

Naso Alveolar Moulding: A Case Report

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ABSTRACT

Background: Surgical approach remains prime choice for treating unilateral/bilateral lip and or palate deformities, some inadequacies remain like scarring of the nasolabial complex, multiple intervention to achieve desired results etc. pre surgical naso alveolar molding consists of selective repositioning of active molding of alveolar segments as well as surrounding soft tissue. This clinical case report of unilateral cleft lip and palate treated with pre surgical naso alveolar molding before surgery, showed significant reduction in defect size and improved contour of the of the columella-philtrum region for superior surgical esthetics.

Keywords: Presurgical naso alveolar molding, unilateral cleft lip and palate, intraoral molding plate.

INTRODUCTION

Cleft lip and cleft palate are the most common congenital malformations. The reported incidence of cleft of lip and palate varies from 1 in 500 to 1 in 2500 live birth depending on the geographic origin, racial and ethnic backgrounds and socioeconomic status. Cleft lip and palate can present with considerable variation in severity and form. Generally, the wider more extensive clefts associated with more significant nasolabial deformity¹. The unilateral cleft deformity is characterised by a wide nostril base and separated lip segments on the cleft side². The bilateral cleft deformity typically presents with a procumbent and/or rotated premaxilla premaxilla. The alar base width is significantly increased and the lip segments are widely separated³.

There have been numerous techniques documented over centuries to improve the position cleft alveolar segments. In 1686, Hoffman described the use of head cap with arms extended to face to retract the premaxilla and narrow cleft. There have been many improvements to this technique of using

the head as a extraoral anchorage, and it is used still today to retract the premaxilla. The concept of intraoral device to reposition the cleft alveolar segments is attributed to 'McNeil'.

Through the series of acrylic plates, the segments were actively molded into desired position. In 1975 Georgiade and Lathman introduced a pin retained appliance to simultaneously retract the premaxilla and expand the posterior segments over period of time. Hotz described the use of passive orthopaedic plate to slowly align the cleft segments. The premaxilla is not retracted, and by the age of 10 hotz feels that the face has grown forward in to appropriate balance with the premaxilla. All these appliances were designed to correct the alveolar cleft only, despite the fact that the cleft nasal deformity remains the greatest esthetic challenge¹. In 1993, Grayson et al described a technique to correct alveolus, lip and nose in infants born with cleft lip and palate. Matsuo has done extensive original research on cartilage molding he recognised that the cartilage is soft and lacks elasticity. Matsuo used

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Fig 1: Patient with midfacial unilateral cleft.



Fig 2: Unilateral cleft showing involvement of lip alveolus and palate.



Fig 3: Preliminary impression and cast.

a stent in the form of a pair of silicone tubes to shape the nostrils, with some limitations. These include need the need for an intact floor and inability to direct the force since his stent expanded circumferentially. Grayson adapted his nasal stent to extend from the anterior flange of an intraoral molding plate. This technique was called Naso Alveolar molding¹ (NAM).



Fig 4: Intraoral molding plate lined with tissue conditioner with 5mm diameter hole at center.



Fig 5: Intraoral molding plate in position with elastics attached with silicone tapes.



Fig 6: Nasal stent attached to existing molding plate and NAM appliance is in position in oral cavity with silicone tapes.

The goal of presurgical nasoalveolar moulding is to align and approximate the alveolar cleft segments while at the same time achieving correction of the nasal cartilage and soft tissue deformity. These corrections are achieved by adding a nasal stent to the labial vestibular flange of a conventional intraoral molding plate. The nasal



Fig 7: Three months after naso alveolar molding. Notice the close approximation of cleft lip segments.



Fig 8: Intraoral defect showing reduction in size approximation alveolar segments.



Fig 9: Shows nasal changes, lifting of columella.

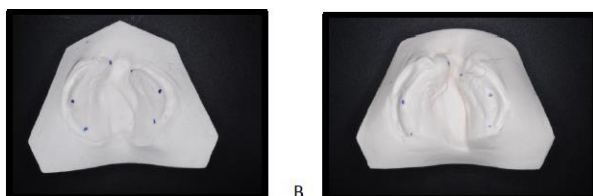


Fig 10: Pre and Post NAM models.

A -Anterior width alveolus = 10mm	B Anterior width alveolus = 4-5mm
Middle width alveolus = 41mm	Middle width alveolus = 41mm
Posterior width alveolus = 36mm	Posterior width alveolus = 36mm

stent and alveolar molding plate are adjusted gradually over a period of 3 months to achieve nasal and alveolar symmetry, nasal tip projection, and contact of the cleft alveolus just before primary lip, nasal, and alveolar surgical repair. The nasoalveolar orthopedic appliance is held in place with a combination of surgical tapes and elastics applied to



Fig 11: Pre and post operative photographs.

the cheeks and cleft lip segments. The presurgical reduction in osseous and soft tissue cleft deformity considerably reduces the magnitude of the surgical challenge, resulting in improved surgical outcomes.

The advantages of nasoalveolar presurgical infant orthopedics may be considered from a soft tissue perspective as well as from the usual osseous perspective. The presurgical reduction in soft tissue and cartilaginous deformity facilitates achievement of surgical soft tissue repair under minimal tension and optimal conditions for scar formation. There is also a reduction in the number and complexity of minor soft tissue revision surgeries required to maintain acceptable nasolabial aesthetics as the nose grows⁴.

