

Presurgical Dentofacial Orthopedic Management of the Cleft Patient



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KEYWORDS

- Cleft lip and palate • Dentofacial orthopedic management • Lip taping • DynaCleft
- Grayson-NAM device

KEY POINTS

- Over the last decade, presurgical orthopedic molding for the patient with cleft lip and palate has become much more common; it is even reasonable to assume it may be the standard of care for those wide unilateral and bilateral clefts with substantial dentofacial deformities.
- In 2013, there was a comparative study of nasoalveolar molding methods, comparing the Grayson-NAM device and DynaCleft. The results showed the 2 to be equivocal with both methods significantly reducing the cleft width and improving the nasal asymmetry.
- The lip-taping component of DynaCleft can be used in conjunction with the Grayson-NAM device or can be used with any other maxillofacial orthopedic device.

INTRODUCTION

The cleft lip and palate deformity presents an enormous and complex surgical challenge. Since the earliest reported cleft lip repair in 390 BC, cleft surgeons have continued to strive to perfect this procedure.¹ Cleft lip and palate can arise with considerable variation in form and severity.

Generally speaking, the wider, more extensive clefts are associated with more significant nasolabial deformities, presenting an even greater surgical challenge to obtain functional and esthetic success.² Although advances in reconstructive surgery have significantly improved the quality of the repair for clefts of the lip, alveolus, and palate, surgery alone cannot correct all aspects of the

defect. The basic goal of any approach to cleft lip, alveolus, and palate is to restore its normal anatomy. Ideally, deficient tissue should be expanded, and malpositioned structures should be repositioned before surgical correction, all allowing for a less invasive surgery to the patient. It is readily agreed on that it is these wide cleft lip and palate cases, wherein alveolar and nasolabial deformities are the greatest, where presurgical noninvasive therapies may be of the most benefit. Presurgical maxillofacial orthopedic treatment appliances address the severe nasolabial deformities, manipulating and minimizing the deformity before surgery and facilitating the repair to improve the surgical outcome.

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HISTORICAL PERSPECTIVE OF MAXILLOFACIAL ORTHOPEDIC THERAPY

Addressing the issues of wide clefts nonsurgically has a history spanning many decades. In 1686, Hoffman described the use of a head cap with extended arms to the face to retract the premaxilla and narrow the cleft.³

In 1844, Hüllihen stressed the importance of presurgical preparation of clefts using adhesive tape. In 1950, McNeil ushered in the new modern thoughts of presurgical orthopedic treatment in cleft patients with active molding appliances.⁴ In 1975, Georgiade and Latham described the intraoral orthopedic device (see [Cruz C: Pre-surgical Orthopedics Appliance: The Latham Technique](#), in this issue) that expanded the collapsed segments while retracting the premaxilla in patients with bilateral cleft lip and palate.⁵ One of the problems that the traditional approaches failed to address was the deformity of the nasal cartilages and the columellar tissue deficiency in infants with both unilateral and bilateral cleft lip and palate.⁶ Presurgical nasoalveolar molding (PNAM) represented a paradigm shift in thinking from the traditional methods. PNAM was developed by Grayson and colleagues⁶ in 1993 with a concept combining an intraoral molding device along with a nasal molding stent. PNAM theory is based on the increased hyaluronic acid in the infant cartilage, lending to the cartilagenous structure having a temporary lack of elasticity and increased pliability and plasticity.⁷ The DynaCleft concept was introduced in 2013 as an alternative infant orthopedic device. Also, having both an alveolar component and a nasal component, it adheres to the very same principles as PNAM, recontouring the misshapen deformity and optimizing before surgery. Currently, PNAM is used in many major centers for preoperative orthopedic management of the patient with cleft lip and palate.

OBJECTIVES OF PRESURGICAL DENTAL FACIAL ORTHOPEDICS

The main objectives of PNAM and DynaCleft in patients with unilateral cleft defects are to align and approximate the intraoral alveolar segments and to achieve correction of the nasal cartilages.⁶ After completion of the molding, the goal is to have the alveolar segments, nasal cartilages, columella, and philtrum in alignment to facilitate the surgical procedure ([Figs. 1 and 2](#)). Additional objectives of PNAM in patients presenting with bilateral cleft deformities are to elongate the columella and to reposition the apices of the alar cartilages superior toward the tip. These objectives all serve a single



Fig. 1. Unilateral cleft before PNAM.

purpose, to minimize the invasive nature of the surgery, leading to less extensive scarring and an enhanced surgical result.

PRESURGICAL NASOALVEOLAR MOLDING

What Is Presurgical Nasoalveolar Molding?

PNAM is a nonsurgical method to reshape the alveolar segments and nasal tissues before surgery, thus lessening the severity of the cleft defect.

The theory depends on the principles of negative sculpting and passive molding of the alveolus and nasal tissues.⁸ Passive molding dictates the growth and direction of the alveolus through custom-made plates. Negative sculpting is a series of modifications to the surface of the molding appliances with the addition or deletion of materials in certain areas to get the desired shape of the alveolus and nose. PNAM takes advantage of the flexibility of the nasal cartilages of the neonate in the first few weeks after birth. This plasticity in the cartilages is caused by the high level of hyaluronic acid found during this time, leaving these cartilages in an optimized state for manipulation.⁷ This presenting window of opportunity allows an ease at which external traction and controlled forces can rotate and mold anatomic parts to a more surgically advantageous position.² The



Fig. 2. Unilateral cleft at the end of PNAM.

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