

## Presurgical Nasoalveolar Molding in a Neonate With Bilateral Cleft Lip and Palate: Report of a Case

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### ABSTRACT

**Background:** Cleft lip and palate as the most common congenital defect of oral cavity possesses a heavy socioeconomic burden for both the child and parents. Nasoalveolar molding (NAM) has received more attention to enhance future facial appearance and function during recent decades

**Case Presentation:** A 21-day old female neonate was referred with a bilateral cleft lip and palate. Parents complained of frequent bouts of cyanosis during feeding. The infant was a type IV cleft patient which was healthy systematically. An acrylic prosthetic obturator was fabricated which covered the palatal defect with a few millimeters extension into the nasal chamber. After a week, an extraoral tension was added to ensure the posterior protraction of upward and anterior displaced prolabium. Frequent adjustments were performed until the cleft lip operation and afterward to follow the centralization of the lateral maxillary segments and muscular tension changes after the cleft lip operation. The parents were highly satisfied with enhanced appearance and feeding and the patient was followed by the age of one year.

**Conclusions:** According to the recent promising outcomes of NAM for cleft lip and palate, this method is encouraged to be applied promptly after the birth and to be continued till further provisional or definite corrective surgeries.

**Keywords:** Alveolar Ridge, Cleft Palate, Dental Prosthesis, Infant, Orthopedics

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### 1. Introduction

Lip clefts and palate have a prevalence of 0.28-0.37 for each 1000 births. It is strongly affected by race, as is more seen in Asian neonates. Isolated cleft lip is more occurring in male neonates; whereas isolated cleft palate is seen more in females (1). Various etiologies including maternal exposure to certain medications or substances, infections, syndromic causes or genetic predisposition are discussed (2).

Early in the life, an infant with cleft lip and palate may have some difficulties in feeding with subsequent aspiration. Getting older, the child may encounter esthetic, speech, or functional problems. Various dental complications including altered teeth size, abnormal number, morphology and location or delayed teeth development in addition to the enamel hypoplasia and buccal cross bite may accompany the cleft (3, 4). In more complex syndromic cases, other apparent craniofacial abnormali-

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Presurgical nasoalveolar molding may improve infant feeding and his/here future facial esthetics.

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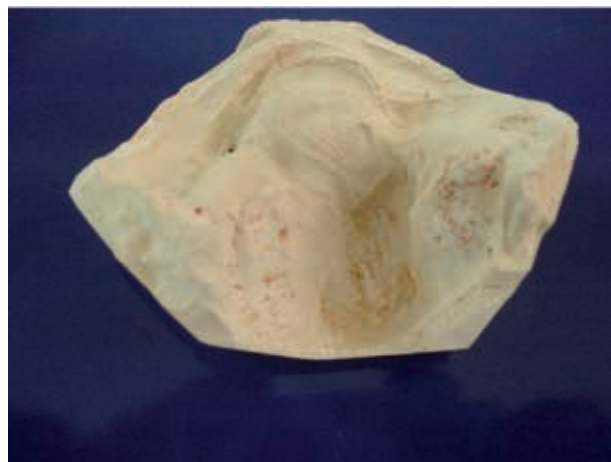
ties should be taken into account when a comprehensive treatment plan is decided. Oral rehabilitation usually includes the involvement of various disciplines; Oromaxillofacial surgeon, pediatrician, pediatric surgeon, Prosthodontist, speech therapist and psychologist (3). A variety of presurgical treatment modalities which are known as presurgical infant orthopaedics (PSIO) or presurgical nasoalveolar molding (PSNAM) are introduced to enhance speech, esthetic and function (5). Different devices such as nasal conformer, palatal obturator, articulation development prosthesis, palatopharyngeal obturator and palatal lift have been developed with different aims which gained different degrees of success during their application period (4). Term of Orthodontics is not used since neonates or young infant do not develop teeth (5). These non-surgical therapies are usually followed by further prosthodontic therapies (e.g. either fixed or removable partial denture), dental implants, more complex craniofacial rehabilitations such as ear implant and primary or secondary corrective surgeries including bone graft (2, 4). A case of bilateral cleft lip and palate is introduced who was aided with PSNAM to facilitate feeding and also to improve future facial appearance.

## 2. Case Presentation

A 21-day old Iranian female infant referred by a pediatric surgeon to a private office with a complete bilateral cleft lip and palate (BCLP). Parents were worried about poor feeding, unpleasant facial appearance and the risk of aspiration. Orofacial examination checked by a pediatrician, revealed a non-syndromic BCLP (Veau Classification, type IV) who was healthy systematically (Figure 1). A written informed consent was obtained from the parents. Primary impression with a red compound was taken while the neonate was sited upright with her face held toward the floor. Her head was held by the clinician finger while the impression was set. This permitted the mobility of mandible for the airway patency and the patient crying ensured the adequate breathing (6). Adequate suctioning and resuscitation facilities were also chair side available. Primary cast was poured in Type III stone (Figure 2). Cast was inspected for the severe undercuts to be blocked out. Special try was made and the secondary impression and working cast were prepared with the same method to obtain a better recording the details. Prosthesis was made with a heat-cure acrylic with a 3-4 mm extension into the nasal chamber (Figure 3). Most retention was assumed to be provided form palatal shelves of maxilla and nose chamber. Pronounced extension into the nasal chamber was avoided to reduce the risk of airway obstruction (6). As the details of inner nasal alar anatomy would not be recorded satisfactory; this part of prosthesis was molded again using tissue conditioner to ensure the maximal fitness (Figure 4). Five adjustment sessions were performed in every other day.



