

PRESURGICAL NASOALVEOLAR MOLDING: A MERITORIOUS APPROACH IN THE MANAGEMENT OF A CASE WITH UNILATERAL CLEFT LIP AND PALATE

Prosthodontics

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ABSTRACT

The standard treatment for the cleft lip and palate patients remains a subject of great debate. To improve the esthetic outcome of lip repair, the concept of presurgical nasolabial molding was introduced. It is a passive molding method which reduces the deformity associated with cleft lip and palate and thus reduces the need of multiple surgeries to get a superior esthetic outcome. This case report shows effective use of nasolabial molding appliance for the management of unilateral cleft lip and palate prior to lip surgery.

KEYWORDS

Unilateral cleft lip and palate, nasolabial molding, presurgical orthopaedics.

INTRODUCTION

Neonatal maxillary orthopedics still remains a debatable part of the comprehensive care for cleft lip and palate patients even after being more than half a century after its introduction by the Scottish Prosthodontist C. Kerr McNeil [1]. He paved the way for the modern school of presurgical orthopaedic treatment in cleft lip and palate in 1950 by using a series of plates to mold the alveolar segments actively into the desired position. Burston [2], an Orthodontist, further developed McNeil's technique and made it popular. In 1975 Georgiade and Latham [3] introduced pin retained appliance to actively retract the premaxilla and expand the posterior segments over a period of days. Hotz [4] described use of passive plate to slowly align the cleft segments after the controversy of use of active plates in retraction. Till that time treatment was mainly concerned to the closing of alveolus only in spite of the fact that nasal deformity associated with cleft possess greatest esthetic challenge. It was in 1993, Grayson et al [5] put forward a new technique to mold the alveolus, lip and nose in infants born with cleft lip and palate presurgically. This technique had the advantage over other previous methods in correcting nasal deformity also. The original research on neonatal molding of the nasal cartilage was performed by Matsuo using silicone tubes to mold the nostril [6-8].

This article describes a case report of presurgical nasolabial molding in a patient with unilateral cleft lip and palate. The objective of treatment was to reduce the severity of cleft deformity, approximation of lip segments to reduce tension in the tissues after lip repair, to reduce the size of the cleft, to improve nasal esthetics and to decrease the nasal alveolar base width. Treatment success by this method is still a matter of debate. Hence this is one such case report which shows the perceptible advantage of this procedure.

Case report

A 15 days old infant was referred to the Department of Prosthodontics, Tamilnadu Government Dental College and Hospital, Chennai from Institute of Child Health and Hospital, Egmore with a diagnosis of nonsyndromic unilateral cleft. Infant had a birth weight of 2.5kg and no other anomalies were present. On examination patient had deviation of nasal septum towards the noncleft side and nasal tip was depressed with marked displacement (Fig 1a). Intraoral features included complete cleft lip and palate with a cleft gap of 7-8mm between (Fig 1b).



Fig 1a: Extraoral view



Fig 1b: Close view showing cleft



Fig 2: Impression

Hence our team decided to do presurgical nasolabial molding. Parent counselling was the first step advocated which included guidelines to take care of the infant with cleft, significance of the treatment and the need of parent co-operation and regular follow up required for the procedure. And an impression was made using silicone impression material (Fig 2) with the patient head in upside down position.



Fig 3: Master cast



Fig 4: Molding plate inserted



Fig 5: Lip taping

Afterwards cast was poured (Fig 3). A feeding plate was fabricated with heat cure clear acrylic resin after blocking out of the cast and inserted on the next day. Parent was instructed regarding the use and maintenance of the plate. After one week nasolabial appliance was fabricated which consisted of an intraoral molding plate with a handle of 40 degree angulation (Fig 4). Appliance was inserted after ensuring there is no soft tissue irritation and held in place with micropore tapes which have orthodontic red elastic of 0.25 inch diameter at one end. The elastic which is looped on the retention arm of the molding plate should be stretched approximately twice the length of their resting diameter for proper activation force of about 100 grams. Taping the lips together helps to upright the inclined columella along the midsagittal plane (Fig 5). The horizontal surgical tapes are a quarter inch in width and about 3-4 inches in length. Molding plate had been adjusted weekly by selective removal of hard acrylic from the region where bony apposition is desired. At the same time soft liner is added to a thickness of 1mm in the region where bone is to be resorbed.

Treatment was continued for 8 weeks. Considerable reduction in the cleft space was noticed. Baby's nourishment was improved and parents were counselled constantly at each visit which helped to get the best outcome. Every 2 weeks a new molding plate was fabricated after taking new impression which helped in accommodating to the change in alveolus. When the cleft size was reduced to 5mm nasal stent was fabricated with a 0.36 inch stainless steel wire (Fig 6) and inserted after adding soft liner at the tip (Fig 7). Treatment was continued for 4 more weeks. At the end of the treatment, lips of the patient was almost approximated (Fig 8), alveolar cleft size was reduced to 2mm and almost a continuous arch form was obtained (Fig 9).



