

Nasoalveolar Molding in the Management of the Prominent Premaxilla

Pedro E. Santiago, DMD, MBA

Director of Oral Health and Craniofacial Orthodontics
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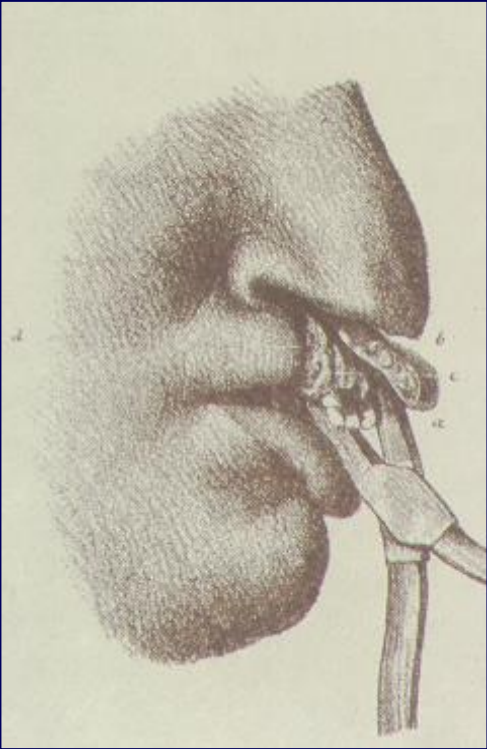
Operation Smile's Lead Global Advisor in Oral Health

Managing the protruded premaxilla has been one of the biggest challenges in the history of cleft care

