

Presurgical Nasoalveolar Moulding In Neonate With Unilateral Cleft Lip And Palate; As An Early Rehabilitative Procedure

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Abstract: Management of a neonate with cleft lip and palate and assuring the parents regarding the future well being of the child can be a challenging task. Timely referral by pediatrician and treatment by an Orthodontist and a Plastic Surgeon can help in limiting the deformity to its minimum and aid in normal growth and development of the child. This paper describes the treatment of two neonates with unilateral cleft lip and palate whose treatment were initiated within 24 hours of their birth. Presurgical Nasoalveolar Moulding (PNAM) followed by one stage surgical repair of lip helped us to achieve remarkable results.

Keywords: Lip taping, nasal stent, Presurgical nasoalveolar moulding, presurgical orthodontics and orthopaedics, PNAM.

I. Introduction

Pruzansky was once asked, “When should an Orthodontist’s, speech pathologist’s, Prosthodontist’s interest in the cleft palate child begin?” His response: “Everyone who seeks to serve the needs of the child with a cleft should begin at the beginning”. The present case report followed the same concept of “Timely initiation of PNAM” that gave the excellent results.[1] Cleft lip and palate (CLP) can present with considerable variation in severity and form. Generally the wider, more extensive clefts are associated with more significant nasolabial deformity. These clefts deficient in both hard and soft tissue elements, present a significant surgical challenge to the achievement of a functional and cosmetic outcome. The global epidemiological survey states that cleft palate is present in one in every 600 newborns. United States Bureau of Census (2001) says that a child with cleft is born every 2.5min. Incidence is highest among Asians followed by Caucasians and Africans. In India over 3,500 cleft lip and palate per year are reported.[2] The Cleft lip and palate (CLP) is associated with constellation of problems that need to be solved for successful rehabilitation.[3,4] The integration of Pediatrician, Plastic surgeon, Orthodontist, Oral surgeon, Pedodontist, Prosthodontist, Speech Therapist, Genetic Scientist, Social Worker and Psychiatrist is needed for the management of CLP from birth to till complete rehabilitation is achieved. [5]

The cases reported here shows the remarkable outcome as a result of timely referral from Pediatrician to Plastic surgeon and Orthodontist to bring about optimal results of Presurgical Nasoalveolar Moulding (PNAM) and primary lip surgery in UCLP neonates.

II. Case Report

A 12 hours old male neonatal patients reported with the chief complaint of difficulty in feeding, nasal regurgitation, burping, unable to do breast feeding due to complete furrow in palate. The medical history revealed that pregnancy of both mothers were uneventful and no other relevant history was reported. Extraoral and intraoral examination “Fig. 1” revealed that complete unilateral cleft lip and palate was present extending from left side of alae of nose, lip, alveolus, entire hard palate to soft palate. Presurgical nasoalveolar moulding was planned through Grayson’s PNAM appliance. [6]

2.1 Fabrication of Appliance: “Fig. 2”

The neonate was held upright in mother’s lap to prevent aspiration of impression material. Primary impression of upper jaw was taken with impression compound. Then primary cast was fabricated. A customized perforated special tray was fabricated with auto-polymerising acrylic resin. Then final impression of maxillary arch and lateral aspect of nostril with defect was made with rubber base impression material to record the precise details of supporting structures and defect. Master cast was fabricated and excessive undercuts were blocked out with modeling wax. Nasal stent was prepared separately. Then appliance with nasal stent was acrylised with auto-polymerising acrylic resin. Elastic thread of approximately 12 inches length was passed through and tied to the eyelet of the appliance. Minor adjustments were made in vivo and then final finishing and polishing was done. The PNAM appliance with nasal stent and elastic thread (to be secured with micropore adhesive tape on forehead) was delivered to the patient along with micropore adhesive tape above the lips

(known as Lip Taping) so as to approximate upper lip properly which would be helpful later during lip surgery. Patient's mother was instructed about method of usage, function, cleaning and maintenance of the appliance. Patient was kept on regular follow up after one week and then at every month for activation of nasal stent. Selective grinding and selective addition of soft relining acrylic was done to facilitate nasoalveolar moulding. At the age of 4 months reassessment of both cases were done and found that greater and lesser segments of maxillary arches approximated towards each other, cleft size drastically reduced and alae of nose was elevated. Then one stage lip repair with optimal and symmetric tissue positions was done by plastic surgeon with better esthetic outcome."Fig. 3"

III. Discussion

Shaw and Semb [7] demonstrated that the current approach to orthodontic management of CLP found in neonatal orthopaedics commonly advocated to reduce excessive alveolar cleft width and approximate lip margins before lip repair. The rationale for this procedure is that surgical repair of lip is revealed more easily, leaving less scar that may interfere with facial growth later. The palatal cleft can be reduced upto 50% with simultaneous desired rotations of greater and lesser segments of maxilla to narrow the cleft further. It was believed that narrowing of palatal cleft was secondary to changes in the slope of palatal shelf as it became more horizontal during treatment due to guidance of moulding plate. Moreover it prevents continuous impingement of tongue into cleft and hence prevents its further enlargement and improves its orientation horizontally. Regarding the timing of starting PNAM in neonate Grayson [6] reported that the hyaluronic acid levels are found to be remain increased in the neonatal tissue till about 45 days even after birth. Therefore the inherent moulding capacity of neonatal cartilaginous tissue is more. Surgical Repair is usually done at 3 months after birth for cleft lip and at the age of 15-18 months for cleft palate. Thereby PNAM during this phase before surgical repair helps to bring the CLP segments as close as possible and makes surgery easy as well as gives maximum esthetics.

