

## CASE REPORT

# Nasoalveolar Molding in Infant with Cleft Lip and Cleft Palate

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## ABSTRACT

**Introduction:** Since the 1950s, presurgical infant orthopedics has been in use as an adjunctive neonatal therapy for the correction of cleft lip and palate. Nasoalveolar molding is used successfully to reshape the nasal cartilage and to mold the maxillary arch before surgical repairing cleft lip.

**Aim:** The aim of the present study is to correct cleft lip and palate by using nasoalveolar molding (NAM).

**Case report:** We describe the case of a 2-day-old baby who presented with unilateral cleft lip and palate, which was corrected by the NAM technique. First, we describe the use of acrylic which is attached to the vestibular shield of an oral molding plate in order to mold the nasal alar cartilages into its normal form and site during the neonatal period. This technique takes benefit of the flexibility of immature cartilage and its capability to sustain a permanent correction of its form. This article presents the appliance design, clinical management, and biomechanical principles of NAM therapy.

**Conclusion:** Use of NAM has removed surgical scars related to conventional columella reconstruction and has decreased the number and price of revised surgical procedures.

**Keywords:** Cleft lip and palate, Nasoalveolar molding, Presurgical orthopedics.

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## INTRODUCTION

Treatment and management of cleft patients are a big challenge to the pediatric dentist. Traditionally, all techniques to correct cleft lip or palate were focused on elastic retraction of the protruding premaxilla and followed by stabilization after the surgical repair. McNeil<sup>1</sup> had introduced presurgical infant orthopedics in 1950. Alveolar segments were molded into desired position by using a series of plates. This technique was further developed and made popular by Burston, an orthodontist.<sup>2</sup>

Further in time, passive orthopedic plate was described by Hotz et al<sup>3</sup> which can align the cleft segments. In the past 10 years, it has been proved that rectification of nasal deformity was done by stretching of the nasal mucosal lining, and attainment of nonsurgical columella elongation, and this can be done in combination with molding of the alveolar process in cleft patients.<sup>4</sup> A new technique was described by Grayson et al,<sup>5</sup> in which alveolus, lip, and nose were molded presurgically among the infants born with cleft lip and palate.

The NAM appliance has two parts: One is an intra-oral molding plate and other is nasal stent which mold the alveolar ridge and nasal cartilage concomitantly.<sup>5</sup> The main objective of the presurgical NAM appliance is to decrease the severity of the original cleft deformity and thus enable the surgeon to attain better repair of the alveolus, lip, and nose.

As compared with other presurgical orthopedics technique, the NAM technique has brought about significant improvements in the surgical outcome of the primary repair among cleft lip and palate patients.<sup>6</sup>

## CASE REPORT

A 2-day-old baby girl with unilateral cleft lip and palate was presented in the Department of Pedodontics and Preventive Dentistry, Vidya Shikshan Prasarak Mandal's Dental College & Research Centre (Fig. 1). There was no history of consanguineous marriage or any major illness during pregnancy. Patient's mother's age was 24 years during labor. Mother delivered full-term baby by cesarean. Initial examination of the baby was carried out in

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Fig. 1: Unilateral cleft lip and palate

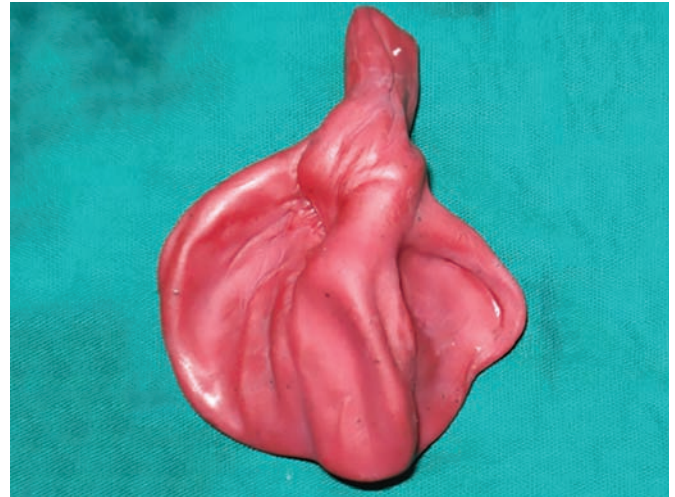


Fig. 2: Impression of cleft lip and palate



Fig. 3: Conventional molding plate



Fig. 4: Conventional molding plate placed in patient mouth

the ward itself. Baby's cleft pattern was classified under Veau's class III. The parents were counseled regarding feeding, and oral health care was done.

The parents were explained about the cleft deformity and consent was taken regarding various stages of treatment. The procedure of NAM was explained in detail to the parents and, the technique, requirement for periodic check-ups, and sequential correction were explained. In the first step, the impression was recorded with the infant fully conscious, in prone position and anesthesia was not administered to the patient (Fig. 2). Before impressions, the child was nothing by mouth nearly for 2 hours. Impressions were taken in the ward with child in the lap of her mother.

