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(CASE REPORT)

The first modified presurgical orthopedic Naso-Alveolar Molding in IIUM: A joint effort between Neonatologist, Orthodontist and Plastic Surgeon

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Abstract

This case exemplifies a high level of compassion and sophistication through an interdisciplinary approach involving a neonatologist, orthodontists, and plastic surgeon, all collaborating towards a singular objective: the best interest of the patient.

Baby H was born in 2021 with a complete bilateral cleft lip and palate, a condition that occurs in approximately 1 in every 941 live births.

The challenges encountered in this case included addressing the complex emotions experienced by the parents upon receiving their child and managing the size and extent of the cleft.

Baby H was delivered at 38 weeks and 3 days of gestation. The cleft was diagnosed antenatally at 22 weeks' gestation; however, the family did not fully comprehend the extent of the condition.

Due to the size of the cleft, which featured a prominent pre-maxilla, repair typically necessitates a staged approach, beginning with lip adhesion to reduce prominence, followed by definitive lip repair months later. Fortunately, the use of modified presurgical orthopedic naso-alveolar molding (NAM) allowed for the approximation of the separated segments, making a single-step definitive surgery feasible by reducing tension across the repair and shaping the nostrils.

Unlike feeding plates, NAM, is a technique that utilizes an active appliance, to gradually bring the cleft segments closer together. It is a highly demanding treatment that requires a high level of skill, meticulous planning, constant review and patient compliance. This case report illustrates the use of NAM and how it increases quality of the lip repair outcome in this challenging case.

Keywords: Nasoalveolar Molding; NAM; Pre-surgical Orthopedic; Cleft Lip and Palate; Interdisciplinary Management

1. Introduction

This case was chosen for many unique reasons. It portrayed intense level of compassion coupled with the sophistication through an interdisciplinary approach, all with one solid goal: Patient's best interest.

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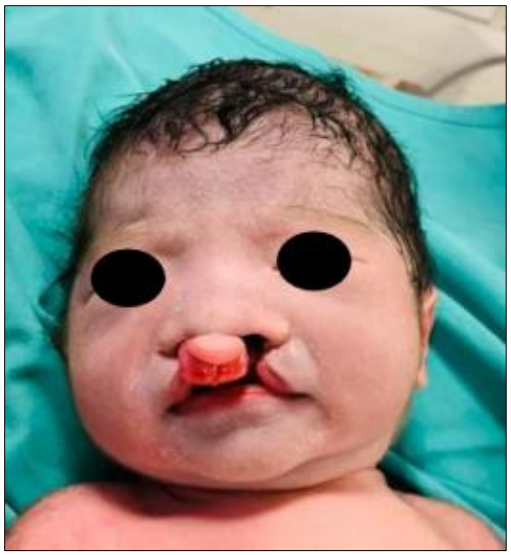


Figure 1 Baby H was born in 2021 with bilateral cleft lip and palate, an occurrence of 1 in every 941 live births (MOH 1998)[1]

Since the cleft was big, approximation of those separated segments prior to surgery would mean a better outcome of the lip repair surgery. This was the very first Naso-Alveolar Molding treatment given in International Islamic University Malaysia (IIUM).

The challenge faced in this case was initially to address the complex emotions experienced by the parents upon receiving their unique baby. Understandably, this was a delicate matter hence not an easy affair. The amalgamation of emotions, shock, and rejection all mixed in the grief cocktail.

Hence, upon devising the treatment plan, the team's first major responsibility was to deal with the boy's family members who were very much in unstable state of mind and emotions.

The nuance in handling this case was striking.

2. General condition and management of baby H

2.1. Written by Asst Prof Dr Syed Abdul Khaliq Syed Abd Hamid – Neonatologist, Department of Paediatrics, Kulliyyah of Medicine and Sultan Ahmad Shah Medical Centre (SASMEC), IIUM, Malaysia

Baby H was born at 38 weeks and 3 days period of gestation. Midline cleft was diagnosed antenatally at 22 weeks' gestation, but the family did not fully understand the extent of the condition. Upon the child's birth, the mother especially was in shocked. Baby H was subsequently admitted to the Neonatal Intensive Care Unit (NICU). A series of carefully planned treatments were implemented and the family underwent multiple counseling sessions.