CASE REPORT

A male child of 3 months 27 days of age presented with a complaint of cleft deformity on one side of the face. (Fig .01). Examination revealed that it is a unilateral complete cleft on the left side involving lip, alveolus, hard palate and soft palate. Intraorally the alveolar segment showed a discrepancy in the sagittal relationship between cleft side and noncleft side. (Fig.02) To reduce the width of the alveolar cleft, and to improve the alignment of the base of the nose and lip segment which enables the surgeon to enjoy the benefit associated with repair of an infant that has minimal cleft deformity, Presurgical naso alveolar moulding was decided in this case. Vertical and horizontal measurement of the cleft of the lip and nose was measured to assess the treatment changes.

APPLIANCE CONSRUCTION

heavy bodied elastomeric impression material was used to make the impression of the intra oral defect child's mouth and cast was poured

using type III dental stone. Later cast was inspected for alveolar anatomy and if any surface irregularities (Fig 03). First an intraoral molding plate was fabricated with auto polymerizing clear acrylic resin and tissue surface was lined with a thin coat of tissue conditioner. A 5 mm diameter hole was made in the centre of molding plate palatal vault region to provide an airway in the event that posterior border of the plate drops down onto tongue (Fig 04).

Parents were instructed to keep the appliance full time and take out for cleaning as needed, at least once a day. The appliance was secured extra orally to cheeks, bilaterally by surgical tapes which have an orthodontic bands at one end. The elastics loop over a retention arm extending from the anterior flange of the plate. The retention arm was positioned approximately 40 degree down from the horizontal plane to achieve proper activation and to prevent unseating of the appliance from the plate. (Fig.05) The tapes and elastics are changed once a day. Weekly visits were required to modify the moulding plate to guide the alveolar segment into the desired position. Parents were instructed to place tapes in order to approximate the cleft lip segment the tape should be applied at the base of the nose and it should be applied to the noncleft side first, then pulled over and adhered to the cleft side. After 3rd week a nasal stent, made of 0.036 inch round stainless steel with the shape of a swan neck at the end was added to the appliance (Fig.06). Tissue conditioner was changed subsequently to provide comfort to the patient. The upper lobe of the nasal stent enters the nose and lifts the dome until a moderate amount of tissue blanching occurred. After 3 months of naso alveolar molding considerable changes were noticed both intraorally and extraorally (Fig.07 & 08)

DISCUSSION

The principal objective of naso alveolar moulding was to reduce severity of the initial cleft deformity which enables the surgeon to enjoy the benefits associated with repair of an infant that has a minimal cleft deformity. Technique allows us to align lip segments closer, lower nasal cartilages and uprighting columella the reason behind the this

tissue molding due to soft nature of cartilage which lacks elasticity in new born.

The original research on for molding cartilage was performed by Matsuo. He believed that the high maternal level of estrogen at the time of birth with an increase in hyaluronic acid, which inhibits the linking of the cartilage intercellular. This process may be necessary to relax ligaments, cartilage and connective tissue, enabling the fetus to pass through the birth canal and later the levels of estrogen decline immediately after the birth⁵⁻⁸.

Patient before implementation of naso alveolar moulding, note wide nostril base, widely separated lip segments. The affected lower lateral nasal cartilage displaced laterally and inferiorly which results in a depressed dome, the appearance of an increased alar rim, an oblique columella and an over hanging nasal apex.

Patient following nucleolar molding, just before primary surgical lip closure, note the marked reduction in severity of cleft deformity, improving prognosis of surgical outcome. The lip segments are in closer approximation at rest, uprighting of the columella.

Three months after the naso alveolar molding overall reduction in the cleft defect is were presented with measurements as follows:

- Width of the cleft in the lip is reduced by 2.3 mm (Fig09)
- Width of the cleft in the alveolus is reduced by 5.5 mm (Fig08)
- Alveolar segment on the non cleft side moved inward and on the cleft side moved outward (Fig11)
- Nasal contour of the columella on the cleft side increased (Fig 12).

CONCLUSION

Naso alveolar molding has evolved over the past decade in to present form through contributions made by practising clinicians and parents this method of treatment requires attention to detail with appliance adjustments that are at times less than a millimetre dimensions. Clinical skills in naso alveolar molding develop with practice, much the way one acquires the mastery of the more rigorous technique in clinical practice. A significant

saving of time may be achieved by the training of dental assistant or laboratory technician to make adjustments to the molding plate under direct supervision of skilful clinicians. Since initiation of NAM and the associated changes in the surgical technique which have taken advantage of the NAM procedure, there have been significant improvements in the outcome of primary surgical cleft repair.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

REFERENCES

- 1) Cleft Lip and Palate—Diagnosis and Management :2nd Edition : Samuel Berkowitz
- 2) McComb H. Primary correction of unilateral cleft lip nasal deformity. A 10 Year Review. *Plast Reconstr Surg* 1985; 75(6):791-799
- 3) Lathman RA. Development and structure of premaxillary deformity in bilateral cleft lip and palate. *Br J Plast Surg* 1973;26(1):1-11.
- 4) The Cleft Palate-Craniofacial Journal: Vol. 38, No. 3, pp. 193–198
- 5) Matsuo K, Hirose T, Iwasawa M, Katohda S, Takahashi N, Koh B. Nonsurgical correction of congenital auricular deformities in the early neonate: A preliminary report. *Plast Reconstr Surg* 1984;73(1): 38-51.
- 6) Matsuo K, Hirose T. Nonsurgical correction of cleft lip nasal deformity in early neonate. *Ann Acad Med Singapore* 1988;17(3):358-365.
- 7) Matsuo K, Hirose T, Otagiri T, Norose N. Repair of cleft lip with nonsurgical correction of nasal deformity in early neonatal period. *Plast Reconstr Surg* 1989;83(1):25-31.
- 8) Matsuo K, Hirose T. Precorrection of non surgical over correction of cleft lip nasal deformity. *Br J Plast Surg* 1991;(1):5-11.