Fig 6: Nasal stent

Fig 7: Nasal stent inserted

Fig 8: At the end of NAM therapy

Fig 9: Cast showing reduction of cleft space

Nasal contour was also improved. After the PNAM therapy patient was referred to the plastic surgery department. Good esthetic result was achieved after lip surgery. Fig 10 illustrates the postoperative picture one month after surgery which shows good columella lift, improved contour of nostril on cleft side which resembles the unaffected side.

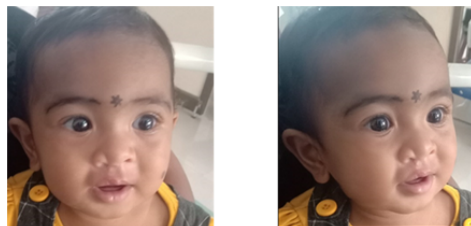


Fig 10: Post surgical extraoral photograph

DISCUSSION

Patients with cleft lip and palate encounters various problems in function, esthetics, speech and psychology. Management of cleft lip and palate is a process that begins in infancy and continues into adulthood. Matsuo [6-8] described that the cartilage in the new born is soft and lacks elasticity. He believes that the high level of estrogen at the time of birth correlates with the increased hyaluronic acid, which inhibits the linking of the cartilage intercellular matrix. Another hypothesis suggested by Hamrick is that, NAM stimulates immature nasal chondroblasts, producing an interstitial expansion that is associated with improvement in the nasal morphology (Chondral Modeling Hypothesis, Hamrick 1999). [9]

The nasoalveolar molding has been significantly shown to improve the surgical outcome of cleft lip and palate patients compared with other techniques of presurgical orthopaedics. The nasoalveolar molding plate described by Grayson and Shetye[10] is made up of hard, clear self-cure acrylic resin. The appliance is secured extra orally to the cheeks and bilaterally by surgical tapes, which have an orthodontic elastic band at one end. The elastics loop over a retentive arm extending from the anterior flange of the plate (Fig 4). The retention arm is positioned approximately down from the horizontal to achieve proper activation and prevent unseating of the appliance from the plate. The position of retentive arm on the labial border of the molding plate in unilateral cleft is determined by pulling the cleft lips together while centering the philtrum and columella. At the junction of the cleft lip segments, a pencil mark is placed and the retentive arm is attached at this point. The vertical position of the retentive arm should be at the junction of upper and lower lip at rest. Instructions should be given to the parent that the plate should be maintained in position of infant's mouth 24 hrs a day and removed only for cleaning after every feed. The tapes should be changed once a day. The elastics(inner diameter 0.25 inch) should be stretched approximately 2 times the resting diameter for proper activation force of about 100 g. Parents should be well instructed to place tapes to approximate the cleft lip segments. The tape should be applied at the base of the nose (nasolabial angle) and should be applied on the non-cleft side first, then pulled over and adhered to the cleft side.

The adjustments of the plate are made by selectively removing hard

acrylic in the inner portion and adding soft denture relining material to the molding plate. At one visit not more than 1 mm of modification of molding plate should be made.

Grayson and Shetye[10]described adaptation of nasal stent to extend from the anterior flange of an intraoral molding plate to increase the columella length as well as to reshape the alar dome. The nasal stent is made up of 0.36 inch round stainless steel wire which takes the form of a swan neck. It has a hard acrylic component which is shaped into a bilobed form in which upper lobe enters the nose and gently lifts forward the dome until a moderate amount of tissue blanching is evident. The lower lobe of the stent lifts the nostril apex and defines the top of the columella.

Complications of NAM: Most common is irritation of the oral mucosa or gingival tissue especially frenum attachments, anterior premaxilla, posterior fauces as the molding plate is reconstructed. If too much force is applied by the upper lobe of the nasal stent, intranasal lining of the nasal tip can become inflamed. Notching along the alar rim results if the lower lobe is not positioned or shaped correctly. Risk of dislodging of the molding plate and obstruction of airway can occur. A small opening measuring 6-8 mm in diameter on the molding plate provides an airway in the event that the plate drops down posteriorly.

CONCLUSION

Presurgical nasoalveolar molding is an easy and passive method of bringing the alveolus and lip together. The greatest advantage of nasoalveolar molding technique is that it enables clinician to selectively apply force to shape the alveolus and cartilage. It is a promising technique which has a high impact on the predictable surgical outcome. Since the procedure demands multiple visits, parent's awareness of the treatment procedure and their co-operation is of utmost importance for the success of the procedure.

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