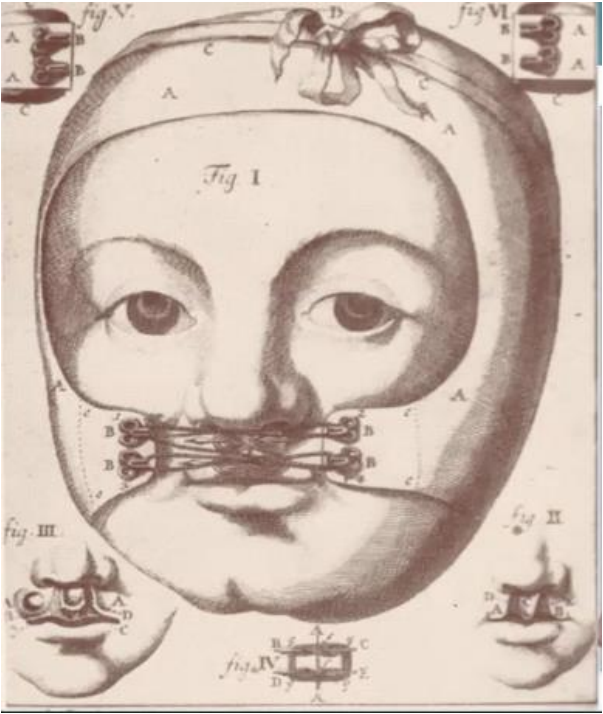
Premaxillary Excision

External Compression

Bonnet



15th & 16th Century



Hoffman, 1686



Dessault, 1790

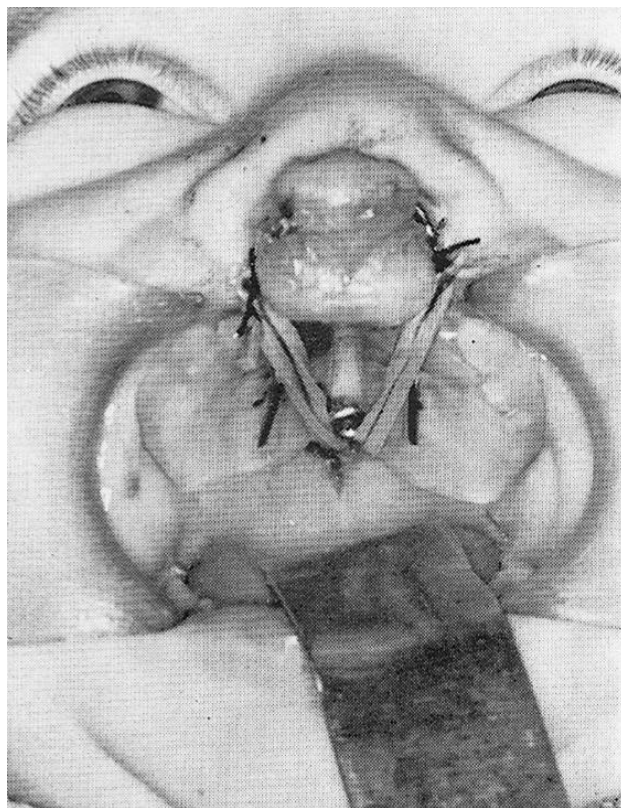


Von Bardeleben, 1868

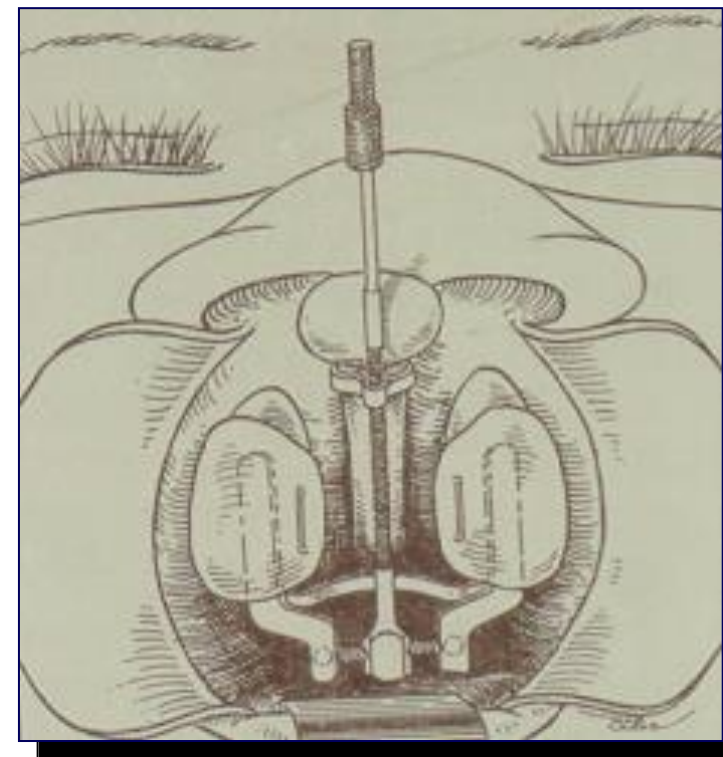
Modern PSIO



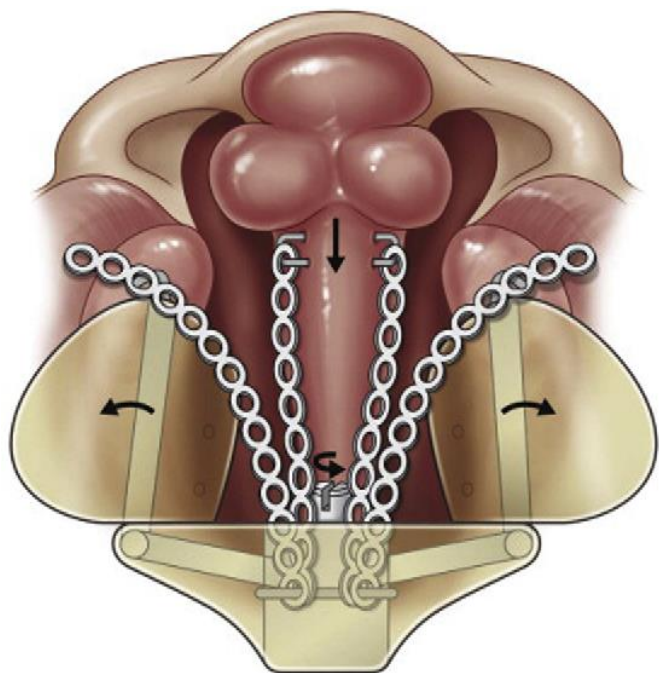
McNeil, Gnoinski



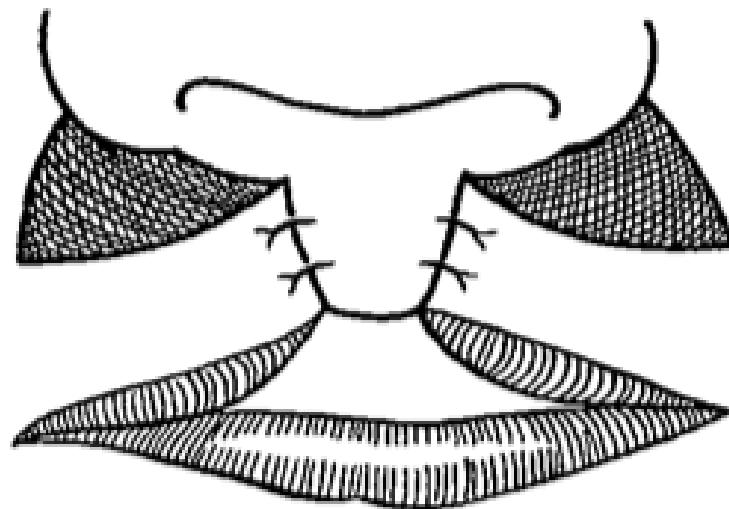
Georgiade



Georgiade/Latham



Millard/Latham



Randall, 1965

Goals of PSIO

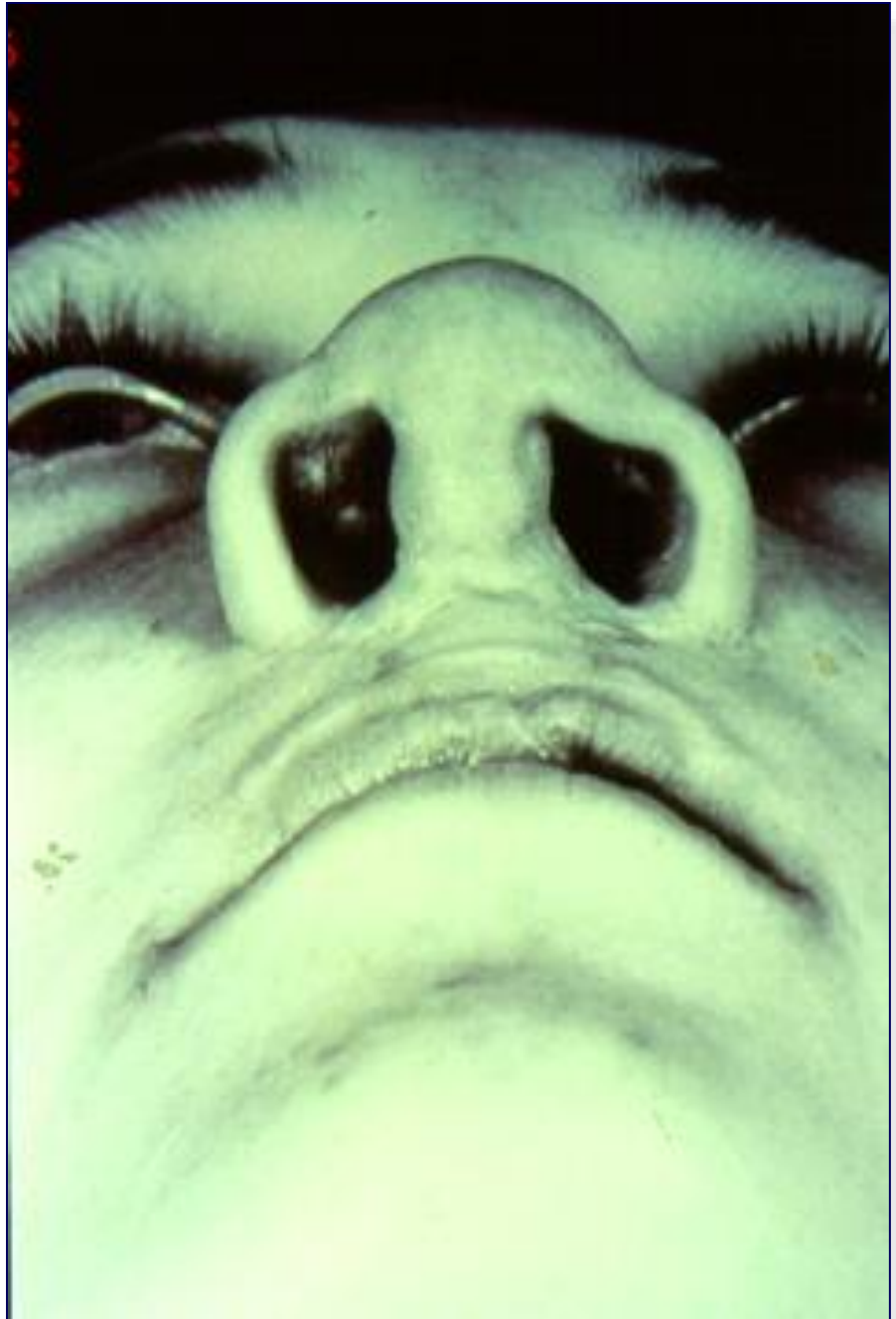
- Reduce the severity of the skeletal, labial and nasal cleft deformity to facilitate surgical closure
- Less aggressive tissue undermining
- Less tension at the suture line
- Better esthetic results

Pre-surgical NasoAlveolar Molding









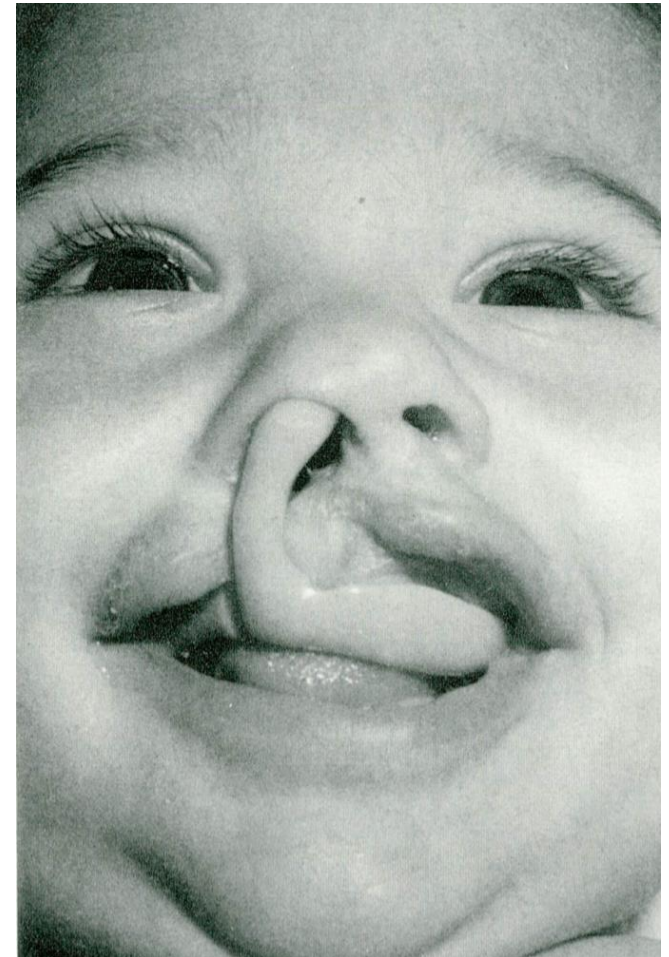
Nonsurgical Correction of Congenital Auricular Deformities in the Early Neonate: A Preliminary Report

**Kiyoshi Matsuo, M.D., Takeshi Hirose, M.D., Tokio Tomono, M.D., Motonao Iwasawa, M.D.,
Susumu Katohda, M.D., Nobuyuki Takahashi, M.D., and Buon Koh, M.D.**

Matsumoto, Japan



Grayson & Cutting



Dogliotti & Bennun

PREOPERATIVE COLUMELLA LENGTHENING IN BILATERAL CLEFT LIP AND PALATE

Sir:

This communication reports preoperative columella lengthening in concert with premaxillary repositioning in the complete bilateral cleft lip alveolus and palate. Nasal shape, absence of columella, and a projecting premaxilla have always been the major obstacles in this deformity.

An intraoral maxillary impression is taken with a rapid-setting silicone impression material. The stone cast of this impression is used to construct a molding plate of methyl methacrylate that captures the premaxilla and lateral alveolar segments. A soft acrylic lines the undercuts and the cleft spaces. By sequentially grinding out acrylic in the direction of desired movement and adding soft acrylic within the space for the premaxilla, the alveolar segments and premaxilla are gradually repositioned such that the premaxilla is in the midline and is in contact with the lateral alveolar segments, forming a symmetrical arch. When this is achieved, two acrylic extensions are formed that enter the nose. These nasal stents are capped with a veneer of soft acrylic and reach well beyond the alar rim under the dome of the nasal tip. The nasal stents are modified weekly with acrylic additions that provide a gentle molding force to the lower lateral cartilages and nasal tip. The prolabium is Steri-Stripped to the molding plate inferiorly, providing countertraction to the nasal stents. A horizontal band of soft acrylic applies force at the junction of the forming columella and prolabium in a posterior direction. The net effect of the appliance is to stretch the columella and prolabium while repositioning the lower lateral nasal cartilages in an anterior direction (Figs. 1 and 2).

This technique permits a one-stage repair of the lip, nose, and alveolus where previously a three-stage repair was necessary: primary lip repair, secondary columella con-

struction, and bilateral alveolar bone grafts. Preoperative orthopedics using this technique allows these objectives to be achieved in a single surgical procedure with a bilateral straight-line repair of the lip. This procedure has been used in four patients.

Others have attempted to affect nasal form by stenting in various contexts. Shah¹ reported his experience with nasal stents for a constricted nostril secondary to smallpox. After defining the techniques of neonatal molding of auricular deformities,² Nakajima and Matsuo³⁻⁵ applied a related approach to the unilateral cleft lip nose.

We believe that two basic mechanisms are active in our current device. Just as auricular cartilage can be permanently molded during the first 6 weeks of life, empirically, it follows that lasting changes might occur in nasal cartilages treated with nasal stents in the neonatal period. Second, the traction/countertraction that this device exerts through the columella and prolabium is a form of tissue expansion. As in other applications of tissue expansion, new tissue is created, here in partial correction of the mesodermal deficiency of bilateral cleft patients.

