

# Management of Cleft Lip & Palate with a Modified NAM Appliance in Neonatal Case : A Holistic Approach

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## Abstract

Over the decades, infant orthopaedics has been incorporated in adjunctive pre-surgical correction of cleft lip & palate. Most of these therapies did not notice deformity of nasal cartilage in unilateral & bilateral cleft lip & palate as well as deficiency of columella tissue in infants. The naso-alveolar moulding (NAM) technique a new approach to pre-surgical infant orthopaedics (Grayson 1950) reduces the severity of initial cleft, alveolar & nasal deformity. This enables the surgeon & patient to maximize the benefits associated with surgical correction of cleft deformity with minimal in severity. This paper will discuss the modified appliance design (NAM), clinical management & biomechanical principles of naso-alveolar moulding therapy. NAM therapy will provide better lip & nasal form, reduces oro-nasal fistula & labial deformities, 60% reduction in the need for secondary alveolar bone grafting. No effect on growth of mid-face in sagittal & vertical plane upto the age of 18.

**Keyword :** cleft lip & palate, naso-alveolar moulding, pre-surgical infant orthopaedics.

## Introduction

Pre-surgical infant orthodontics has been used in treatment of cleft lip & palate for centuries. Previously facial binding was used to narrow the cleft & to prevent post surgical dehiscence<sup>1</sup>, later stress was put upon the importance of pre-surgical preparation of cleft using an adhesive tape binding<sup>2</sup>, attempts were also made by passing of silver wire through both the ends to cleft, alveolus & then progressively tighten the wire to approximate the ends of the alveolus before lip repair<sup>3</sup>. Then modern pre-surgical orthopaedic treatment was started using series of plates to actively mould the alveolar segment into the desired position<sup>4</sup>. After this new technique was developed to mould alveolus, lip & nose in infants born with cleft lip & palate which was also called as Naso-alveolar moulding(NAM)<sup>5</sup>, it consist of intraoral nasal stents to mould the alveolar ridge & nasal cartilage. The objective is to reduce the severity of original cleft deformity. Use of NAM technique has also eliminated surgical columella reconstruction & resultant scar tissue.

## Clinical Presentation

A 6 hour old female neonate had reported to the Dept. of Prosthodontics with a chief complaint of malformed upper jaw.

On examination, unilateral cleft lip & palate was seen associated with right side, extending from right nasal floor to soft palate & philtrum was not present & upper lip was separated. (Fig. 1)

## Appliance Design & Fabrication Impression technique

Initial impression of cleft lip & palate of 6 day old neonate is obtained. A heavy bodied silicon material was used to take the initial impression. An impression can be taken in a clinical setting by preparing patient to handle airway emergency, if at all faced. The infant was held upside down by a prosthodontist & impression tray was inserted into oral cavity, in an inverted position to prevent the tongue from rolling or fall back & to allow it to drain out of the oral cavity. The tray is seated adequately cover the anatomy of upper gum pads & material to flow. After impression is set, the tray is removed, mouth is examined for residual impression material. The impression is then poured in a dental stone to obtain accurate cast. (Fig. 2)

## Appliance Design:

A moulding plate was fabricated on dental stone model. All the undercuts & cleft space was blocked with block out wax. The plate was made up of hard, self cure acrylic & was trimmed with denture soft tissue liner material. Dimension of acrylic component i.e. of the plate was of 2-3mm in thickness to provide structural integrity & to allow adjustments during process of moulding. Along with relieved borders with freni & other attachments, a retention button is fabricated on 21 gauge stainless steel wire positioned anteriorly at an angle of approximately 40o to the plate. Since patient was having unilateral cleft, only one retention arm was incorporated & positioned in such a way that it should not interfere in bringing the cleft lip together. The vertical position of retention arm was located at the junction of appliance & lower lip, (Fig.3). The retention button adequately secures the moulding plate in mouth with the help of orthodontic elastics & plates.

## Appliance Adjustments

The patient is seen weekly to make adjustment in moulding plate to bring the alveolar segments together. These adjustment are carried out by removing hard acrylic & adding soft denture liner material to moulding plate. Modification of moulding plate permitted 1mm per visit. The alveolar segment should be directed to it final & optimum position by taking care to prevent

the soft denture liner material from building upon the height of alveolar crest as it will prevent complete seating of moulding plate.

## Nasal Stent

Anatomically the alar rim which at the birth was stretched over a wide alveolar cleft deformity will show some laxity & with nasal stent this can be elevated into a symmetrical & convex form. A stent was made up of 21 gauge round stainless steel wire & take the shape of 'Swann Neck'. The stent is attached to labial flange of moulding plate near the base of retention arm, extends forward & then curves backward (like a Swann Neck), entering 3-4 mm post nasal aperture. A small loop for retention at intra nasal position was created on wire for better retention of the acrylic component. A hard acrylic component is shaped into single lobed form with added soft denture liner for comfort paced by gentle lifting forward the lips until moderate amount of tissue blanching is seen. The lower lobe of the stent lifts the nostril apex & defines the top of columella. (Fig.4,5,6.)

