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PRESURGICAL NASOALVEOLAR MOLDING IN AN INFANT WITH UNILATERAL CLEFT LIP AND PALATE: A CASE REPORT

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Abstract
Presurgical nasoalveolar molding (NAM) is an established orthopedic technique used in the early management of infants with cleft lip and palate to reduce cleft severity and improve nasal symmetry prior to definitive surgical repair. This case report describes the management of a 20-day-old male infant presenting with a left-sided complete unilateral cleft lip and palate (Veau Group III). NAM therapy was initiated using a custom-fabricated intraoral molding plate, with regular appliance modifications to guide controlled approximation of the alveolar segments. Within one month of therapy, the alveolar cleft width was reduced from 12 mm to approximately 5 mm. During the second month, further approximation resulted in a cleft width of approximately 4 mm, following which a nasal stent was incorporated into the modified NAM appliance to facilitate molding of the columella and alar cartilages. By the third month, the infant weighed 4.9 kg and demonstrated continued improvement in nasal morphology. At the completion of five months of NAM therapy, the alveolar cleft width was reduced to approximately 1 mm, with marked improvement in nasal tip projection and alar symmetry. Following completion of presurgical molding, the patient underwent primary lip and nose repair with satisfactory esthetic and functional outcomes. This case highlights the effectiveness of early, staged NAM therapy in improving presurgical anatomy, facilitating surgical repair, and potentially reducing postoperative scarring and the need for secondary corrective procedures.

Keywords: Cleft lip and palate; Nasoalveolar molding; Presurgical orthopedics; NAM appliance

Introduction

Cleft lip and palate are among the most common congenital craniofacial anomalies and require coordinated multidisciplinary management. The primary goals of treatment include restoration of function, improvement of facial esthetics, and facilitation of normal growth and development.[1] Presurgical nasoalveolar molding (NAM) is an orthopedic intervention introduced during early infancy to modify alveolar segments and nasal cartilages prior to definitive surgical repair.[2]

NAM aims to reduce the severity of the cleft deformity by approximating the alveolar segments and improving nasal form during the neonatal period when tissues exhibit increased plasticity.[3] By improving presurgical anatomy, NAM can simplify surgical procedures, reduce tissue tension, and enhance postoperative esthetic outcomes. This case report describes the clinical application and outcome of NAM therapy in an infant with unilateral complete cleft lip and palate.

Case Presentation

A 20-day-old male infant presented with a facial deformity present since birth (fig 1). The child was the second offspring of non-consanguineous parents and was born with a birth weight of 2.8 kg. No family history of cleft lip or palate was reported.

Clinical examination revealed a left-sided complete unilateral cleft lip and palate, classified as Veau Group III.[4] Extraoral examination showed deviation of the nasal tip towards non-cleft side with widening of the left alar base. Intraoral examination revealed a complete cleft palate with an alveolar cleft width 12 mm. The gingival pads appeared healthy, and no other congenital anomalies were noted. Based on the clinical findings, a treatment plan involving presurgical nasoalveolar molding followed by surgical correction of the defect was formulated.

Clinical Procedure

At the initial appointment, primary impression was made with Condensation silicone putty (Neopure C-silicone Impression Material) and primary cast was prepared (Kalabhai Ultra Rock Die Stone) (fig 2). Lip taping was initiated to approximate the cleft segments and reduce the soft tissue tension (fig 3). Medical-grade adhesive tapes were used (3M™ Transpore™ Surgical Tape 1527; 3M™ Tegaderm™ Transparent Film 1624W), and parents were instructed regarding proper taping technique and appliance care. A feeding plate was fabricated (DPI RR Cold Cure Clear Shade) on primary cast and was stabilized intraorally (with TP Ortho Plain Lime Extraoral Elastics 1/4" 8 oz; and Medical-grade adhesive tapes) during the second appointment to assist feeding and provide initial guidance for alveolar molding (fig 4).

At one week, a custom perforated impression tray (DPI RR Cold Cure Clear Shade) was fabricated, and a definitive impression was made with Condensation silicone putty (Neopure C-silicone Impression Material) and a cast was poured (Kalabhai Ultra Rock Die Stone). New feeding plate was fabricated and relined with soft relining material (Detax Mollosil Relining Material) to improve adaptation and patient comfort (fig 5).

At one month, the alveolar cleft width was reduced to 5 mm (fig 6). Continued weekly adjustments resulted in further reduction of the alveolar cleft. Nasal molding was incorporated using bilateral nasal stents (22 Gauge SMITH stainless steel wire; DPI RR Cold Cure Clear Shade) to improve nasal tip projection and alar symmetry (fig 7).[5] Nasal alar cartilage symmetry was enhanced by lengthening and shifting the columella from an oblique to an upright posture.[6]

Weekly modifications were performed by selective grinding of the internal surface of the molding plate and addition of hard acrylic and soft reline material to direct controlled movement of the alveolar segments (fig 8).

By the third month of therapy, the infant weighed 4.9 kg and demonstrated significant improvement in alveolar alignment and nasal morphology (fig 9). Following completion of NAM therapy at 5th month, the alveolar cleft width was reduced to approximately 1 mm (fig 10). At 8 months of age, the patient underwent primary lip–nose repair with concomitant gingivoperiosteoplasty (fig 11). Definitive palatal repair was carried out at 20 months of age, timed in accordance with early speech development (fig 12).