This new preoperative orthopedic technique offers several advantages. The lower lateral cartilages are reshaped, the columella and prolabium are lengthened, and the premaxilla is repositioned. This permits a straight-line repair where we would otherwise have employed columellar lengthening procedures.⁵

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Court Cutting, M.D.
Robert Wood, M.D.
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New York, N.Y. 10016

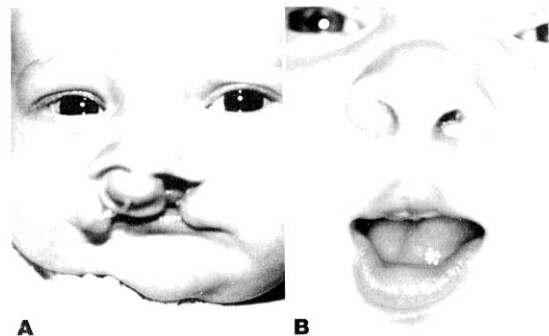


FIG. 1. (Left) Infant with bilateral clefts of the lip, alveolus, and palate. (Right) One month after surgical correction with a straight-line repair of the columella and prolabium. Surgery was performed at 3 months of age.

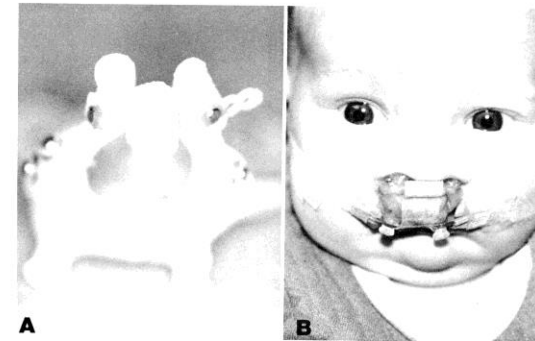


FIG. 2. (Left) Maxillary alveolar molding plate with bilateral nasal stents. Note the horizontal band of soft acrylic that applies pressure at the junction of the columella and prolabium in a posterior direction. (Right) The appliance is suspended by Steri-Strips from the cheeks that pass under the anteriorly positioned retention limbs. Note the Steri-Strip that adheres to the prolabium and is drawn down to attach to the inferior surface of the molding plate.

REFERENCES

1. Shah, M. S. Stenosis of the nostrils: A case report, following smallpox. *Plast. Reconstr. Surg.* 39: 57, 1967.
2. Matsuo, K., Hirose, T., Tomono, T., et al. Nonsurgical correction of congenital auricular deformities in the early neonate: A preliminary report. *Plast. Reconstr. Surg.* 73: 38, 1984.
3. Nakajima, T., and Yoshimura, Y. Augmentation of the nostril splint for retaining the corrected contour of the cleft lip nose. *Plast. Reconstr. Surg.* 85: 182, 1990.
4. Matsuo, K., and Hirose, T. Preoperative nonsurgical overcorrection of cleft lip nasal deformity. *Br. J. Plast. Surg.* 44: 5, 1991.
5. Cutting, C., and Grayson, B. The prolabial unwinding flap method for one-stage repair of bilateral cleft lip, nose, and alveolus. *Plast. Reconstr. Surg.* 91: 37, 1993.

POSTOPERATIVE HEADACHES FOLLOWING LARGE-VOLUME SUCTION LIPECTOMIES

Sir:

I have recently noted intense postoperative headaches 2 to 4 days after suction lipectomies of 2000 to 4000 cc in approximately one-third of my patients. These headaches are not responsive to any narcotic pain medicines. They are not associated with visual changes and not related to position.

I initially felt that these were due to anemia. Transfusions of 1 to 3 units of autologous packed cells with autologous plasma have been used. Postoperatively, the hematocrits were in the 30 to 35 percent range, so I do not feel that anemia is the cause.

The patients routinely are given 2 cc of crystalloid fluids (saline/one-half NS/Ringer's, etc.). Patients who sustain fluid loads of 4 liters or more obtained these headaches. I feel that these headaches are due to mild intercerebral edema. The headaches do not show for 48 hours because of the large (250 mg) dose of Solu-Cortef given at surgery. Recently, I have given more colloid (packed cells and Hespan) with a slight decrease in an incidence of the headaches. I am considering tapering the steroid dose with Medrol Dosepak postoperatively to prevent this very bothersome problem.

I was wondering whether any reader has observed a similar problem, and what suggestions he or she might have.

David Benvenuti, M.D.
335 Placentia Avenue, Suite 99
Newport Beach, Calif. 92663

CALCIFICATION BONDED TO SALINE-FILLED BREAST IMPLANTS

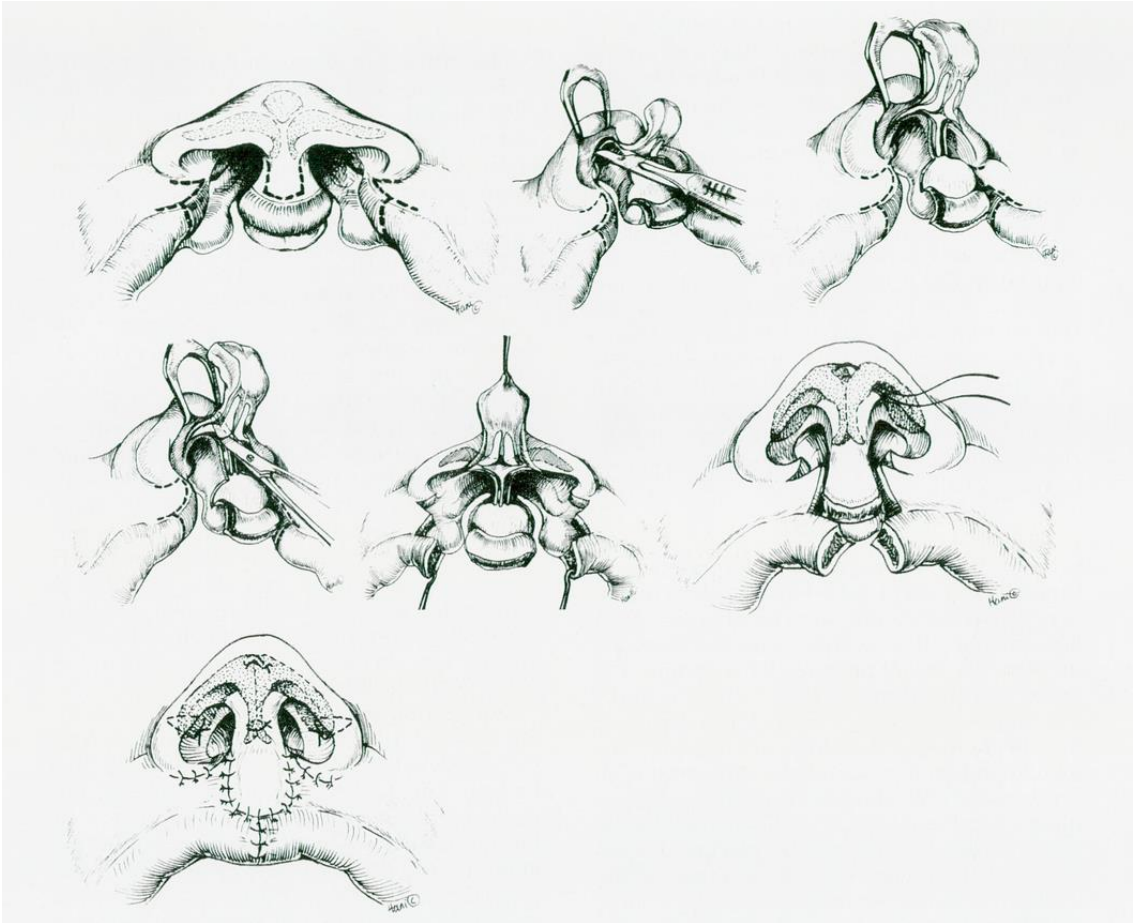
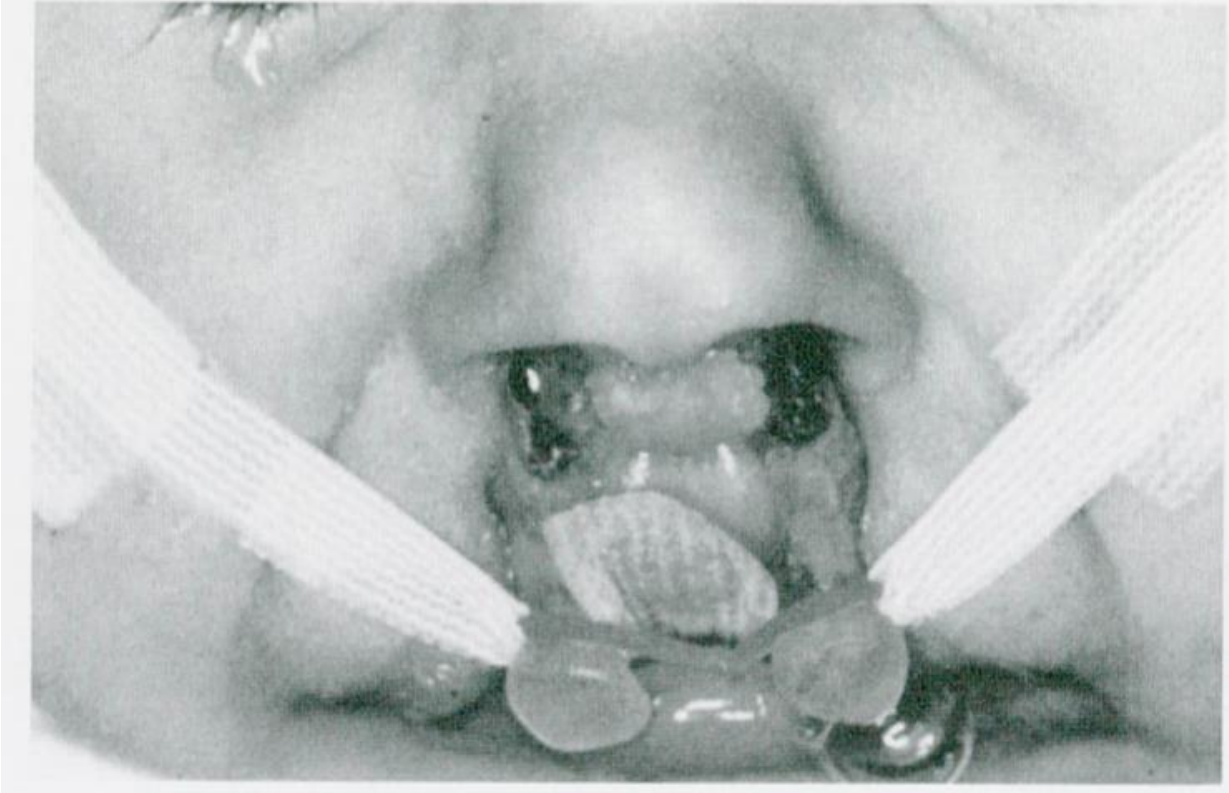
Sir:

Periprosthetic calcification of the capsule around breast implants was first reported in 1977 in patients with gel-filled implants.¹ It also has been noted in the capsule of saline-filled implants.² Calcification intimately bonded to the

Presurgical Columellar Elongation and Primary Retrograde Nasal Reconstruction in One-Stage Bilateral Cleft Lip and Nose Repair

Cutting, C., Grayson B., Brecht, L., Santiago, P., Wood, R. and Kwon, S.

Plastic and Reconstructive Surgery, 101:3, 630, 1998



1999 BEST PAPER AWARD

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for his outstanding paper

"Presurgical Columellar Elongation and Primary Retrograde Nasal Reconstruction in One-Stage Bilateral Cleft Lip and Nose Repair"

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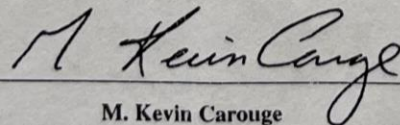
THE AMERICAN SOCIETY OF MAXILLOFACIAL SURGEONS

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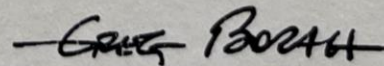
THE ASSOCIATION FOR THE STUDY OF INTERNAL FIXATION

and

SYNTHES MAXILLOFACIAL



M. Kevin Carouge
President, Synthes Maxillofacial



Gregory L. Borah, M.D., D.M.D.
President, American Society of Maxillofacial Surgeons

Pre-surgical Naso-alveolar Molding in Patients with Cleft Lip and Palate

Grayson, B.H., Santiago, P.E., Brecht, L.E. and Cutting, C.B.

Cleft Palate-Craniofacial Journal, 36:6, 486-98, 1999

NasoAlveolar Molding



All hard acrylic molding plate
and nasal stent

Soft acrylic added to the nasal
stent

Well fitted plate

Weekly adjustments of hard
and soft acrylic

Extraoral Traction System

Santiago's Modifications



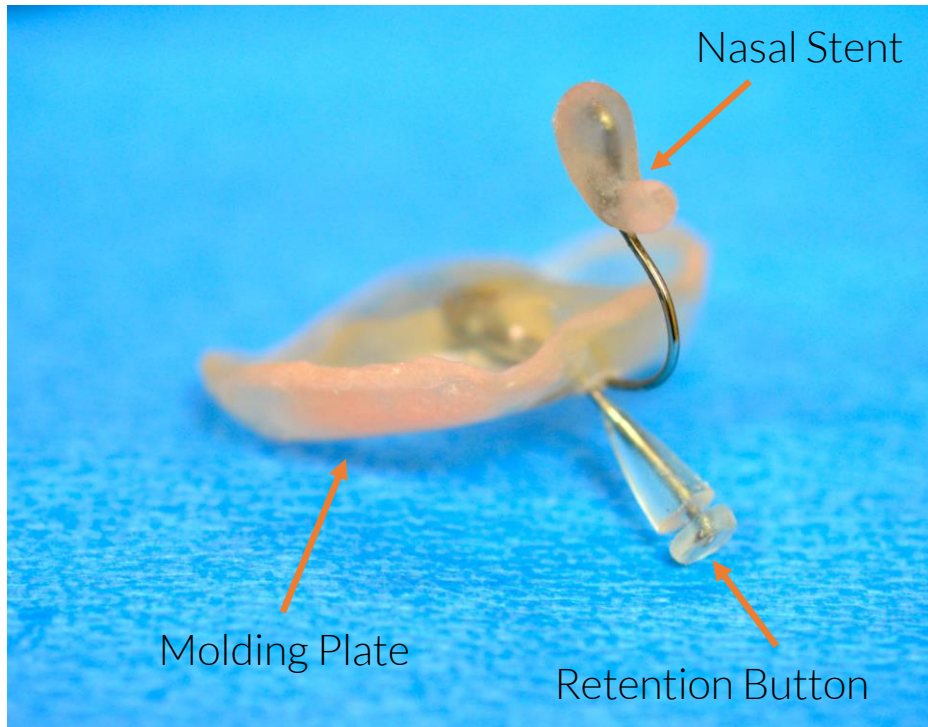
1996-2000

Wire based retention buttons and nasal stent to facilitate adjustments and activations

Use of denture adhesive to increase retention and increase efficiency

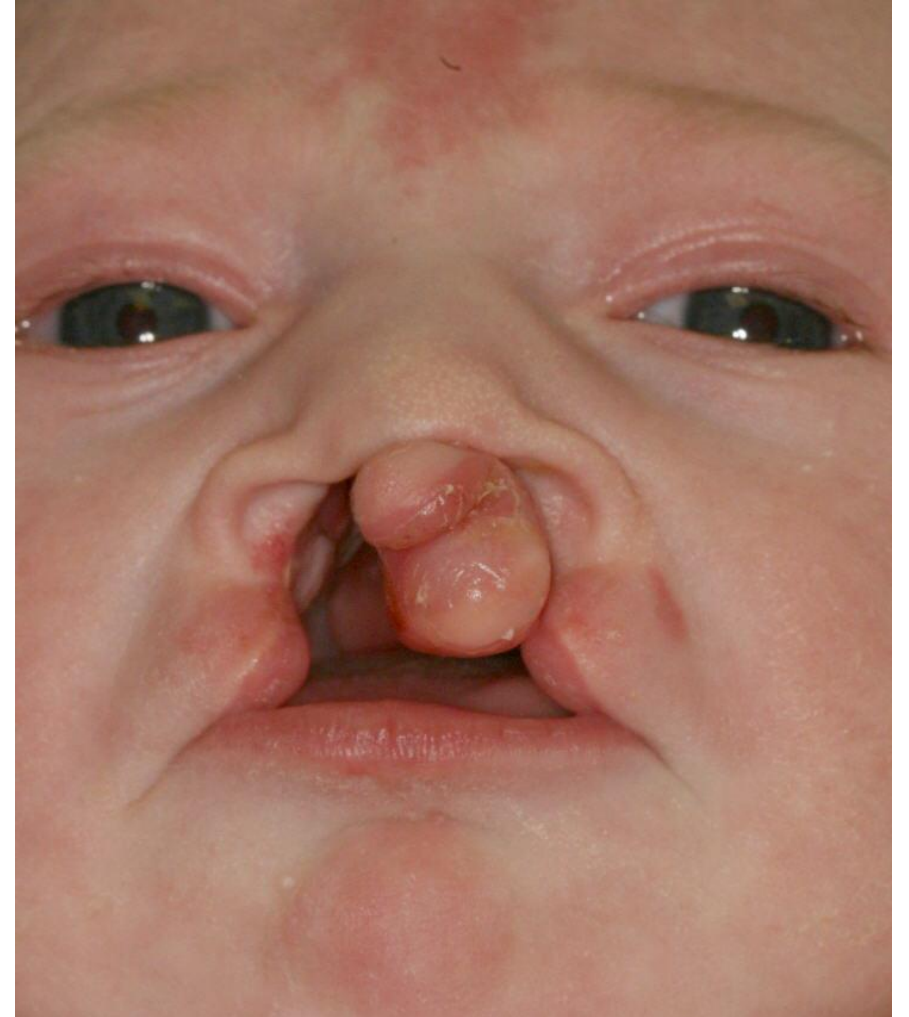
Simplified weekly or bi-weekly adjustments of mainly hard acrylic removal