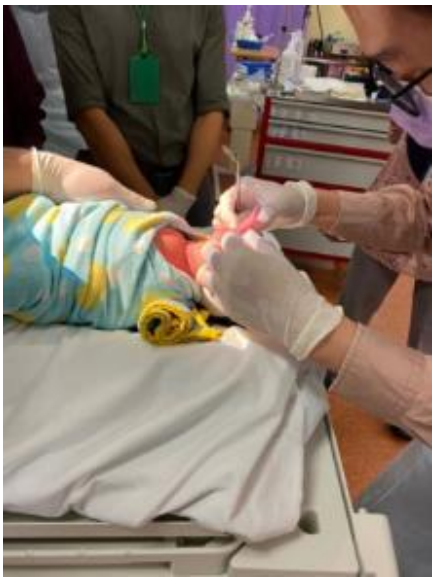
Throughout the duration of the stay in NICU, Baby H has consistently remained in a stable condition. Genetic testing has been conducted and the results indicate normal findings. Initially the baby was placed on a nil by mouth regimen and started on Intravenous fluids. Subsequently, a gradual feeding training process was initiated, involving the careful assessment of the baby's ability to swallow without experiencing aspiration or choking incidents. The implementation of the dental procedure with the use of a Naso-Alveolar Molding (NAM) device significantly facilitated the feeding process[1].

At first, family decided to allow maternal grandmother to care for Baby H. Baby was discharged from NICU at day 8 of life and has since been on regular follow up at the Paediatric clinic in SASMEC.

3. Description of the Orthodontic treatment

3.1. Written by Assoc Prof Dr Noraini Abu Bakar – Orthodontist, Department of Orthodontics, Kulliyyah of Dentistry, IIUM, Malaysia

Unlike feeding plates, Naso-Alveolar Molding, in short NAM, is a technique utilizes an active appliance, to gradually bring the cleft segments closer together[3]. It is a highly demanding treatment that requires a high level of skill, meticulous planning, constant review, and patient compliance. As a result, NAM is only offered by a select few hospitals worldwide. The Department of Orthodontics learnt about this technique during our attachment at Chang Gung Memorial Hospital in Taipei, Taiwan. After evaluating Chang Gung Hospital's 40-year longitudinal data and success rate in treating cleft babies, our team decided to learn the method and transferred it to IIUM. The appliance was specifically designed to incrementally approximate the segments via trimming and applying active force using oral-facial soft tissues[4]. Impression (using silicone) of the top jaw and nose area was first taken, under close supervision of the neonatologist to ensure Baby H oxygen level was optimum. The impression was taken to the laboratory and design for the appliance was carefully planned to suit its purpose. The cost of the appliance was fully covered by the Department of Orthodontics. The appliance was adjusted periodically by orthodontist to ensure favorable movement. Family members including the aunt and grandmother were taught how to properly place the appliance. As a result of these preparatory measures, the cleft segments were successfully approximated prior to surgery.



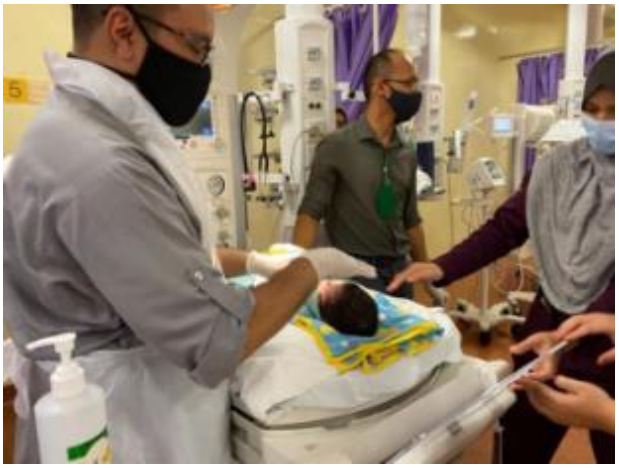


Figure 2 Impression using silicone was taken by Dr Cheong Joo Ming and Dr Noraini Abu Bakar (Orthodontist, IIUM) at the NICU with Dr Syed Khaliq (Neonatologist, IIUM) monitoring baby H's oxygen level

Figure 3 Silicone putty impression material in a custom tray to register the cleft defect

