

Rehabilitation of an Orofacial Cleft through Presurgical Nasoalveolar Molding with a 1-year Follow-up

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ABSTRACT

Aim: To highlight the effectiveness of Presurgical Nasoalveolar Molding (PNAM) technique and the appliance used prior to the surgical reconstruction of cleft lip and palate in newborns.

Background: In underdeveloped and developing countries, babies born with oral clefts, are generally anemic with low birth weight and may be unfit for surgery immediately. Feeding these babies is also difficult as the air leaks through the cleft and they cannot create the suction needed for suckling.

Case description: Two newborn babies, presented with unilateral midfacial clefts involving the lip, alveolus and palate.

Conclusion: The PNAM appliance enabled breast Feeding while lessening the soft tissue and cartilaginous deformity and allowing surgical soft tissue repair with minor scar formations.

Clinical significance: PNAM can reduce the surgical burden and reduce the number of surgical revisions when initiated early.

Keywords: Alveolar cleft segments, Cleft lip and palate, Feeding appliance, Nasoalveolar molding.

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INTRODUCTION

Among the 250,000 babies born each year with facial clefts, a great number are from underdeveloped and developing countries.¹ Globally, the prevalence of cleft palate is one in every 600–800 newborns, with about 27,000–33,000 clefts occurring in India alone.^{1,2} Rehabilitating cleft lip and palate requires the collaboration of various specialties, primarily involving oral maxillofacial surgery, plastic surgery, pediatrics, otolaryngology, speech pathology, orthodontics, and prosthodontics.³ In presurgical nasolaveolar molding (PNAM), the nasal cartilages and alveolar processes are repositioned to reduce the span between the clefted segments in addition to augmenting the columella.⁴



Fig. 1: Prenasoalveolar molding therapy at 10 days

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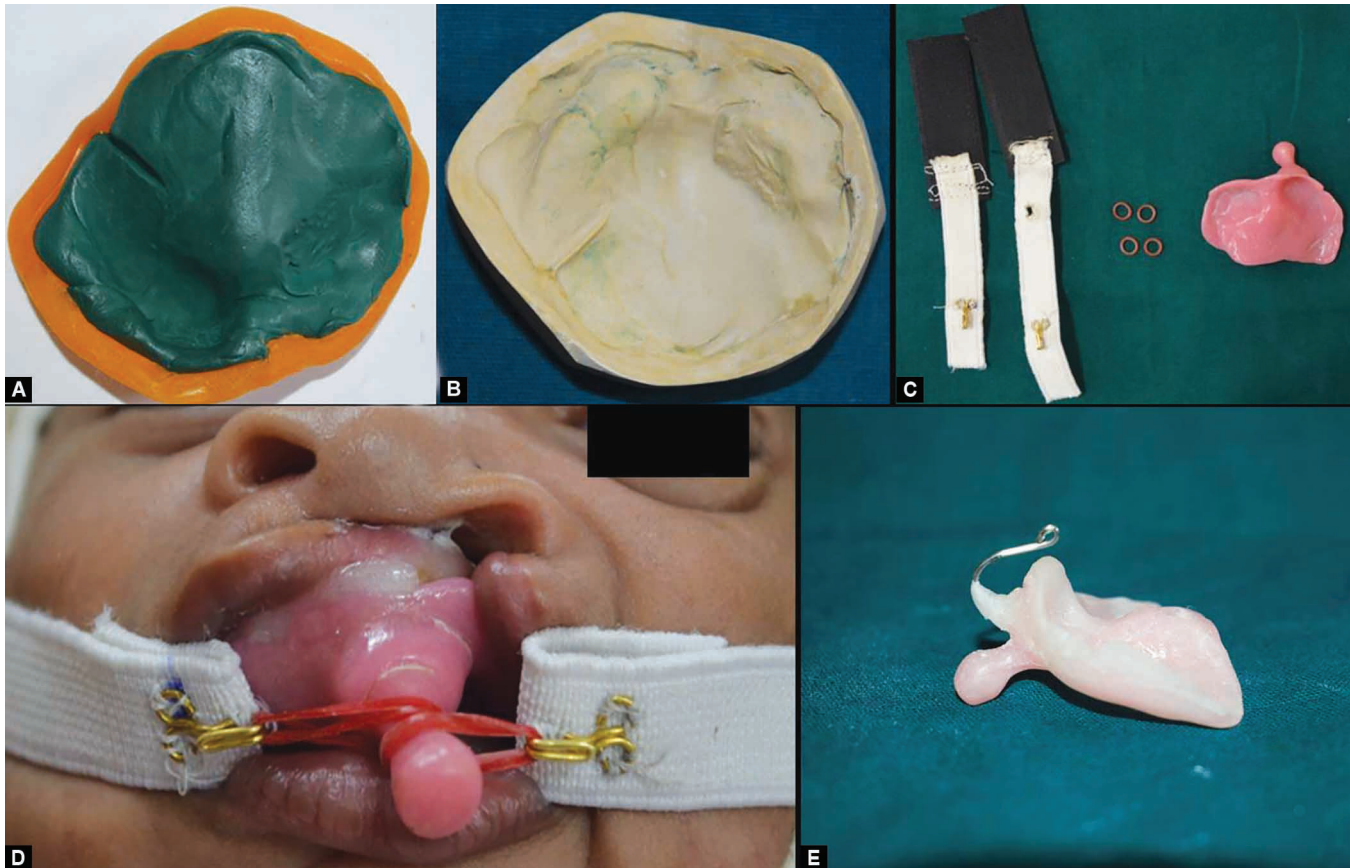
CASE DESCRIPTION

Case 1

A 10-day-old newborn with a midfacial cleft was referred to the Department of Prosthodontics for a feeding appliance. A detailed assessment revealed a left unilateral cleft lip which extended to the hard and soft palate. A sunken nasal rim was also noted (Fig. 1). Considering all the factors, it was decided to carry out PNAM. The treatment procedure was explained to the parents, and their cooperation was sought.