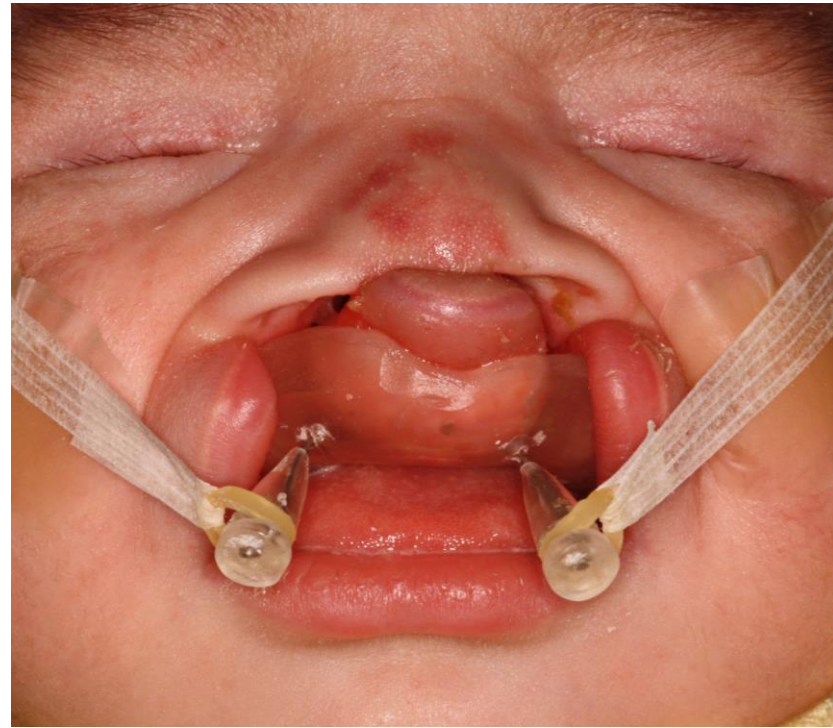
Grayson-Santiago Nasoalveolar Molding (GS-NAM) Device and Technique

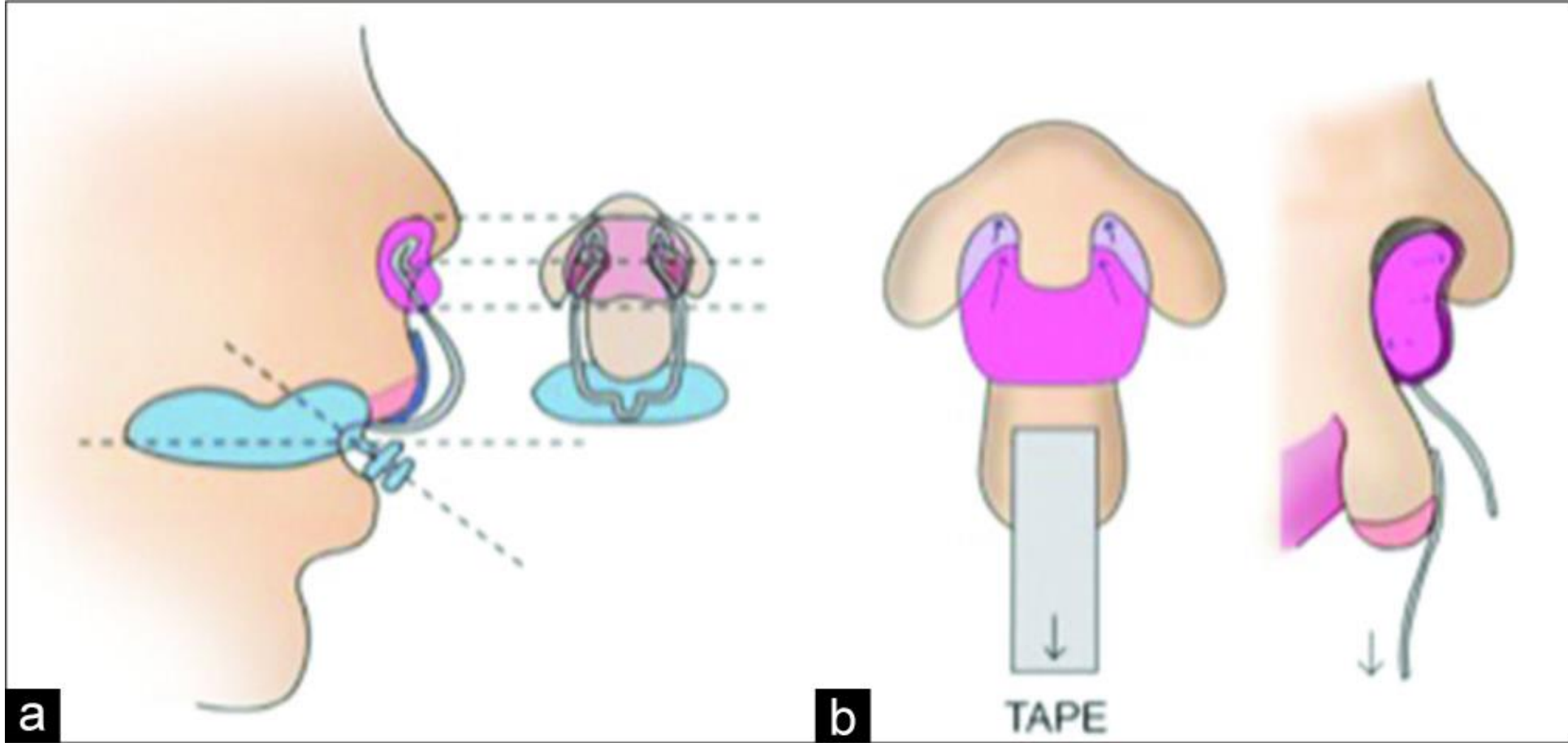


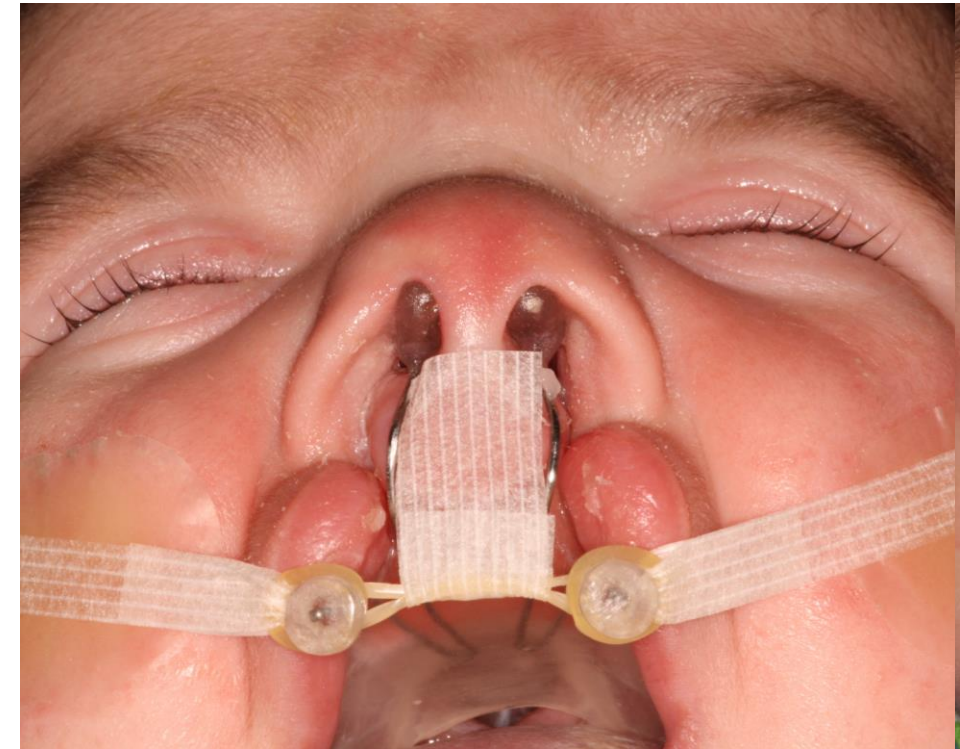
GS-NAM Goals on BCLP

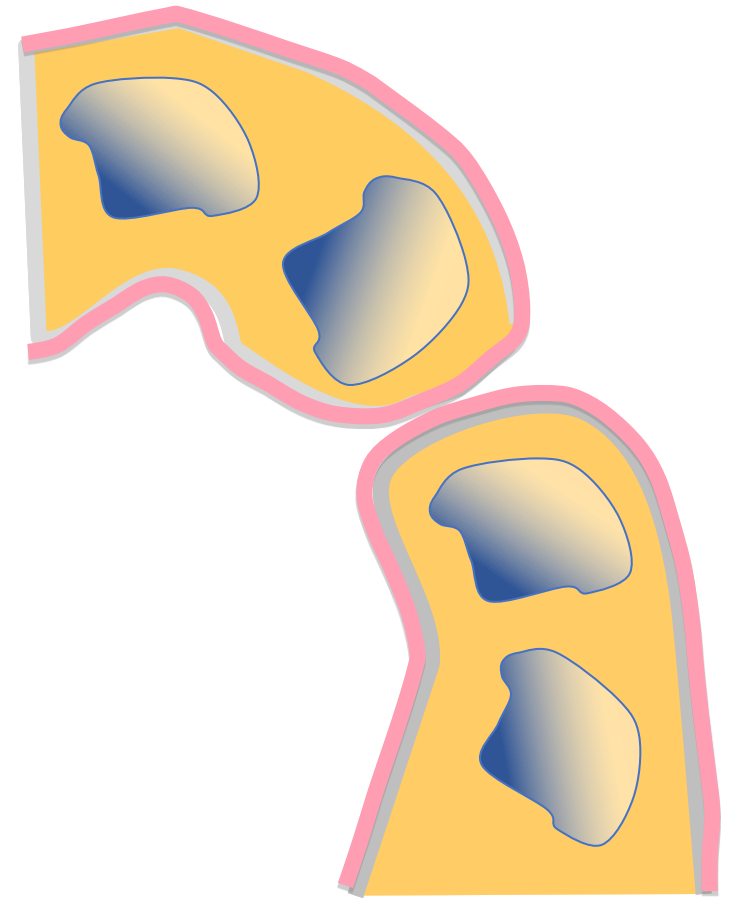
- Retract and center the protruded premaxilla
- Align the alveolar segments to form a normal maxillary arch
- Lengthen the deficient columella
- Narrow the alar base



