Wide alveolar cleft and midface distraction: Report of a case

Stuti Singh^{a,*}, Divya Mehrotra^b, Chandan Gupta^a

ABSTRACT

Background: Cleft lip and palate patients often present wide alveolar cleft and midface hypoplasia. Closure of such wide alveolar clefts may be difficult using bone graft. Traditional orthognathic surgery for midface advancement shows relapse. Distraction osteogenesis (DO) as a modality for midface advancement has shown good results with external distractors. Use of internal distractor (ID) further improves patient compliance, causes minimal discomfort and offers the advantage of limiting relapse. The purpose of this study was to evaluate the versatility of intraoral distractors in midface advancement in cases with alveolar cleft.

Method: A 16 years old young girl with midface deficiency and alveolar cleft visited our outpatient clinic for aesthetic improvement and midface distraction was planned. After Le Fort I osteotomy, internal distractor was fixed. A latency period of 5 days was allowed and then distraction was started at the rate of 1 mm per day in two installments. Evaluation was done for closure of cleft, ease of the procedure, stability, and complications. Lateral cephalograms were evaluated at three stages: predistraction; post-distraction; and 1 year post-distraction.

Results: Complete closure of alveolar cleft was observed with 17 mm midface advancement and bone formation at the pterygomaxillary region. Maxillary position improved in relation to the cranial base. The results were stable even at 1 year follow-up.

Conclusion: Distraction osteogenesis using intraoral distractors was successful in alveolar cleft closure, as well as midface advancement in terms of stability of results and patient compliance with minimal complications.

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Keywords: Distraction osteogenesis, Maxillary hypoplasia, Alveolar cleft, Midface distraction, Midface advancement

INTRODUCTION

Cleft lip and palate is a common birth defect, with an average incidence of 1 per 700–1000 live births in India. Such patients may present with cleft alveolus, maxillary retrusion, a tendency towards class III malocclusion and concave profile. Critical analysis reveals the deficiencies and limitations of current management trend.¹ Distraction osteogenesis (DO) is a technique in which bone is lengthened gradually under tension after an osteotomy. The technique of DO was first described by Codivilla in 1950.² Ilizarov developed the technique further and in 1988, published his results based on more than 30

years of experimental and clinical study.³ Synder reported DO as a technique for mandibular lengthening in canine mandible. McCarthy later published the first clinical report of mandibular bone lengthening in patients with hemifacial microsomia and Nagers syndrome.³ The technique allowed for the generation of new bone between two bone surfaces by gradual distraction of callus between two vascularized bone surfaces.

Midfacial distraction has been attempted in the past using extraoral distractors.^{4,5} Wide alveolar cleft have been managed with interdental distraction osteogenesis and rapid orthodontic tooth movement,⁶ with maxillary segmental distraction,^{7,8} or using transport distraction.^{9,10}

^aResident, ^bProfessor, Department of Oral and Maxillofacial Surgery, King George's Medical University, Lucknow, India.

*Corresponding author. email: singh.drstuti@gmail.com

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The purpose of this study was to evaluate the versatility of intraoral distractors in midface advancement in a case with wide alveolar cleft.

CASE REPORT

Patient and method

A 16 years old girl visited our outpatient department of oral and maxillofacial surgery with repaired unilateral cleft lip, scarred palate and wide alveolar cleft for aesthetic correction. She presented with a concave profile with a severe midface hypoplasia, alveolar cleft 13 mm wide, scissors bite, and a class III occlusion. Initially secondary alveolar bone grafting was planned to make the maxilla stable as a single unit, and the second stage midface distraction was planned at 6 months later. Unfortunately, alveolar cleft closure using corticocancellous bone chips was unsuccessful due to infection. Patient was planned for second stage surgery for midface distraction. A deficiency of 17 mm in maxillary base length was calculated on cephalometric and model analysis. The maxillary advancement using bilateral internal distractors, was planned for aesthetics, occlusion and closure of alveolar

defect. Evaluation was done for ease of the procedure, stability, and complications (Fig. 1).

Surgical procedure

Midface advancement surgery was performed under general anaesthesia with nasoendotracheal intubation. Reference point was made by fixing a screw in the midline at naso-frontal region and vertical measurements were made. An incision was made in the buccal sulcus from first molar to first molar, 5 mm above the gingival margin. The lateral aspect of nasal cavity was exposed without perforating the nasal mucosa and posteriorly, exposure was obtained around the tuberosity. Osteotomy of the lateral wall of the maxilla was extended up to the pterygoid with the help of surgical saw. Lateral nasal wall and posterior wall of maxilla were gently tapped to complete the osteotomy. Nasal septum and vomer were separated from the maxilla using a septalosteotome and osteotomy was completed bilaterally. Internal distractors were placed parallel to occlusal plane on both sides, their functioning was checked and the wound was sutured. After 5 days of latency period, distraction was started at the rate 1 mm per day in two installments. 3 months later, at the end of consolidation period, distractors were removed bilaterally.

Fig. 1 (a) Alveolar cleft, (b) Le Fort I osteotomy for distraction, (c) bilateral internal distractors in place, (d) final closure of alveolar cleft and midface advancement.

RESULTS

Post distraction radiograph showed total 17 mm advancement and the area of alveolar cleft was closed. Class III molar relationship was changed to class I molar relationship. Anterior and posterior scissors bite got modified into a normal intercusp relation. Clinically the outcome was appealing with a considerable aesthetic improvement. Stability of results was evident in the follow up.

DISCUSSION

Cleft lip and palate is a commonly seen congenital defect. Along with a plethora of problems including speech, dental defects, and psychosocial problems, they present with maxillary hypoplasia. Studies estimate that 25–50% of all patients with cleft lip and palate need maxillary advancement.⁵ Cleft patients are difficult to treat with traditional orthognathic surgery due to scarred palate. DO overcomes most of the problems associated with conventional surgery, can be done at any age, has fewer complications, and is a better choice for cleft patients as the gradual traction force causes the formation of membranous bone and growth of soft tissue which eliminates the need for bone grafting for advancement and yields long-term aesthetic facial balance.³ ID has the merits of smaller size, better patient compliance, minimal discomfort and allows internal distraction for virtually any region of the craniofacial skeleton, in a range of 20–30 mm which is very difficult to achieve with conventional Le fort I and II osteotomies and advancement.

Wide alveolar cleft was closed successfully whilst maintaining the ideal arch form with Le fort I distraction osteogenesis without the need of bone grafting. Simultaneous 17 mm midface advancement was achieved. Significant reduction in the facial concavity by 22°, anterior movement of upper lip, and improvement of the nasolabial angle by 19.2° was observed.

CONCLUSION

Maxillary hypoplasia secondary to alveolar cleft presents a challenge to the surgeon. Maxillary DO permits a near normal correction of the midface deficiency in cleft patients with maxillary position improvement in relation to the cranial base. Further longterm studies are

recommended, with a larger sample size, randomised controlled samples, and longer follow-up to assess the relapse rate after DO in cleft midface distraction cases.

CONFLICTS OF INTEREST

All authors have none to declare.

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