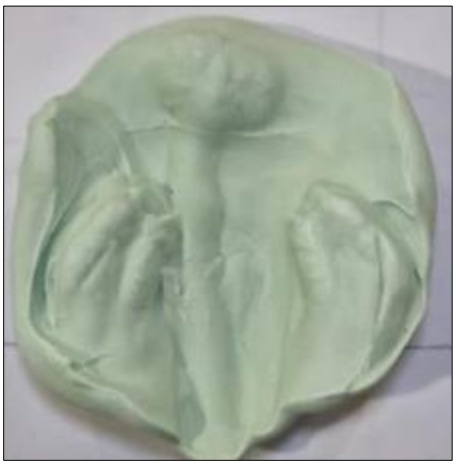


Figure 4 Replica of the impression in stone model depicting bilateral cleft defect. The posterior bilateral segments and the premaxillary segment are registered

Figure 5 Fabrication of NAM plate for Baby H, with 2 groove handles for attaching elastic, and nasal stent (pic right) to exert pressure to gently raise his nose to restore form and function [4]

Figure 6 Issuance of the NAM with taping on Day 4 of life

Figure 7 Baby H's first bottle feeding was administered by Dr Noraini Abu Bakar (Orthodontist, IIUM) on Day 4 of his life. Prior to this, he was feeding through the Ryle's tube. The NAM appliance also facilitated effective suction during bottle feeding

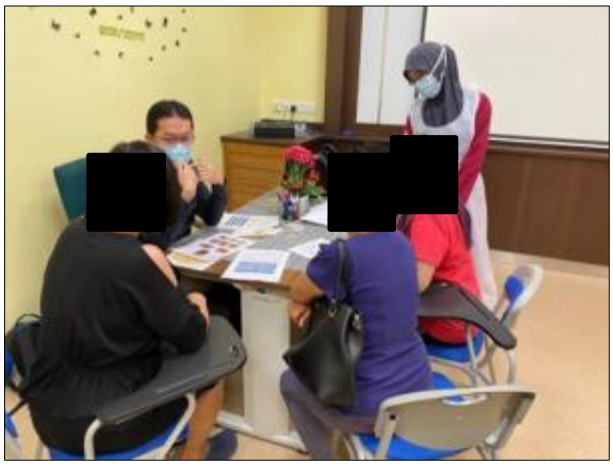


Figure 8 Briefing and detailed explanation of the NAM appliance provided by Dr Cheong Joo Ming (Orthodontist, IIUM) to the extended family members, including Baby H's aunt and grandmother. Ample time was allocated to train them for usage of NAM. They were also taught how to trouble shoot in case of problems. Motivation of the family members were constantly in place to ensure successful outcome of the treatment

Figure 9 Interdisciplinary approach for the care of this special baby: From the right, Dr Cheong Joo Ming (Orthodontist, IIUM), Dr Syed Khaliq (Neonatologist, IIUM) and Dr Noraini Abu Bakar (Orthodontist, IIUM). Not in photo: Dr Akmal Azim (Plastic Surgeon, IIUM)