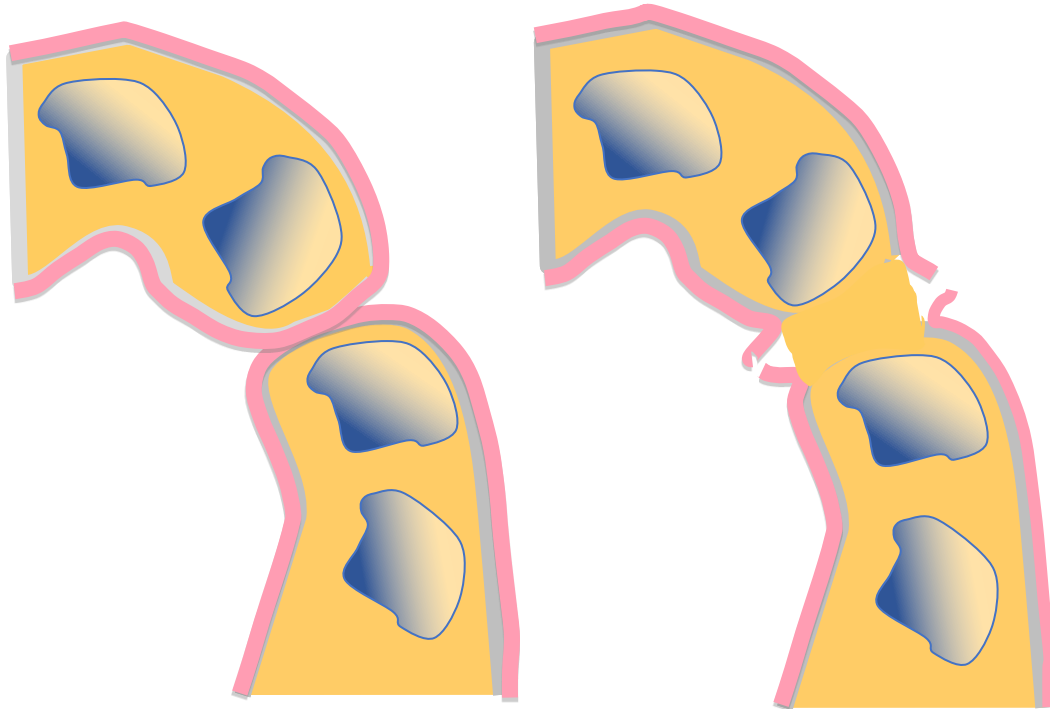








Gingivoperiosteoplasty



60% reduction in the need for an alveolar bone graft procedure

Santiago, P.E., et al.

Cleft Palate-Craniofacial Journal, 35:1, 77, 1998



Gingivoperiosteoplasty

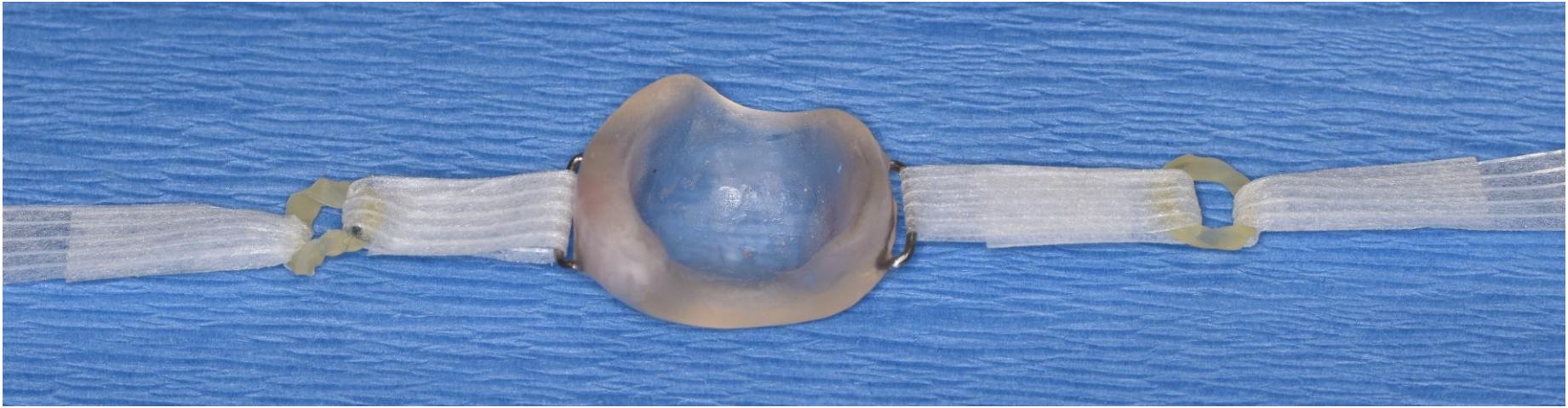
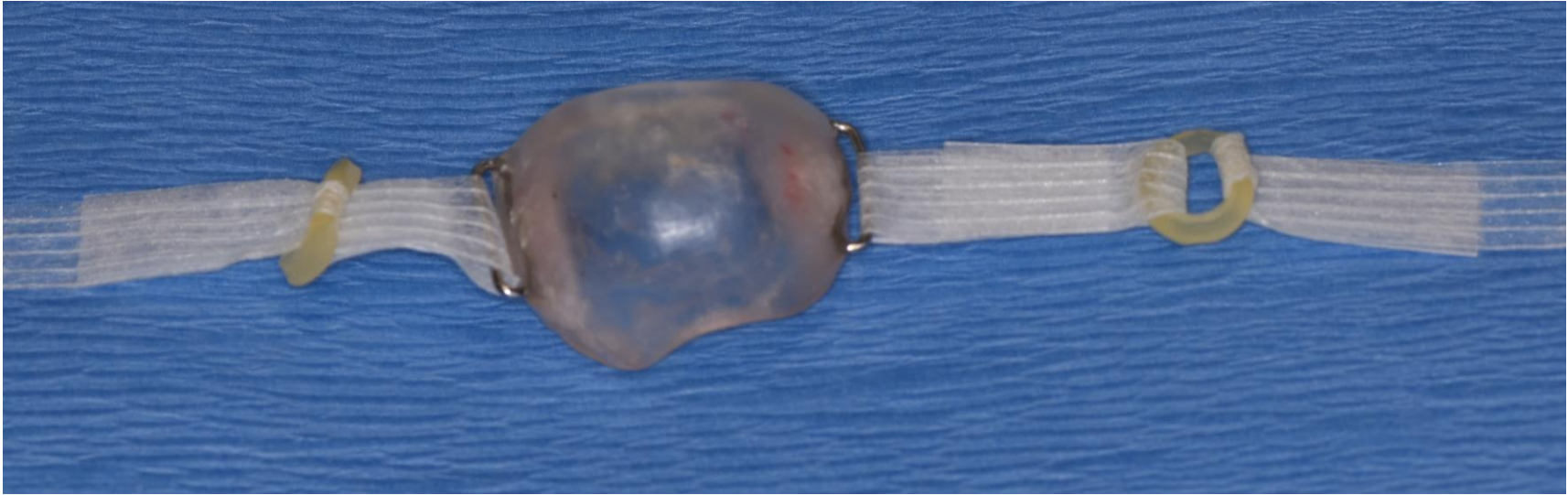
Prevent



- Vertical displacement of the premaxilla and future surgical repositioning
- Collapse of the posterior alveolar segments
- Presence of nasolabial fistulae and its associated symptoms

