CASE REPORT

Presurgical Orthopedic Nasoalveolar Molding in Cleft Lip and Cleft Palate: Case Report

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Abstract

Aim and objective: The present clinical report describes management of complete unilateral cleft lip and palate with presurgical nasoalveolar molding (NAM) therapy for infants.

Background: Orofacial clefts have a negative impact on the health and social integration of individuals affected. Patients undergo numerous procedures until they reach adolescence. The ultimate focus of surgical intervention is to improve the esthetic appearance of the lip and nose by improving the lip scar, nasal tip projection, and symmetry of the nasolabial complex.

Case description: This paper discusses a situation in which the parents of a three days old baby with the chief complaint of regurgitation of milk while feeding. On examination, baby had complete left-sided cleft lip and cleft palate (CL+CP).

Conclusion: Before surgery, nasoalveolar molding has been shown to be a useful adjunctive therapy for reducing hard and soft tissue cleft deformity.

Clinical significance: Passive preoperative intervention of the lip and alveolar segments helps to reduce tissue tension and is thought to improve surgical outcomes by minimizing wound healing disturbances and scarring.

Keywords: Cleft lip, Cleft palate, Nasoalveolar molding.

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Introduction

Cleft lip and palate (CLP) are considered common congenital deformities inherited, leading to craniofacial malformation that escorts to various dental abnormalities in the early stages of life. According to the World Health Organization, the prevalence of an orofacial cleft at birth varies worldwide, ranging from 3.4 to 22.9/10,000 births.[1] Occurrence of a cleft lip, with or without cleft palate (CL ± P) and cleft palate (C+P) alone is one in every 500–1,000 births worldwide.[2] A child with this condition not only has poor dental development but also cannot breastfeed because of nasal regurgitation, improper oral seal, and swallowing. They are also inclusive of other issues like difficulties in hearing, primarily due to palatal musculature abnormalities, speech adversities caused due to nasal escape, and other articulation problems.[3] Though orofacial cleft anomalies can be corrected in early childhood, scarring, aberrant face growth, and development result in ongoing functional and psychosocial issues. To treat the causes of CLP, an interdisciplinary team is required to meet the standard of treatment apart from surgical intervention. The left side cleft is most often found in unilateral cases. Although the diagnosis of cleft lift and palate is simple, it could be challenging to handle a few days old baby. Here, we demonstrate the management of unilateral complete CLP in a case series.

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Case Description

A 26-year-old female with her 3-day-old female baby reported to the Department of Pedodontics and Preventive Dentistry at JSS Dental College and Hospital, Mysuru, Karnataka, with the chief complaint of regurgitation of milk while feeding. On examination, the baby had a complete left-sided cleft lip and CP (Fig. 1). Complete case history was recorded. Family history reveals an elder sibling born with the cleft lip, with no other hereditary disorders. The parent gave the history of consanguineous marriage. On the first visit, parent counseling regarding the diet was done with audiovisual aids and live demonstrations were given, followed by the interaction with parents of other patients. The treatment planned was dynamic presurgical nasal remodeling appliance, followed by lip and palatal repair.[4] After informing the parents about the treatment protocol, parent consent was taken for the NAM technique. Silicone impression materials were used to take impressions of the palate, cleft lip, and nose complex. During this impression recording phase, a surgeon is always present

Figs 1A to D: Preoperative photographs of the patient: (A) Frontal view; (B) Intraoral view; (C and D) Profile view