Treatment Procedure

Impressions of the cleft were made in impression compound (Kerr impression compound) with the baby placed in a head



Figs 2A to E: (A) Impression of a unilateral cleft; (B) Dental stone working model for appliance fabrication; (C) Elastic bands with hooks used to secure the appliance; (D) Appliance in position; (E) Swan neck nasal stent



Figs 3A to C: (A) Lip and nose surgery performed at 15 weeks; (B) Postnasalveolar molding therapy at 6 months; (C) Postnasalveolar molding therapy at 1 year

downward position in the lap of his mother. The span of the cleft measured 9.2 mm on the cast. The clefted area was blocked out and a 2-layer thickness of base plate wax was adapted, and subsequently acrylicized in clear heat cure acrylic resin (Coltene Heat Cure). The appliance was smoothed to ensure that no jagged edges were present. An acrylic retentive arm was then added to the labial flange.

The appliance was tried in the baby's mouth and evaluated for fit. Tissue conditioner (Visco-Gel, Dentsply) of 1 mm thickness was layered on the outermost aspect of the greater clefted segment while the innermost was relieved by 1 mm. On the inner aspect of the lesser segment, a 1 mm thickness of tissue conditioner was added and the outer was relieved by 1 mm. This created an inward force on the greater segment and an outward force on the lesser segment that would ultimately result in the approximation of alveolar tissue. Orthodontic elastics (Tru-Force Latex Elastic system) were twisted around the retentive arm and anchored *via* hooks to elastic bands. A tailor-made cloth headcap with velcro fastening at the sides helped secure the appliance. The patient was recalled weekly for an additional 1 mm of molding which continued over 2 months, after which another impression was made, and the size of the cleft had reduced to 5.2 mm. Active nasal molding was then started by incorporating a "swan neck" nasal stent made with 19 gauge stainless steel wire (Smith SS Wire). The superior loop of the nasal stent was adapted to first lie passively in the nostril, after which it was concealed with self-cure acrylic, and then by tissue conditioner until mild blanching was seen (Fig. 2). Molding continued until lip and nose surgery, which was scheduled at 15 weeks. The patient was periodically recalled and showed excellent results at 6 months and at 1 year (Fig. 3).

Case 2

A 13-day-old baby girl reported with a right unilateral cleft involving the lip, alveolus, and hard palate (Fig. 4).

Treatment Procedure

Impressions were made in the same manner as described in case 1. The span of the cleft was measured to be 8 mm. The feeding appliance was fabricated in heat cure acrylic with an additional feature of a 5 mm aperture in the midpalate region, which would allow breathing in case of accidental displacement. The appliance was smoothed and verified for fit in the baby (Fig. 5).



Fig. 4: Prenasoalveolar molding therapy at 15 days



Figs 5 A to D: (A) The cleft region is blocked out with wax; (B) A 5 mm breathing hole is incorporated in the feeder plate; (C) Tailor-made cloth headcap to help secure the plate; (D) Appliance in position



Figs 6A and B: Postnasalveolar molding therapy at 1 year

The appliance was selectively layered and trimmed to allow selective pressure on the clefted alveolar segments using tissue conditioner. The patient was recalled weekly, and the molding procedure was repeated until the severity of the cleft lessened to 5.6mm at 3 weeks. A nasal stent was then added. The patient was scheduled for lip and nose surgery at 17 weeks and recalled after a year for follow-up (Fig. 6).

DISCUSSION

Presurgical nasolaveolar molding (PNAM) aims at decreasing the severity of the initial cleft region and ensuring the repair of only a minor cleft deformity.¹ It was Matsuo and Hirose and Grayson et al. who described the first PNAM appliance and insisted that active soft tissue and cartilage molding should be initiated in the first 3–4 months after birth due to the increased amount of maternal estrogen and the elevated levels of hyaluronic acid in the fetal cartilage, which permits it to be moldable.^{5–7} The nasal stent molds and uplifts the collapsed ala. The headcap is custom fitted with velcro strips on either side which allows the attachment, placement, and removal of the elastic bands. Long-term research has determined that the augmented nasal shape is stable with less scar tissue and improved lip and nasal form, thus reducing the number of surgical revisions.^{8,9} Since the initiation of PNAM, there have been significant changes made in the conventional surgical technique, which has resulted in significant improvements in the final outcome of primary surgical cleft repair.¹⁰ On the whole, fewer surgical interventions aid in substantial cost savings for families and insurance companies.¹¹

CONCLUSION

Presurgical nasolaveolar molding (PNAM) is a simple and effective adjunctive therapy for the rehabilitation of cleft lip and palate. When initiated at an early age, it works effectively in reducing the span between the clefted alveolar segments, thereby reducing the surgical burden. It, however, requires active participation and compliance from the patient's caregivers.

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