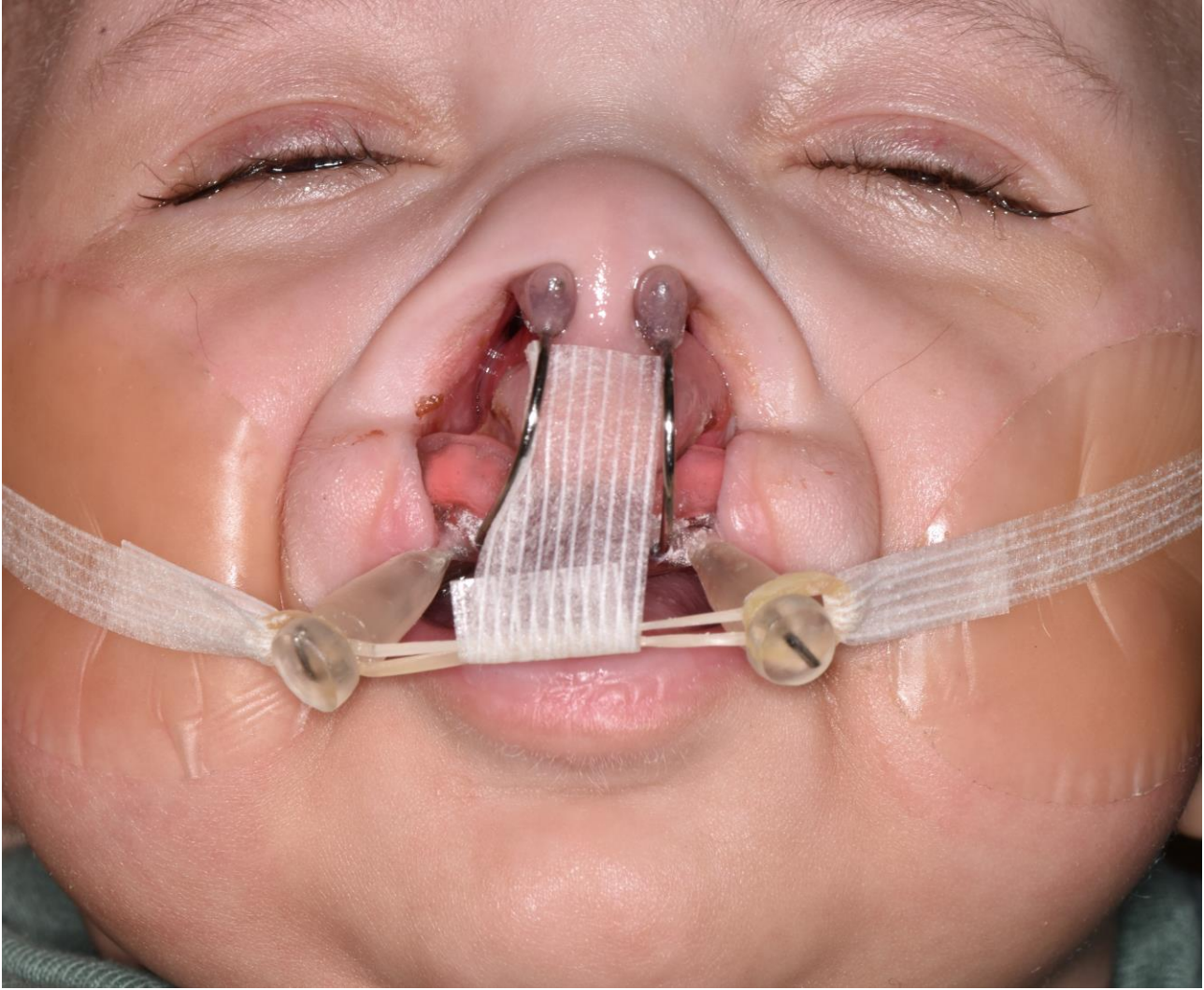
















Controversy?

Proponents Claim

- Restore normal anatomical relationships
- Facilitate primary lip, alveolar and nose surgery
- Improve nasolabial esthetics
- Reduce the number of surgical revisions and surgeries over the patient's lifetime

Skeptics Claim

- No significant difference vs no-NAM
- Might affect maxillary growth
- Increases the burden of care

Molding Plates

McNeil1950. Acrylic appliance made from a plaster model that was cut and modified



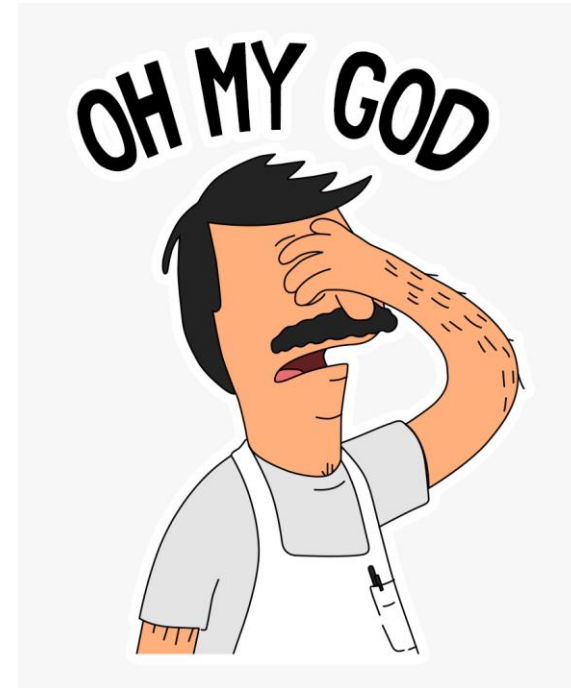
McNeil's Exaggerated Claims

Improves Speech

Improves Feeding

Optimize Dental Relationships

Improve Facial Esthetics



Early Studies

Pre-surgical infant orthopedics with alveolar molding plates has no positive or negative effect on feeding, speech, facial growth or occlusion

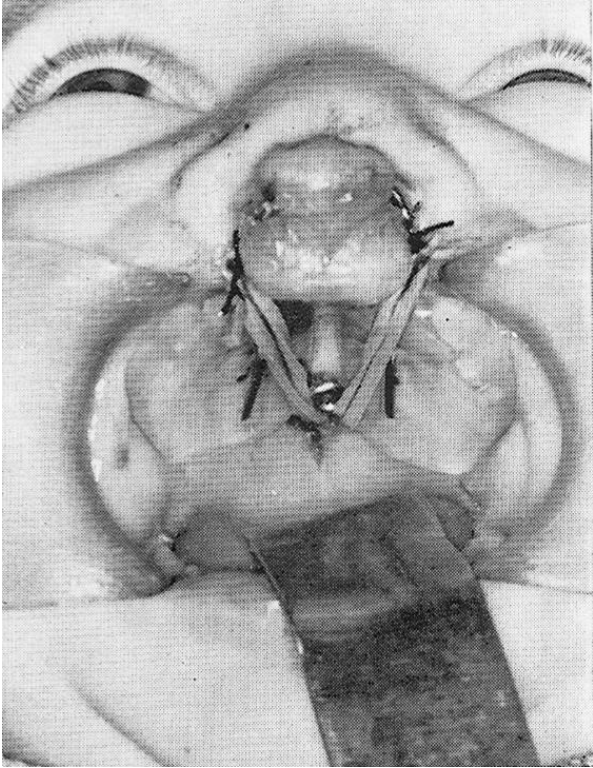
Ross, 1987

“Pre-surgical orthopedics in the neonatal period
has no apparent long term effect on facial
growth in height and depth”

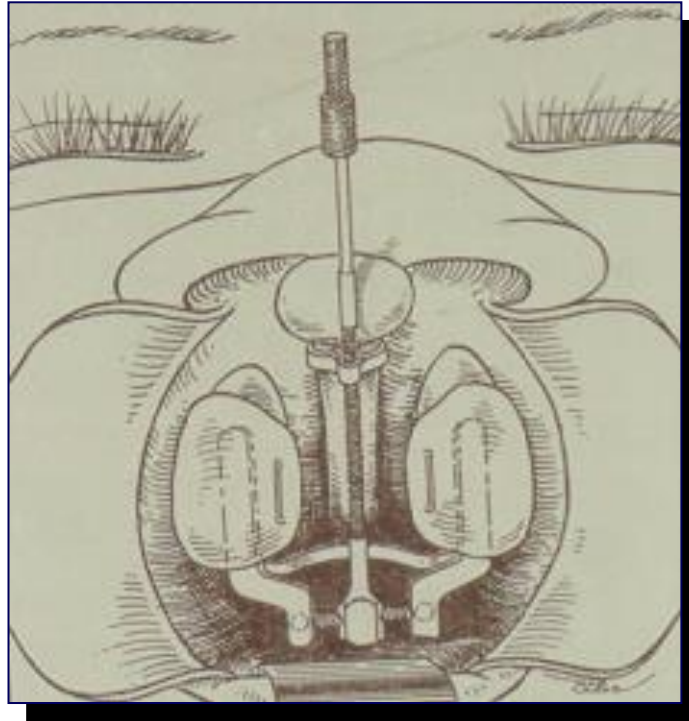
Ross, 1987

Maxillary Growth Inhibition

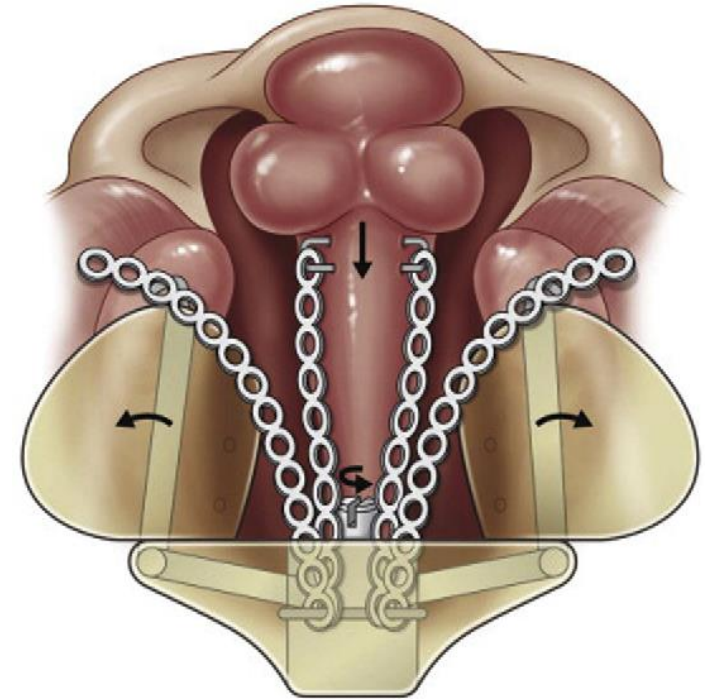
Pin-Retained Appliances



Georgiade



Georgiade/Latham



Millard/Latham

Molding Plate is not a Latham Appliance

The palatoplasty is a necessary evil

The Likelihood of Orthognathic Surgery After Orofacial Cleft Repair

Katherine J. Choi, BA, Jordan R. Wlodarczyk, MD, MS,^{†‡} Eric S. Nagengast, MD, MPH,^{†‡§}
Erik Wolfswinkel, MD,^{†‡} Naikhoba C.O. Munabi, MD, MPH,^{†‡§} Caroline Yao, MD, MS,^{‡§||}
and William P. Magee, III DDS, MD^{†‡§||}*