in case of handling any emergency. The infant's head is held in a slightly upright position while the impression tray is placed into the oral cavity. The impression tray is seated until the silicone impression material begins to protrude past the tray's posterior border. With the help of high-volume evacuation, fluids were drained out. A feeding plate was delivered immediately after ruling out retention, posterior extension, rough margins, and fitting of the plate. The patient was asked to report immediately, if they found any ulcerations or soft tissue irritation. Infant suckling was evaluated after inserting the plate, and educated the parent for the same. NAM began within 10 days after the child's birth. The treatment protocol consisted of an alveolar molding, followed by a subsequent phase of nasal molding (for a duration of 6–8 weeks). With the support of previously taken impressions of the patient, a customized acrylic plate which covers the entire palate and alveolar ridge was fabricated. To seal the gap between the lips, a "lip taping" was used. Modification of the molding plate by the application of soft liner acrylic resin (Pattern Resin LS1, GC) was done every week to specific portions, and other parts were grounded in order to achieve movement and guide the growth of alveolus in the right direction. A thorough examination of the patient was done at regular intervals to identify the presence of any pressure marks and any other skin or mucosal irritation. When the alveolar cleft was narrowed after 6–8 weeks of alveolar molding (Fig. 2), a kidney-shaped nasal stent extending from the molding plate was placed to lift the alar dome and form the alar wing (Fig. 3). This stent was regularly adjusted and activated to lift up the lower lateral cartilage and to improve the nasal symmetry. At the age of 3 months (as the patient's hemoglobin was less), the primary lip repair procedure was performed by using a modified Millard technique. Palate surgery was done at 18 months (Fig. 4). The lip and nose repair scars were minimum, thereby giving the patient an esthetic appearance.

Discussion

Every year, 28,600 babies are born with this congenital cleft lip and CP, which equates to 78 babies with clefts born every day, or three babies with clefts born every hour.[5] Active intervention in infancy are highly suggested to correct nasolabial clefts. When evaluating the unilateral complete clefts, a few factors are crucial to note, like the position of the lesser and greater alveolar segments, the vertical height of the lateral lip element, and the degree of associated nasal deformity. McNeil in 1950 first described the concept of presurgical maxillary orthopedics by the use of serial appliances to approximate alveolar cleft segment.[6] High levels of maternal estrogen in the fetal circulation during the first 6 weeks of life causes a rise in hyaluronic acid levels, which essentially aids in the molding of the cartilage, ligament, and connective tissue for the desired permanent result of the molding tissue. This concept was applied by Matsuo et al. for the correction of nasal deformities in patients suffering from cleft lip.[7]

Nasoalveolar molding (NAM) is a passive, nonsurgical way of bringing the gum and lip together by redirecting natural growth forces, which aids in the correction of a flattened nose prior to surgery, and also allows nose repair during the time of lip repair. PNAM employs the principles of both "negative sculpturing" and "passive molding" of the alveolus and soft tissues in the vicinity. In order to gently direct the growth of the alveolus to achieve the desired position, passive molding is done, where a customized molding plate for each patient is fabricated with acrylic resin. Negative sculpturing, on the contrary, involves making serial changes to the inside surfaces of the molding appliance, such as adding or subtracting material in specific regions, in order to achieve the desired shape of both the alveolus and nose.[8,9] The idea behind preoperative NAM is to actively shape and reposition deformed