3.1 Additional Advantages of PNAM [6]

- 3.1.1 Act as feeding appliance thus improves feeding.
- 3.1.2 Act as a guide for growth and development of palatal shelves more horizontally and towards each other.
- 3.1.3 PNAM therapy helps in decreasing the complexity and number of subsequent refinement surgeries.
- 3.1.4 Improves the posture of tongue hence improves speech at later stage of life and growth of dentofacial structures.
- 3.1.5 Provides positive psychological impact on the parents as because of improved feeding weight gain issues are resolved and timely surgical intervention leads to early reduction of deformity.

IV. Figures



Figure 1: Two patients born with a left unilateral complete cleft lip and palate and its associated nasal deformity. Concave lower lateral alar cartilage, depressed nasal tip, dropped nostril apex, columella base

deviated to the noncleft side, deficient columella length on the cleft side, wide alveolar gap, and large interlabial gap.



Figure 2: Fabrication of PNAM appliance. A; Impression taken, B; Beading and boxing, C; Study Model, D; Wax block out in Cleft Area, E; Initial Acrylic plate given without nasal stent for 1week, F; PNAM Appliance delivery and Lip Adhesion, G; PNAM Appliance with Nasal stent delivered after a week which was activated on weekly interval, selective grinding and addition was also done on palatal surface of appliance. The differential forces exerted by the nasal stents, surgical tapes, and a horizontal band placed across the columella, provide for required changes.

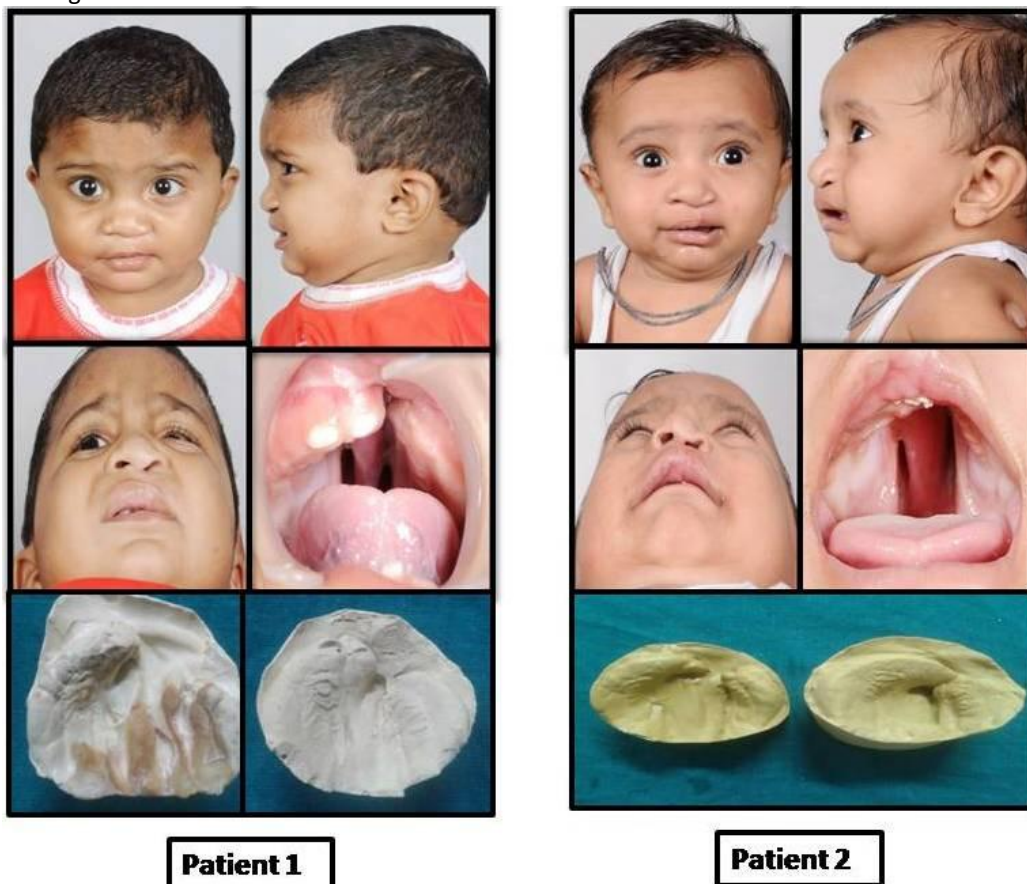


Figure 3 : Post-treatment extraoral and intraoral photographs. Improved lower lateral alar cartilage, elevated nasal tip and nostril apex, improved position of columella base and columella length on the cleft side,

drastically reduced alveolar gap, interlabial gap. Extraoral frontal photographs showing healing with minimal scar formation. Study Models showing approximation of alveolar ridges and reduction of cleft size.

V. Conclusion

Candidates for Presurgical Orthopaedics management present with severe tissue disparities such that a surgical closure without tension may be difficult to achieve. With proper and timely presurgical orthopaedic management the tissues can be brought into better alignment permitting a one stage repair under optimal and symmetric tissue positions with excellent results.

Acknowledgement

We extend heartfelt thanks to our Departmental Staff namely Dr. Renuka Patel, Dr. Amit Bhattacharya, Dr. Harshik Parekh and Dr. Rahul Trivedi,. Immeasurable thanks to Dr. M.F. Shaikh, Cleft Surgeon , Civil Hospital , Ahmedabad for their cooperation while completing the surgical aspect of reported cases.

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