38.1% BCLP

30.2% UCLP

Burden of Care

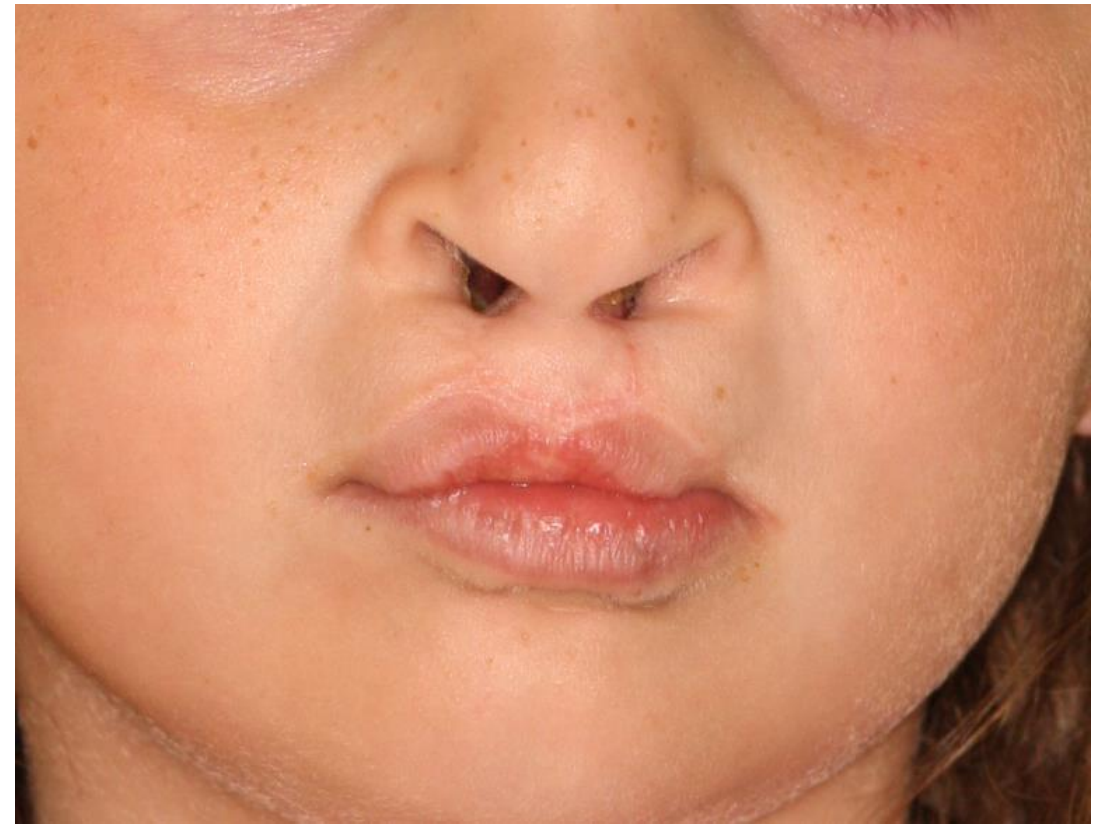
Define Burden

- Cost?
 - Over the patient's lifetime
 - Socio-economic cost
- Number of visits
 - Number of surgeries
- Stress to caregivers
 - Learning curve 1-2 weeks
 - Increasing Empowerment/Decreasing Anxiety
- Psychosocial burden

Burden to the Family?

- 3-4 months (12-16 visits) of their life for their child's lifetime benefit
- Covered by most medical insurances
- Proven to reduce caregiver stress while increasing empowerment
- Reduces cost by reducing the need for revision surgeries

Burden to the Child!!



The Cleft Palate-Craniofacial Journal

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<https://doi.org/10.1177/10556656221136325>



Original Article

Systematic Review and Critical Appraisal of the Evidence Base for Nasoalveolar Molding (NAM)

Kristina Dunworth, BA, (MD candidate 2024)  ¹, Denisse Porrás Fimbres, BS, (MD candidate 2023)¹, Rose Trotta, MD², Andrew Hollins, MD², Ronnie Shamma, MD², Alexander C. Allori, MD, MPH^{1,2,3}, and Pedro E. Santiago, DMD, MBA^{1,2,3}

NasoAlveolar Molding

180+ articles supporting the technique

Conclusion

- Strong evidence supports the efficacy of NAM for preoperative closure of alveolar gap (level-I, -II, and -III) and improvement in postoperative nasolabial aesthetics (level-II and -III)
- The available evidence on maxillofacial growth does not show impaired growth with NAM (level-III)

Conclusion

- Evidence suggests fewer lip and nose revisions and requirement of alveolar bone grafts (level-III)
- NAM's long term impact appears to reduce costs associated with avoidable procedures (level-III)
- NAM does not appear to increase caregiver psychosocial burden of care and may be associated with improved quality of life (level-II)

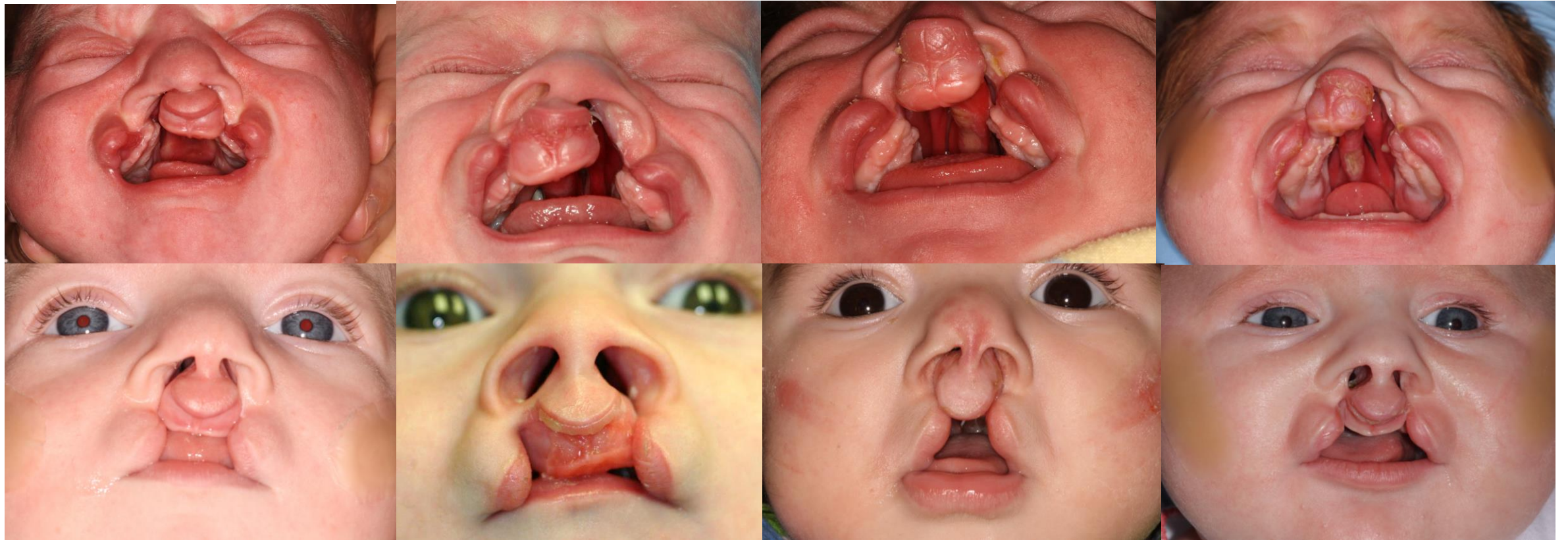
Controversy or Skepticism?



GS-NAM on BCLP Should be Performed
During the First 6 Months of Life



The degree of the cleft severity does impact the surgical result, regardless of how good the surgeon is



It's not about a specific technique,
it is about an interdisciplinary well
designed effective protocol

Minimize the number of surgical
interventions in a patient's
lifetime while maximizing the
outcomes



Thank You!!