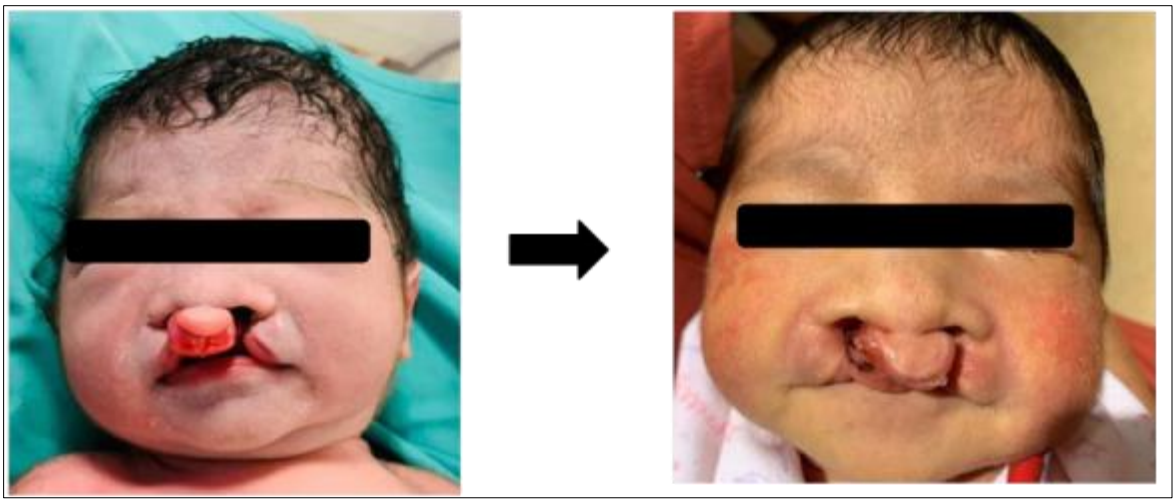


Figure 10 The striking improvement following NAM treatment resulting in the repositioning of the prominent premaxilla and the improvement of the nasal deformity, prior to surgical lip repair by the collaborating plastic surgeon

4. Description of the lip repair surgery and outcome

4.1. Written by Asst Prof Dr Akmal Azim Ahmad Alwi - Plastic Surgeon, Department of Surgery, Kulliyyah of Medicine and Sultan Ahmad Shah Medical Centre (SASMEC), IIUM, Malaysia

Among the different variations of oral cleft, complete bilateral cleft lip and palate is the most severe. Repair of such deformity is much more difficult than that of unilateral cleft lip, especially when the middle segment (premaxilla) is very prominent as was the case for Baby H. Usually the repair has to be done in stages where lip adhesion is performed first to reduce the prominence, and definitive lip repair is performed months later. Hence, resulting in additional operations and delayed treatment. Fortunately, our Orthodontist colleagues were able to convince Baby H's parents to have the NAM treatment. The treatment made a single-stage definitive surgery possible by reducing the tension across the repair as well as shaping the nostrils[4,5,6]. Both are important factors in achieving a good cosmetic outcome. The surgery cost was borne by the Ronald McDonald charity.

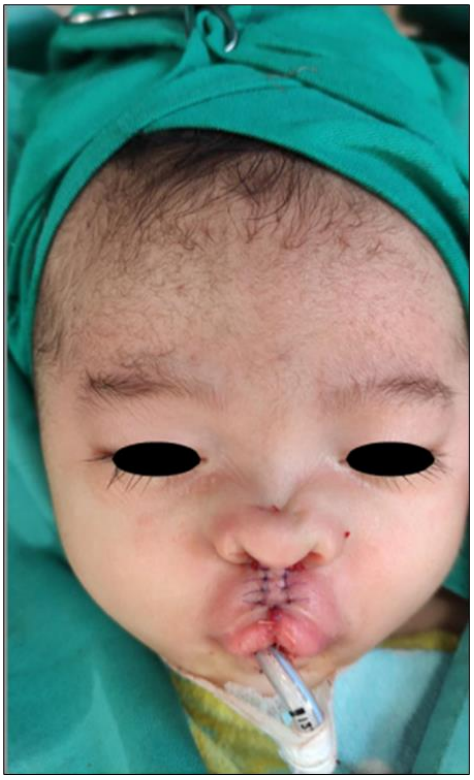


Figure 11 Lip repair surgery done by Dr Akmal Azim (Plastic Surgeon, IIUM) at 3-months of age

Figure 12 Post lip surgery repair photo of Baby H

Figure 13 Baby H at 9 months of age under regular follow up with Paediatrics Clinic, SASMEC

After the successful lip surgery repair, baby H's parents have wholeheartedly embraced baby H and baby H have since been fully under the loving care of his parents.

All's well that ends well.

5. Conclusion

In summary, the treatment of cleft patients involves various nuances and necessitates a compassionate approach from clinicians. Each case is unique, highlighting the importance of effective interdisciplinary collaboration and empathy in delivering optimal care for cleft-affected infants. Although NAM pauses disadvantages of regular appointments and cost of the appliance, the benefit surpass the drawbacks. The NAM protocol contributes to a healthier society by enhancing individual quality of life, reducing healthcare costs through a decreased number of surgeries, and promoting interdisciplinary collaboration. As this is the inaugural implementation of NAM at IIUM, it represents a significant advancement in cleft care and enhances the overall efficiency of the healthcare system for cleft patients at IIUM.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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