PRE-SURGICAL NASOALVEOLAR MOLDING TECHNIQUE USED FOR EARLY TREATMENT IN COMPLETE CLEFT LIP AND PALATE NEONATES; CASE REPORTS

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ABSTRACT

Despite ongoing scientific debate on treatment of oro facial clefting, varying treatment schemes and surgical techniques are still being used by different cleft care teams. Early treatment – before primary lip / nose repairs- of a neonate with a cleft lip and or palate (CLP) using a conventional maxillary plate has been appealing for cleft surgeons, dentists and also parents worldwide as this may result in reduction of cleft width and hence lessen the esthetic and functional implications involved with the overall multidisciplinary CLP treatment. In this case report we sought to introduce a rather recent approach for early management of neonates born with cleft lip palate deformity through presurgical nasoalveolar molding (PNAM) technique. Two complete cleft lip palate cases will be reported with illustrations of laboratory and clinical steps involved.

Key Words: *Cleft lip palate, oral clefts, presurgical nasoalveolar molding, neonate cleft care.*

INTRODUCTION

Oral clefting involving upper lip and or palate presents a challenge for the treating cleft care team members to restore esthetics and function. Nasoalveolar molding (NAM) is an intraoral presurgical orthopedic appliance introduced at the first weeks of life of an affected CLP newborn, it was introduced by a Craniofacial Orthodontist in the late 1990s exploiting the plasticity of the nasal cartilage and early alveolar molding to reduce cleft gap.[1] The objective of the presurgical NAM is to reduce the severity of the original cleft deformity and thereby enable the surgeon to achieve better results and less future repairs of the alveolus, lip and nose.[2]

Nasoalveolar molding as introduced by Dr Grayson from New York University comprises of a maxillary plate and nasal stents. It aims to elevate the nasal alar wing and nasal tip during the first 5 to 6 weeks prior to the primary lip and nose repairs, while in bilateral CLP deformity it aids in the elongation of the columella which is paramount to reduce nostril flattening and collapse.[3,4] Primary lip repairs is done at 3 months of age range 3±3 years; so whatever moulding is done is carried out prior to 3-4 months of age hence idal time for molding is from birth to 03 months. This nasal molding is preceded or accompanied with alveolar segments approximation and alignment. Both alveolar and nasal molding is achieved via orthodontic resin additions and trimming during weekly visit intervals. This offers improved symmetry of the nostril and alveolar segments post chelioplasty[5,6] as this primary repair becomes a tension free surgery.

In a recent study, over one third of united states national Craniofacial centers offer NAM as a presurgical management for infants with CLP deformity[7], another European study concluded that PNAM is still rather an innovative protocol of treatment, and it seems promising treatment modality.[8] In the Middle East region NAM use is still not a common treatment approach, as usually surgeons undergo the primary lip repair at 5-6 months of age without any presurgical intervention. In this article we report two cases of CLP deformity treated with PNAM technique and then followed by lip and nose repair at Farah Rehabilitation center of the Royal Medical Services Amman, Jordan.

Unilateral Cleft lip and palate case

A 10 days old female H.K newborn was referred from plastic and reconstructive surgery unit at Farah Rehabilitation center to our Orthodontic department, she presented with a unilateral complete clefting into upper lip and palate, medical records showed no associated syndromes or medical impairments.

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Initiation of treatment

Upon H.K parent's interview and thorough intra-oral examination, an impression - using a previously made special tray- of the maxillary arch was obtained via a heavy-body poly vinyl siloxane impression material, with the infant held in a reclined position in her father lap, a dental examination mirror was used to push down tongue and assure airway patency during this impression taking procedure. Lip tapping was initiated at the same day using 3M Steri-strip surgical tape and Duo-derm skin patches (see Fig 1). Parents were taught and instructions were given for use and placement, appointment was given the following day for fitting of molding plate.

While at dental laboratory, two dental stone casts were made; one for patient reference and other as working model, this was used to fabricate the molding plate. We discussed design and fabrication steps on the working cast with the operating technician beforehand, also all under cuts including cleft spaces were blocked with baseplate wax, then using autoploymerizing acrylic resin a 2-3mm thickness molding prosthesis was fabricated along with stainless stents extensions as described by[9,10] see Fig 2.

Treatment progress

Maxillary acrylic plate was inserted at the second visit, mild trimming and polishing was done for rough surfaces to prevent soft tissue ulceration and trauma. A denture adhesive paste is used to retain this molding plate while in oral cavity, parents were instructed about proper wear and oral hygiene maintenance. We stress the importance of parent compliance and cooperation through the whole treatment process to attain satisfactory results.

HK cleft infant was seen every week, acrylic trimming was done from tissue surfaces of palatal alveolar processes to aid in alveolar segments approximation utilizing cheek pressure coming from facial and lip tapping. At 45 days, wire extensions were removed and single 36 mils stainless steel wire inserted into acrylic plate extending below left nasal alar base, wire bending using bird peak and three prongs pliers to fabricate nasal prone as kidney shape, this was later covered with orthodontic resin to elevate nasal tip upward and ipsilateral to help attain symmetry in nasal septum as well. (See Fig 3). Each visit a 2mm activation of the nasal piece was done using a three prongs plier. Primary lip and nose repair was done at day 105, and 2 weeks later two pieces of nasal conformer was fabricated for retention of nasal symmetry. See Fig 4

Bilateral Cleft Lip and Palate case

R.F was 15 days old male newborn with a bilateral cleft lip palate deformity referred from plastic and reconstructive surgery department at Farah Rehabilitation center to our orthodontic department (see Fig 5). Medical records showed no associated diseases.