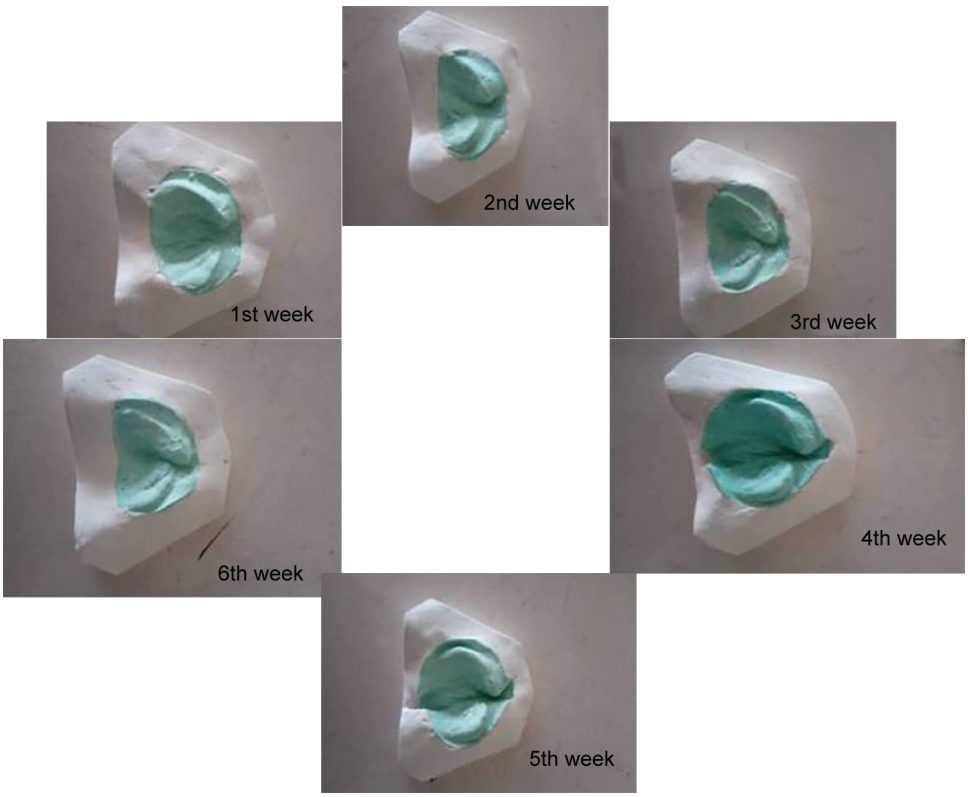
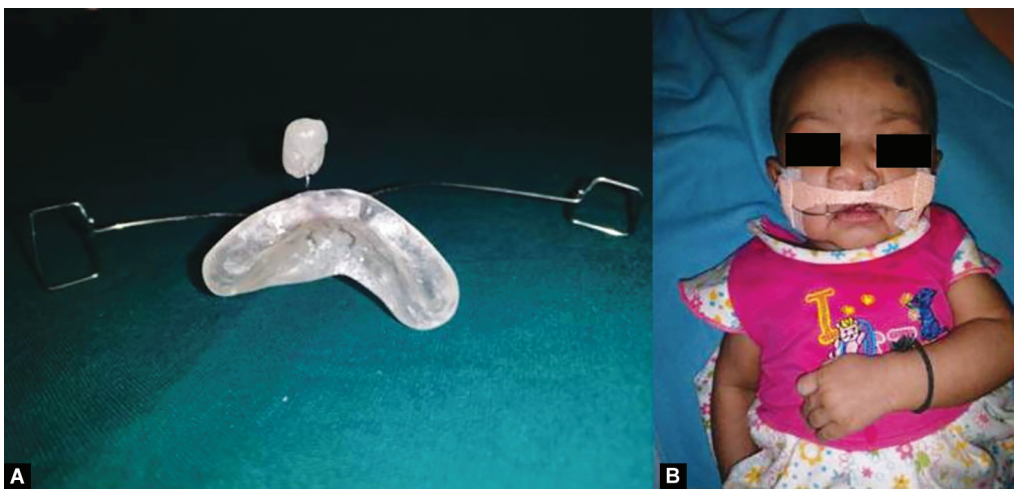


Fig. 2: Narrowed alveolar cleft during the NAM



Figs 3A and B: (A) A kidney-shaped nasal stent extending from the molding plate; (B) An extraoral taping was done for stabilizing the acrylic plate

nasal cartilage and alveolar processes, to nonsurgically lengthen the columella, and to reduce tissue tension by approximating the lip region. NAM reduces scarring and the need for secondary alveolar bone grafting after lip repair.[10–13] Once the arches are aligned and alveolar gaps are approximated, a nasal stent is added to an orthopedic device to extend the length of the columella and reshape the alar dome.

According to Grayson and Shetye,[14] an intact nasal floor is not essential for the nasal stent as it extends from the anterior flange of an intraoral molding plate. The main advantage of NAM is that it allows for the delivery of force to shape and sculpt the nasal cartilage skillfully. The stent is "swan neck" in shape and is made up of a 0.36 inch, stainless steel round wire. The wire component is coated in acrylic and molded into a bilobed kidney-like shape. A soft denture liner is mixed with hard acrylic to prevent irritation of the mucous membrane. The correct position of the upper lobe is determined by the moderate amount of tissue blanching and gentle lift of the ala of the nose. The tip of the nostril is lifted by the lower lobe of the stent and it also defines the tip of the nasal bridge. The narrowing of the alveolar gap width to approximately 5 mm traps the nasal stent component of the NAM device. The alar rim at birth was stretched across a large alveolar cleft deformity, resulting in considerable laxity; with the nasal stent, this can further be elevated into an asymmetrical and convex appearance. The idea behind delaying the placement of the nasal stent is that the alignment of the base of the nose and labial segments improves

Fig. 4: Postoperative photograph

as the alveolar space narrows. A study by Maull et al. reported that long-term retention of nasal symmetry could be achieved by performing PNAM.[15]

Limitations of the NAM procedure are parental cooperation; as age progresses, cartilage gets less plastic and treatment needs to be inaugurated as soon as possible after birth; misdirected molding leads to locked out of segment; and soft tissue irritation.

