



Children's
Healthcare of Atlanta

Pre-surgical Orthopedic Appliances for Cleft Lip and Palate



EMORY
UNIVERSITY

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Introduction

A pre-surgical orthopedic appliance may be used for infants with cleft lip and palate before primary lip repair. These appliances can provide molding of the cleft alveolus and/or nasal cartilage to help improve the surgical esthetic outcome of the lip and the nose. Various techniques have been used over the past 25 years, with the most common types of appliances for cleft lip and palate being the removable **Nasoalveolar Molding (NAM) appliance** and the **fixed Latham Dentomaxillary Advancement (DMA) or Elastic Chain Premaxillary Repositioning (ECPR) appliance**. From 2009 to the present, Children's Center for Cleft and Craniofacial Disorders has treated 450 patients with pre-surgical appliances. The NAM appliance was the most common, with 404 removable appliances (NAM) compared to 46 fixed Latham appliances (DMA/ECPR.) We will present case examples showing the use of pre-surgical orthopedic appliances and will provide an overview of indications, techniques, and limitations of these appliances.

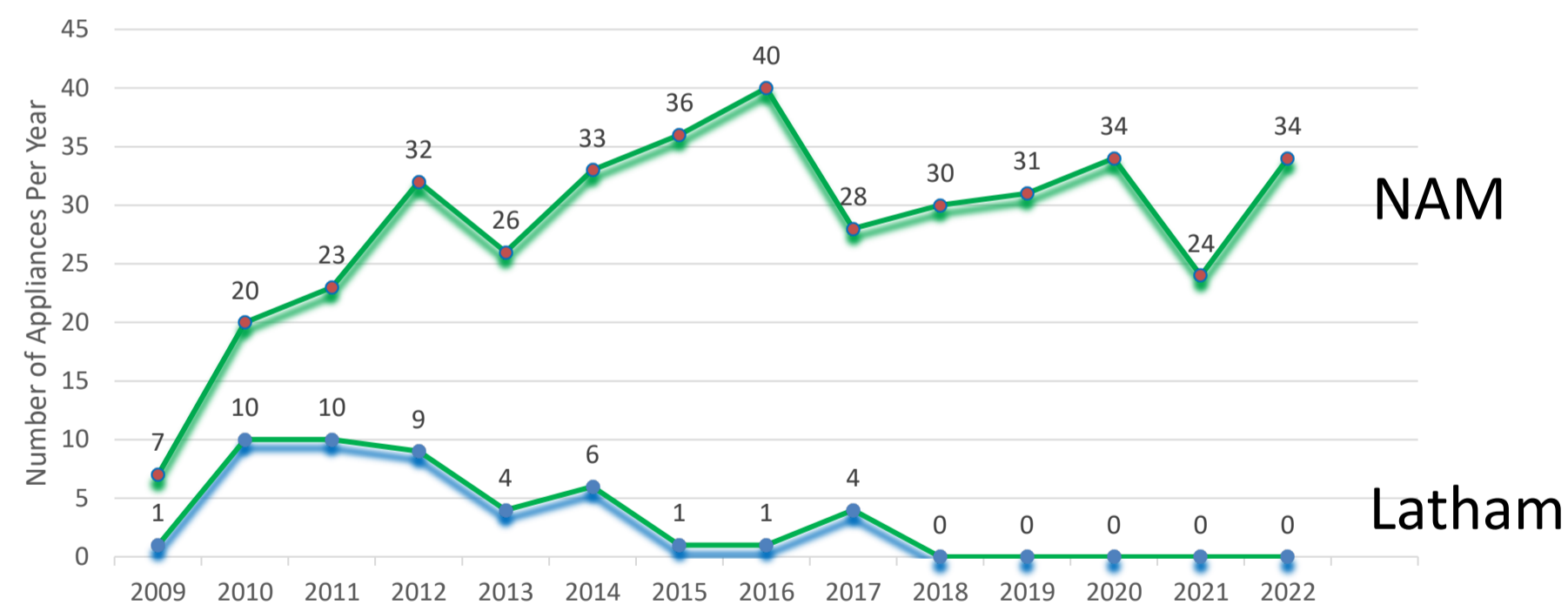
Goals of Pre-surgical Appliances

- Align alveolar segments
- Reduce distance between segments
- Reduce tension on surgical site / incision line by pre-surgically normalizing anatomy
- Re-establish nasal symmetry
- Increase length of columella
- Shape dome of nostrils
- Project nasal tip anatomy

Background of Pre-surgical Appliances

Pre-surgical orthopedic appliances for patients with cleft lip and palate can be dated back as early as 1686 to Dr. Johan Hoffman, who used an extra oral head cap appliance to retract the premaxilla. Progressing into modern presurgical appliances, in 1950, McNeil introduced techniques involving intraorally fixated orthopedic appliances to align maxillary alveolar segments in cleft palate patients. Latham (1980) popularized an active fixed presurgical orthopedic appliance involving an acrylic appliance fixed by pins into the alveolar segments in combination with screws and elastic chains to facilitate alveolar alignment; this appliance is now referred to as a Latham appliance. In 1993, Grayson established a technique referred to as nasoalveolar molding (NAM), which uses a technique involving removable acrylic that is altered over time in combination with external forces (such as extra oral taping) to help facilitate movement of the alveolar segments progressively. The NAM technique utilizes the malleability of neonatal anatomical structures to mold both alveolar segments and nasal cartilages/columella without surgical intervention.

