical orthodontics before surgery (T1) (Fig. 2), immediately after removal of RED (T2) (Fig. 4) and one year after retention phase (T3) (Fig. 5). The cephalograms were traced using NemoCeph Studio cephalometric software (Nemotec Dental Systems). X–Y coordinate system was used to differentiate between horizontal and vertical changes of midface and maxilla. The horizontal axis (X-axis) was a line through the nasion 6° upwards from sella-nasion line. The vertical line (Y-axis) was a line perpendicular to the horizontal axis through nasion. Examined points were indicated as positive values when moved anterior and superior on X–Y coordinate and similarly negative value when moved posteriorly or inferiorly. Point A and ANS were used to record the position of maxilla in horizontal and vertical plane to calculate the skeletal correction of the maxilla and also the relapse in retention phase. Cephalometric values recorded are shown in Table 1.

4. Discussion

Distraction osteogenesis is a useful method for bone regeneration and is a popular technique for treatment of craniofacial skeletal dysplasia, commonly employed in patients with cleft lip and palate. The maxillary hypoplasia in cleft lip & palate patients is because of genotype of the patient, cleft itself or because of surgical scaring. The choice for maxillary advancement between conventional Le Fort I surgery and DO depends upon the extent of deformity. In a patient where the requirement of maxillary advancement is more than 10 mm, conventional Le Fort I surgical procedure cannot be employed.[4]

The RED device, introduced by Polley & Figueroa for treatment of severe maxillary hypoplasia,[5] is preferred over internal devices because of its advantages like large distraction in 3 planes, good vector control, predictable results with ease in application and removal of the device.[6]

In present case, a significant correction in sagittal position of maxilla was achieved with DO (change in SNA was 8.9° & ANB angle was 8.8°). The overjet reduced from −6 mm to +3 mm. The total facial height i.e. N – Me, increased by 2.5 mm, an increase in lower facial height was 2.7 mm. The



Fig. 5 – Post-retention.

Table 1 – Cephalometric comparative values.

S. no	Ceph value	Pre-surgical (T1)	Post DO (T2)	Postretention (T3)
1	SNA (°)	71.0	79.9	79
2	SNB (°)	76.9	76.5	76.4
3	ANB (°)	−5.9	3.4	2.6
4	Mand plane to SN (°)	37.3	38.5	38.6
5	Palatal plane to SN (°)	4.6	4.9	5.0
6	Overjet	−6.0	3.0	2.0
7	Nasolabial angle (°)	65.1	96.2	96
8	Na–Me (mm)	117.1	119.6	119.4
9	ANS-Me (mm)	64.5	67.2	67.0
10	Point A (mm) (X-axis)	−11	0	−1
11	Point A (mm) (Y-axis)	54.0	55.3	55.2
12	ANS (mm) (X-axis)	−9	2.0	1.0
13	ANS (mm) (Y-axis)	50.8	51.2	51.0
14	Mx1 (mm) (X-axis)	−12.0	1.0	0
15	Mx1 (mm) (Y-axis)	75.1	77.6	77.4

change in position of skeletal and dental landmarks on X-axis (Point A, ANS & Mx1) showed marked improvement and correction in skeletal disharmony. The change in position of skeletal & dental landmarks on Y-axis showed the improvement in facial height. The profile of the patient improved with improvement in nasolabial angle to 96.2°.

The cephalometric measurements were re-recorded after retention phase of 1 year to quantify relapse. Postretention relapse noticed was only 9% of the correction achieved which is clinically not significant, as ANB reduced by 0.8° and point A & ANS 1 mm. Patient is under observation in retention phase and further records will be made after 5 years to confirm the stability.

This case report highlights long term cephalometric follow-up of a patient with cleft lip and palate and showed drastic improvement in dentofacial structures with maxillary DO. The stable result with DO can be attributed to orthotrophic autologus bone formation in pterygomaxillary area.[7]

5. Conclusion

Midface distraction with RED device seems to provide a significant structural improvement for patients with cleft lip and palate. There was marked improvement in dentofacial structures and results were stable following retention phase of 1 year.

Conflicts of interest

All authors have none to declare.

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