Conclusion

Presurgical NAM (PNAM) can be conveniently used in the early management of cleft anomalies in newborns. It provides a secure, effective, and lasting improvement in the esthetics of the nasolabial complex in infants with unilateral or bilateral cleft deformities.

References

1. Allam E, Windsor L, Stone C. Cleft lip and palate: etiology, epidemiology, preventive and intervention strategies. Anat Physiol 2014;4:940–2161. DOI: 10.4172/2161-0940.1000150
2. Murray JC. Gene environment causes of cleft lip and/or palate. Clin Genet 2002;61(4):248–256. DOI: 10.1034/j.1399-0004.2002.610402.x
3. Banerjee M, Dhakar AS. Epidemiology-clinical profile of cleft lip and palate among children in India and its surgical consideration. CJS 2013;2(1):45–51.
4. Bennun RD, Figueroa AA. Dynamic presurgical nasal remodeling in patients with unilateral and bilateral cleft lip and palate: Modification to the original technique. Cleft Palate Craniofac J 2006;43(6):639–648. DOI: 10.1597/05-054
5. Mossey P, Little J. Addressing the challenges of cleft lip and palate research in India. Indian J Plast Surg. 2009;42(Suppl):S9-S18. DOI: 10.4103/0970-0358.57182
6. McNeil CK. Oral and facial deformity. Sir Isaac Pitman and Sons: London; 1954. p. 81–89.
7. Matsuo K, Hirose T. Preoperative non-surgical over-correction of cleft lip nasal deformity. Br J Plast Surg 1991;44(1):5–11. DOI: 10.1016/0007-1226(91)90168-j
8. Laxmikanth SM, Karagi T, Shetty A, et al. Nasoalveolar molding: a review. J Adv Clin Res Insights 2014;1(3):108–113. DOI: 10.15713/ins.jcri.28
9. Rossell-Perry P. The surgical nasoalveolar molding: a rational treatment for unilateral cleft lip nose deformity and literature review. Plast Reconstr Surg Glob Open 2020;8(8):e3044. DOI: 10.1097/GOX.0000000000003044
10. Shetty V, Vyas HJ, Sharma SM, et al. A comparison of results using nasoalveolar moulding in cleft infants treated within 1 month of life versus those treated after this period: development of a new protocol. Int J OralMaxillofac Surg 2012;41(1):28–36. DOI: 10.1016/j.ijom.2011.09.002
11. Splengler LA, Chavarria C, Teichgraber FJ, et al. Presurgical nasoalveolar moulding therapy for the treatment of bilateral cleft lip and palate: a preliminary study. Cleft Palate Craniofac J 2006;43(3):321–328. DOI: 10.1597/05-093.1
12. Clark SL, Teichgraeber JF, Fleshman RG, et al. Long-term treatment outcome of presurgical nasoalveolar moulding in patients with unilateral cleft lipand palate. J Craniofac Surg 2011;22(1):333–336. DOI: 10.1097/SCS.0b013e318200d874
13. Radhakrishnan V, Sabarinath VP, Thombare P, et al. Presurgical nasoalveolar moulding assisted primary reconstruction in complete unilateral cleft lip palate infants. J Clin Pediatr Dent 2010;34(3):267–274. DOI: 10.17796/jcpd.34.3.7r7615h422235773
14. Grayson BH, Shetye PR. Presurgical nasoalveolar moulding treatment in cleft lip and palate patients. Indian J Plast Surg 2009;42(Suppl):S56–S61. DOI: 10.4103/0970-0358.57188
15. Maull DJ, Grayson BH, Cutting CB, et al. Long term effects of nasoalveolar moulding on three dimensional nasal shape in clefts. Cleft Palate Craniofac J 1999;36(5):391–397. DOI: 10.1597/1545-1569_1999_036_0391_lteonm_2.3.co_2