Discussion

Presurgical nasoalveolar molding (NAM) has gained wide acceptance as an adjunctive therapy in the early management of infants with cleft lip and palate. The technique takes advantage of the adaptive capacity of neonatal tissues, allowing gradual correction of alveolar and nasal deformities prior to

surgical intervention. Initiating treatment during the early postnatal period enables effective molding while minimizing the extent of surgical manipulation required later.[7]

In the present case, NAM therapy was initiated within the first month of life and resulted in progressive approximation of the alveolar segments. Serial appliance adjustments led to a clinically significant reduction in the alveolar cleft width from 12 mm to less than 1 mm, facilitating improved presurgical anatomy. These findings are consistent with previously reported outcomes demonstrating the benefits of early presurgical orthopedic intervention.[7]

Improvement in nasal symmetry was also observed following nasal molding. The malleability of neonatal nasal cartilage during early infancy allows effective reshaping when gentle and continuous forces are applied. Enhancement of nasal form prior to surgery may contribute to improved postoperative esthetics and may decrease the likelihood of secondary nasal corrective procedures.

The favourable outcome in this case may be attributed to timely initiation of therapy, careful appliance fabrication, and consistent follow-up. Parental cooperation played a crucial role in maintaining appliance wear and ensuring effective molding. Parents were instructed to ensure continuous appliance wear except during cleaning, maintain oral hygiene of the appliance and oral cavity, apply cheek tapes as demonstrated, feed the infant in an upright position, and regularly monitor for signs of irritation, pressure sores, or discomfort. Regular follow-up visits were emphasized for appliance modification and assessment.

Potential complications associated with NAM therapy include cheek skin irritation due to taping, oral or nasal ulceration, infection, and unfavourable molding resulting from improper appliance design or inadequate follow-up. In the present case, only minor transient soft tissue irritation was observed and managed conservatively.

Despite its advantages, NAM is a technique-sensitive procedure that requires clinical expertise and close monitoring. Improper appliance design or inadequate follow-up may result in undesirable outcomes. Therefore, NAM should be implemented as a part of a comprehensive cleft care protocol with long-term follow-up to evaluate growth and stability.[8]

Conclusion

Presurgical nasoalveolar molding is an effective adjunct in the management of unilateral cleft lip and palate when initiated early in infancy. By improving alveolar alignment and nasal morphology prior to surgery, NAM can facilitate surgical repair and enhance esthetic outcomes. Successful results depend on careful appliance management, regular follow-up, and parental compliance.

Patient Consent

Written informed consent was obtained from the patient's parents for publication of this case report and accompanying clinical photographs.

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Figure Legends



Fig 1. (a) Preoperative extraoral view showing left-sided unilateral complete cleft lip with deviation of the nasal tip and widening of the alar base. **(b)** Preoperative intraoral view demonstrating complete unilateral cleft palate with an alveolar cleft.



Fig 2. (a) Primary impression **(b,c)** Diagnostic cast showing alveolar cleft width of approximately 12 mm using a millimeter ruler.



Fig 3. Lip taping at the first appointment to approximate the cleft segments and reduce soft tissue tension.



Fig 4. (a) Feeding plate **(b)** stabilized with elastics and lip taping to aid feeding and provide initial guidance for alveolar molding.



Fig 5. (a) Custom impression tray **(b,c)** Definitive impression and cast for modification of feeding plate **(d)** Retention of modified feeding plate **(e)** Feeding without any discomfort.



Fig 6. Alveolar cleft width reduced to 5 mm (Cleft covered with modelling wax).

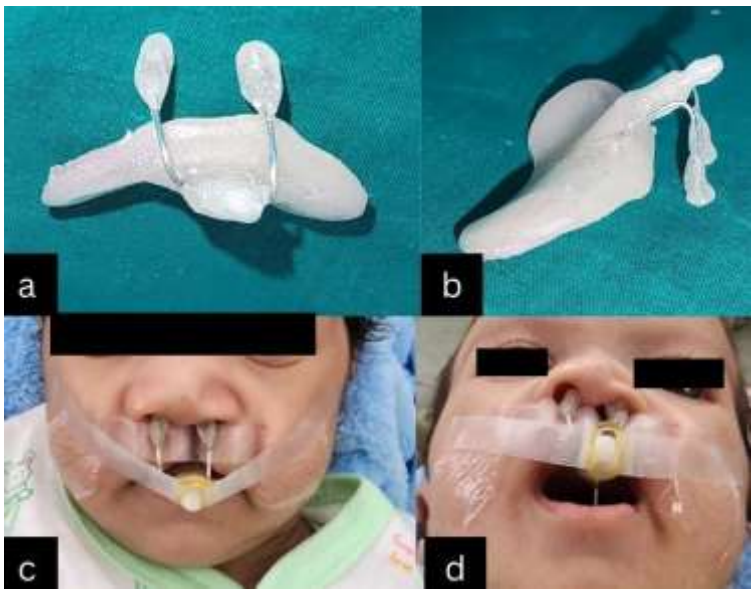


Fig 7. (a,b) Nasoalveolar molding appliance with bilateral nasal stents **(c,d)** Extraoral view showing NAM appliance in position.



Fig 8. (a,b,c) Addition of hard acrylic resin and soft reline material to guide controlled movement of the alveolar segments.



Fig 9. Reduction of the cleft width.



Fig 10. Near-complete approximation of the alveolar segments with approximately 1 mm residual cleft **(a)** Cast **(b)** extraoral **(c)** intraoral.



Fig 11. Extraoral view following primary lip repair performed at eight months of age, showing satisfactory lip continuity and nasal form.



Fig 12. (a) Intraoral view following palatal closure performed at 1-year 8months old. **(b)** Postoperative extraoral view demonstrating improved facial esthetics, nasal symmetry, and lip form.