## Discussion

There are several advantages of this modified naso-alveolar moulding technique in the cleft lip & palate deformity patient.

Wire Component	Acrylic Component
1. Use of 21 gauge stainless steel wire will facilitate easy & proper appliance adjustment periodically without getting deformed.	Acrylic component consist of self cure acrylic & soft denture liner as it is a newer material of this time.
2. Wire extension for naso-alveolar stent will reduce the bulk of material & lessen the weight.	Weight & bulk of material is reduced in comparison to the previous design.
3. Double looped wire provides better stability & retention for nasal stent.	Soft tissue liner applied to the nasal stent lessens the chances of irritation.

## Conclusion

In this case report, the patient with cleft lip & palate defect was treated successfully by modified naso-alveolar moulding appliance. It is necessary rehabilitate such patients with suitable prosthetic management to provide successful result for better functional, esthetics & psychological needs.

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 Fig. 1: Cleft lip & palate defect  
 Fig. 2: Diagnostic Impression

- Fig. 3: Fabrication of NAM Appliance  
 Fig. 4: Patient with the appliance  
 Fig. 5: After 1 week  
 Fig. 6: After 3 months



## Conscious Sedation of Pediatric Dental Patients with Chloral Hydrate

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Behavior management strategies for pediatric dental patients have evolved greatly over the past 2 decades, with verbal techniques like positive reinforcement, tell-show-do, and voice tone control hand-over-mouth exercise and hand-over-mouth with airway restriction having lost considerable popularity. In light of this trend, conscious sedation with chloral hydrate is a vital dimension of pediatric dentistry for those children who fail to cooperate for treatment in a conventional setting or are very young to understand and follow the instructions given by surgeon. One such case, a 24 months old boy with nursing bottle caries was treated with conscious sedation using chloral hydrate in dept of Pedodontics and Preventive dentistry, Manav Rachna Dental College. Pulpectomy was performed on upper centrals and laterals. Obturation was done with calcium hydroxide and Iodoform paste followed by crown build up with glass ionomer cement since parents were not ready to bear the cost of polycarbonate crowns. The popularity of

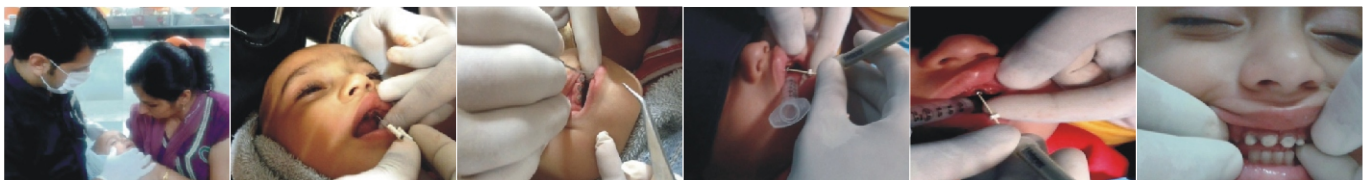
conscious sedation among pediatric dentists is underscored by the safe and effective means by which sedative drugs can be used when practitioners follow the (ADA) Guidelines for the Elective Use of Conscious Sedation, Deep Sedation, and General Anesthesia in Pediatric Dentistry.

Chloral hydrate, which is one of the well known and widely used drug for pediatric dental surgeon has an onset of action of 15-30 minutes given orally with a peak effect for an hour or more. Primary metabolite of chloral hydrate is trichloroethanol which is responsible for most of the CNS effects that occur. Since it is irritating to gastric mucosa one should administered the drug in diluted flavored medium otherwise it may cause nausea and vomiting. Pre-sedation, kids often enter a period of excitement and irritability.

One problem with sedation in pediatric dentistry is that you can only give what is considered a "safe" dosage. Those children who do not respond to that dosage, well, you don't just give twice the dose and hope it will take. That could lead to trouble. Whatever is

used, you monitor vital signs in accordance with the AAPD guidelines. The whole process is somewhat of an art as much as a science. Lethal dose is 10gm in adults, sometimes the tendency to push the drugs to larger dose to achieve the necessary sedation. It is recommended that young children receive 25-50 mg/kg body weight and not more than 1gm.

Things can be unpredictable as medications elicit different responses in different children. The younger the child, the more unpredictable the medication's effect. A certain dosage on one child may make them quite sleepy and sedated, while the same exact dose will not seem to do anything for the next child. Studies have found an individual child's temperament has a lot to do with their response. Therefore, some kids are better served with treatment under general anesthesia. In fact, if there is so much work that several sedative appointments will be required to complete the treatment, then the option of general anesthesia is usually discussed.



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