**Figure 1.** Oral Examination Revealed a Type IV Cleft, Based on Veau Classification



**Figure 2.** Study Cast Was Poured in Stone Type III, Severe Undercuts Were Blocked Out. Note Maxillary Lateral Segments Positions



**Figure 3.** A Heat-cure Acrylic Prosthesis Was Fabricated With 3-4mm Extension Into the Nasal Chamber. Further Adjustments Were Performed With Grinding and Using Tissue Conditioner



**Figure 4.** Molding the Prosthesis With Tissue Conditioner Provided Better Soft and Hard Tissue Adaptation

Parents were instructed how to use and clean the device and were ordered to place the prosthesis to the infant all day long except for cleaning. A week after the prosthesis was delivered to the parents, two crossed straps which were secured to a head cap at the sides were added to augment the posterior protraction of the displaced premaxillary segment and corresponding soft tissue. Lip operation was performed when the infant reach the age of three months and she was scheduled for a cleft palate surgery at the age of one year. Between the surgeries, on the basis of clinician discretion, further adjustments were performed to follow hard and soft tissue changes with centralization of lateral maxillary segments and altered soft tissue tension following lip surgery. The child gained normal weight till the age of one and the parents were highly satisfied with improved facial appearance and more feasible feeding. The patient did not have any cyanotic bouts during feeding afterward. The patient was followed by the age of one year. All researchers undertook Helsinki treaty

### 3. Discussion

A case of nasoalveolar molding with posterior traction for a neonate with bilateral cleft lip and palate was reported. Someday, there was a belief for cleft lips that "When God marks somebody, there is a reason". Besides, some cultures even celebrated the birth of such neonate infants (7). Today, in many developed countries a team would be established soon after the birth of the neonate with advanced cleft. Accordingly, we fabricated a prosthetic device to serve both the child and her parents. A passive appliance was used in our case and an extra-oral traction was added a week later. Based on the biomechanics of the desired forces, appliances are classified into either active (with fixed intraoral orthodontic elastics and plates) or passive (to control and guide the distance between two maxillary segments in addition to external posterior force) or semi passive (4, 7). In the case

presented, the fabricated obturator covered the palatal defect with a little extension into the nasal cavity to mold the nasal alars (6). Such approach should be commenced early in the life regarding considerable nasal cartilage plasticity in neonates because of transmitted estrogen from the mother (8). Our case underwent lip surgery at the age of three months. This corrective surgery could be performed in any time. One approach is to correct the lip cleft once the child has 10 mg/dl of hemoglobin, 10 pounds weight and is as old as 10 weeks (Rule of 10's) (7). Although, this can be accomplished before discharge soon after birth that indeed increase the acceptance of the parents for a dysmorphic baby.

History of palatal obturator dates back to 384-328B.C, reporting Demosthenes used coast pebbles to cover his palatal defect (4). By the leading hypothesis of McNeil in the early 1950s, many devices were developed (7). Many advantages for PSIO are considered including reduced complexity of future surgery, lesser scar, improved feeding, less need to secondary bone graft and improved speech. Despite the fact, many authorities have not shared these points of views and have claimed suspicions about its long term beneficial effects. Moreover, many side effects such as skin irritation, pressure ulcer of the adjacent gingiva, airway obstruction and deficient facial growth are discussed (4, 9). Graycon, in 1993, introduced PSNAM (10). Main advantages of PNAM over PSIO are possibly lesser scar, better alar base width and more symmetric and aligned nose. This approach may lessen the need for secondary alveolar graft by 60 percent (10, 11). Notably, various Deutch cleft trial studies evaluating PSIO, did not find any remarkable outcomes for facial appearance, facial growth, mothers` satisfaction, language skills, prevention of premaxillary collapse and deciduous teeth occlusions (9). A recent systematic review by Uzel et al. has evaluated 12 investigations of randomized and control clinical trials with or without PSIO. They concluded that based on the existing documents, PSIO cannot be recommended, since a promising effect of PNAM for improving nasal esthetic is sensed. They believed that a timely and nit surgery would largely affect the treatment outcome (9). Papadopoulos et al. in their recent systematic review and meta-analysis, concluded that current evidences must reach to a point in which PSIO would be recommended due to its improvement in dentoskeletal development rather than soft tissue esthetics (12).

We used a protraction with crossed straps. In BCLP, prolabium is displaced anterior and rotated upward. This device may help approximation of lateral maxillary segments and also help the surgeon to obtain a better soft tissue esthetic. In contrary, Berkowitz believes that this approach is of no benefit with the aim of preventing future arc collapse and cross bites. He disputed that approximation of alveolar ridge with inter segment of deficient bone would not maintain inter-canine arc width and displacement or even impaction of later incisors would

be highly anticipated (7). Recently, another treatment option has been added which includes prenatal diagnosis and intrauterine fetus surgery. This option, however is in its infancy and indeed requires more experience (13).

This study lacks the follow up after cleft surgery and thereafter. Certain decisions regarding waste or value of such modalities need more prospective randomized clinical trials sharing the same method of PSIO or PSNAM and corrective surgeries methods. Establishment of the cleft wards and teams in teaching subspecialty hospitals in our country, Iran is suggested. This collaboration would indeed increase the knowledge transfer, update and would enhance the long term outcomes and surveys that covers all aspects of the treatment not just medical, but also includes the psychosocial aspects.

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### Authors' Contribution

Vahid Soltan-Karimi designed the study, Arash Poorsattar Bejeh Mir drafted the manuscript. Both authors critically evaluated the final draft and approved it for publication

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