Treatment

Upon parents interview and intra-oral examination, we decided to accept his alveolar segments proximity and to lengthen the clearly deficient columella via nasal molding, so facial tapping was initiated to enhance better lips proximity and maxillary acrylic plate was fabricated with two stainless steel wire extensions to initiate nasal molding at newborn's age of 21 days. (see Fig 6).

Clinical and laboratory steps were no different than unilateral cleft lip palate case presented in 2.1. Primary lip and nose repair was done at 3 months of age (see Fig 7). Both newborns had nasal conformers for retention of nasal deformity correction attained via NAM therapy. We recommend retention for at least one year as proposed by Chang et al (2010).[11]

RESULTS

This approach of presurgical nasoalveolar molding permitted the nose of patients with unilateral and bilateral CLP to be easily molded and lessen the degree of asymmetry or deficiency in nasal tissues apparently. This technique of Nasoalveolar molding also reduced cleft gap at both alveolar and palatal areas, as it prevented tongue insertion into the cleft region via the acrylic plate palatal coverage, additionally, more proximity on the alveolar clefting were accomplished using the facial and cheek adhesive tapping applied across the clefted lip, this was confirmed during clinical follow ups and photographic assessments. Additionally, columellar lengthening attained in bilateral cleft lip case shown at Fig 3.1 was highly indicated to prevent the usual nasal collapse seen in such deformity. Authors feel that taking an impression just before the primary lip repair for the sake of record taking or to carry out some measurements is completely unnecessary.

DISCUSSION

These positive dentofacial changes were achieved as a result of the early neonatal intervention, as cartilage plasticity is being highest directly after birth and keeps on reducing gradually as infants grow.[12] The contemporary introduction of Presurgical Nasoalveolar molding by Dr Grayson was based on the concept of molding infant's cartilage at 2 to 8 weeks of age, a concept firstly exploited and applied by a plastic surgeon named Dr Matsuo dating back to 1984, where Matsuo et al in 1984[13] described a technique to nonsurgically mold and correct congenital auricular deformities, this was thought to be a result of the high levels of circulating maternal estrogen in an infant's bloodstream, these

Fig 1: Shows pretreatment presentation of left sided unilateral complete cleft lip palate, and initation of facial tapping.

Fig 2: Shows fitting of the oral plate along with stainless steel extensions

Fig 3: Shows addition of nasal piece for nostril molding at almost 2monthes

Fig 4: Shows outcome just days after lip repair procedure and at 6months of age.

Fig 5: Shows the initial presentation of a 15days old bilateral cleft lip palate newborn

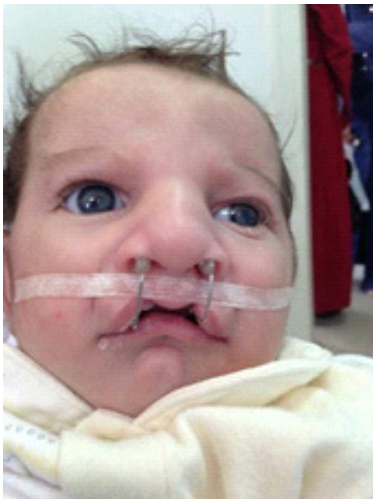

Fig 6: Shows initiation of NAM therapy

levels trigger an increase in hyaluronic acid secretions which can lead in reducing the inherent elasticity of nasal and oral connective tissues.[14] As this plasticity fades over the first 4-5 months of age, a condition of elasticity ultimately settles in, maintaining the molding attained earlier.

Global health epidemiological data coming from developing countries are showing oral clefting incidence is increasing, with a prevalence rate in the Middle East region 1 to 2.4 per 1000 live births.[15] Oral clefting is considered a significant short and long term disability, along with an enormous psychosocial, financial and health burden for whole society.

Fig 7: Shows the surgical outcome post lip repair

Subjects born with Orafacial clefting need holistic care to begin from the early neonatal life and usually extend to at least her/his late teens, and involves multidisciplinary care and team approach involving dental, surgical, medical and speech psycosocial therapy follow ups and care.[16]

NAM is an early non-invasive inexpensive intervention which can be applied via an Orthodontist, Prosthodontist or Paedodontist, where if applied properly and accompanied with compliance and parents cooperation could significantly lessen the degree of cleft severity and consequently make surgery tension free and scar less.[17,18,19] This technique showed short and long term clinically proven benefits for both unilateral and bilateral cleft lip and palate, with esthetic and functional benefits for both unilateral & bilateral CLP.[20-22]

CONCLUSIONS

Authors sought to introduce this rather contemporary approach for early cleft care, and we recommend this simple, non-invasive technique to be implemented and practiced by the pioneers of cleft care teams and professionals in the Middle East region, also we aimed to raise the awareness toward early CLP care among medical and dental professionals. General masses should be made aware about the benefits of NAM, and its importance be highlighted.

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