Appliance History at Children's Healthcare of Atlanta



Latham Appliance Results

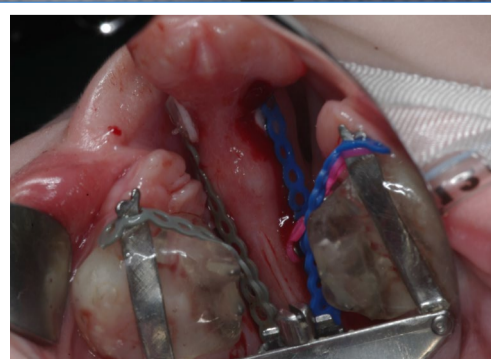
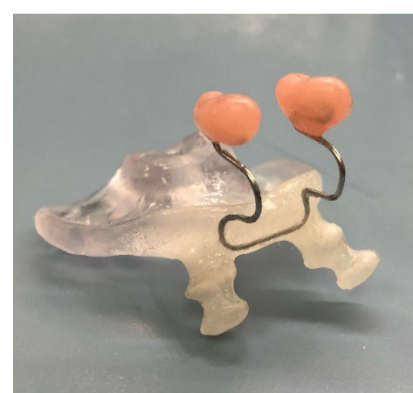


NAM Appliance Results



Latham Appliance

NAM Appliance



NAM Appliance

Advantages

- Alveolar molding (allowing for gingivoperiosteoplasty)
- Nasal molding (improves surgical result of nasal repair)
- Minimally invasive
- Requires no anesthesia/hospitalization

Disadvantages

- Time/labor intensive procedure (1+ hour visits per week for 12+ weeks)
- Retention of the appliance can be difficult
- Parents/caregivers must be compliant regarding usage

Latham Appliance

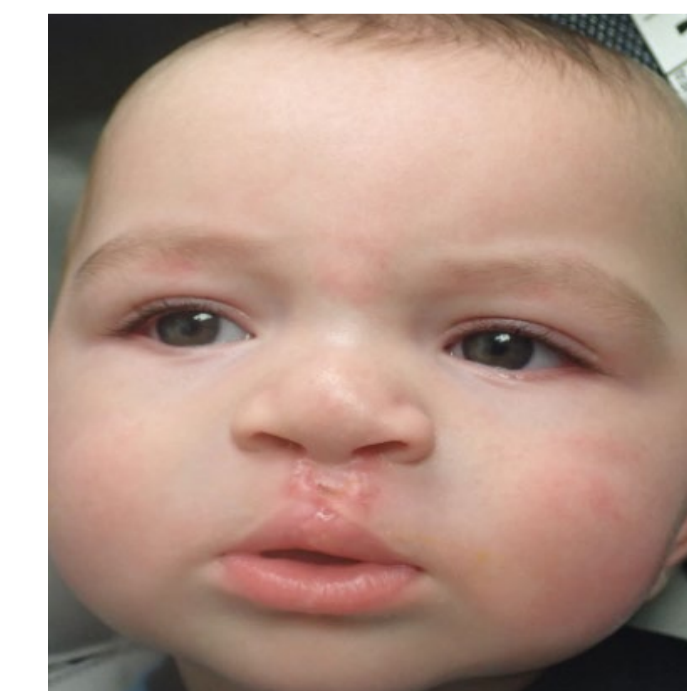
Advantages

- Alveolar molding (allowing for gingivoperiosteoplasty)
- Reliable, predictable results can be achieved since appliance is fixed
- Does not depend on when/if the appliance is used
- Does not require significant clinic time (requires single impression, OR visit, and quick follow up appointments)

Disadvantages

- Requires general anesthesia
- Invasive procedure
- Initial difficult post-operative recovery (feeding, discomfort)
- No nasal shape impact (no nasal molding)
- Cost (surgical, laboratory)

NAM 1-month Post-surgery Result



Summary

•For many years, there have been significant changes from blunt, simple molding techniques to advanced, sophisticated nasoalveolar molding with technological advancements continuing to shape the future potential of presurgical orthopedics.

•The Latham and NAM pre-surgical appliances facilitate movement of alveolar segments that lead to improved post-surgical esthetic outcomes for cleft lip and palate patients.