Impression was recorded very cautiously and it should be done in the presence of anesthesia team. Primary impression of the cleft lip and palate infant was recorded within the first week of birth. Primary impression was recorded with the help of impression compound (Fig. 2).

After setting of impression, the tray was removed, and the mouth was examined for residual impression material. In the second step, the impression was filled with dental stone and cast was prepared and labeled with patient's name, age/sex, and date of impression. The main purpose of the dental stone model was measurements and fabrication of appliance.

In the next stage, with the help of self-cure acrylic resin, a conventional molding plate was prepared on the maxillary cast. The molding plate has a nasal stent wire passed from it going in superior direction toward the nose. To remove tissue irritation, the tip of wire was covered with acrylic and this acrylic at active tip of nasal stent was covered with a thin layer of soft denture lining material when pressure is applied for NAM (Figs 3 and 4).

After preparation of the NAM plate, examining of rough areas should be done. At the time of handling of plate to parents, instruction regarding oral hygiene maintenance, cleaning, and insertion and removal of plate was



**Fig. 5:** Presurgical photo



**Fig. 6:** At 1-year follow-up

done. Adjustment to plate during feeding by infant will take time initially.

A surgical tape was used to fit appliance extraorally to the cheeks and bilaterally, which have orthodontic elastic bands engaged to the opposite side. The patient was called the next day to evaluate the feeding status and then at weekly intervals. Feeding plate was modified during weekly visit by patient, in order to guide the alveolar segment in the desired position, and direction of nasal wire should be changed during these visits. The lip segment will come together on closure of the alveolar gap. Examination of local area was done for ulceration or pressure points.

For the purpose of accuracy, nasal parameters and alveolus were measured with the help of thread and artery forceps on dental stone model and also on the patient directly. Matching of both measurements, i.e., on patient's and dental models, was done, and they were found to be almost similar.

Reference points used for different measurements were (Figs 2 and 3):

- Alar base noncleft side
  - Columellar base noncleft side
  - Midpoint of a to b, center of floor of the nose
  - The highest point on the alar rim noncleft side
- The measurements after lip repair:
- Alar base cleft side
  - Columellar base cleft side C, midpoint of A to B, center of floor of the nose
  - The highest point on the alar rim noncleft side
- These measurements included the following:

Height of the nostril = distance from midpoint of floor of nose to the highest point on alar rim, i.e., c to d or C to D

Width of the nostril = distance between alar base and columella base, i.e., a to b or A to B

Alveolar gap = gap between alveolar arch (on dental models). All measurements were taken in millimeters.

These measurements and photographs were taken, at the time of first presentation before beginning of NAM.

Photographs were taken at the time of operation of lip repair (Fig. 5), at 1-year follow-up, or when this patient came for palatal repair (Fig. 6). The patient underwent lip surgery at the age of 5 months. The Millard's lip repair was done. The palatal surgery was done at the age of 16 months. The Veau-Wardill-Kilner repair of palate was done. Palatoplasty by Von lagen back/view method was done.

## DISCUSSION

Plastic surgery has made great advances in the area of cleft surgery, but surgical repair alone cannot resolve various problems associated with deformities that result due to cleft lip and palate. A particular difficult challenge to surgeons is the formation of an esthetically acceptable correction of the deficient columella and the deformity of the nasal cartilages in patients with bilateral cleft lip and palate.

The current surgical protocols result in formation of scars at the base of the nose and columella, whereas the nasal tip cartilage deformity remains uncorrected. During the first month, the cartilage of infants was highly plastic and this forms the basis of modification of traditional methods of presurgical molding plate therapy described in this article.

Matsuo et al<sup>7</sup> put forward a theory that due to the presence of high level of hyaluronic acid in neonatal cartilage, it has high degree of plasticity, which is a constituent of the proteoglycan aggregate of the intercellular matrix in the cartilage. Recent clinical studies have shown the role of NAM in correcting the nasal cartilage deformity, columella length deficiency, and alveolar malposition prior to the primary surgical repair.<sup>8-10</sup>

In addition, presurgical NAM, when used in combination with a modified surgical approach,<sup>10</sup> allows for an

initial surgical procedure to address the lip–nose–alveolus complex and its deformity

## CONCLUSION

From the above, we conclude that the use of NAM technique has removed surgical scars associated with traditional columella reconstruction. This technique also reduced the number and cost of revision of surgical procedures and has become the standard of care in this cleft palate center.

## CLINICAL SIGNIFICANCE

Clinical skills in NAM develop over time. Efficiency in treating patients increases, as these clinical skills improve, and if training of dental assistants or dental laboratory under direct supervision of the practicing clinician is done, regarding the adjustments to the molding plate, these skills can be more superior.

There has been a significant difference in the outcome of primary surgical cleft repair due to the initiation of NAM and the associated surgical technique.

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