



**GREAT HOSPITAL, BETTER KIDS.**



# ARNOLD PALMER MEDICAL CENTER



ARNOLD PALMER HOSPITAL  
For Children



WINNIE PALMER HOSPITAL  
For Women & Babies



# Historical Perspectives

- World War I (Trench Warfare)
  - Maxillofacial Surgery begins
- World War II
  - Techniques are expanded
  - American Society of Oral and Plastic Surgeons
- Technical Refinements
  - Fracture repair improves
  - Orthognathic (Corrective Jaw) surgery (1966)
  - Bone plates and screws (Rigid Fixation)

# What is Craniofacial Surgery?

- Tessier, 1967
- Definition of Craniofacial Surgery
  - Regional subspecialty?
- Most appropriate definition is “surgery of the upper facial skeleton that requires a transcranial approach.”
- An extension of the “maxillofacial” techniques.

# Pediatric Craniomaxillofacial Surgery Fellowship Training

- Cleft Lip & Palate Repair
- Combined Craniofacial/Neurosurgical
  - Craniosynostosis, CFD Syndromes, Complex Craniofacial Malformations
- Corrective Jaw (Orthognathic) Surgery
- Trauma
- Pathology
  - Skull base, Maxilla, Mandible

# Cleft & Craniofacial Surgeon

- Definitions:
  - American Cleft Palate-Craniofacial Association
  - Parameters of Care Documents
  - State Children's Medical Services Guidelines
- Completed “core” residency training in OMFS, Otolaryngology, Plastic Surgery.
- Minimum 12 months fellowship training.
- Minimum number of cases per year.
- Other requirements:
  - 50% of practice dedicated to CP/CF
  - Membership in interdisciplinary team

# Cleft, Craniofacial, & Pediatric Oral/Maxillofacial Surgery

## University of Alabama-Birmingham

- ◉ Victor J. Matukus DDS, MD, PhD
- ◉ Peter D. Waite DDS, MD, MPH
- ◉ Charles A. McCallum DMD, MD

## University of North Carolina-Chapel Hill

- ◉ Timothy A. Turvey DDS
- ◉ Bill C. Terry DDS

## Posnick Center for Facial Plastic Surgery & Georgetown University Medical Center

- ◉ Jeffrey C. Posnick DMD, MD

# OMS Residency → Plastic Surgery Residency

## ■ Positives:

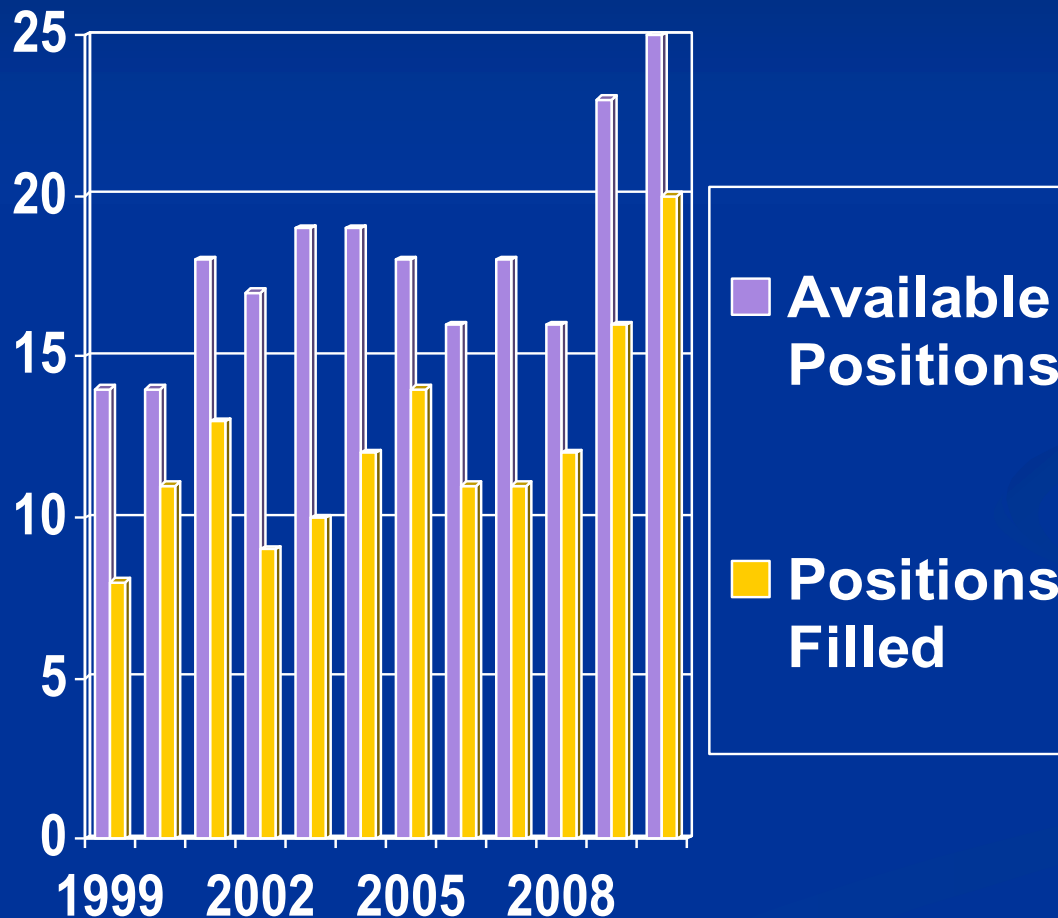
- Advanced standing following OMS residency.
- Provides a broad surgical experience.
- Eligibility for cleft & craniofacial fellowships.

## ■ Negatives:

- Average 4 months of “pediatric” training.... So you still need to pursue cleft & craniofacial training.
- No OMS activities (orthognathic surgery, etc) during training (2-3 years).
- Complicates board certification.



# Craniofacial Fellowships Available to Plastic Surgeons



- ◆ 18 Participating programs in Match
- ◆ 3 are ACGME approved
- ◆ 10 programs
  - ◆ Research emphasis
  - ◆ “Combined” (esthetic)
  - ◆ Accept fellows before PS

# Fellowship Training:

- ◎ *Fellowships are the contemporary mechanism that surgical specialties use to advance the art and science of their disciplines without casting off those components of their specialty.*

*Fellowships: The Third Wave*

*Assael LA. J Oral Maxillofac Surg*

*67:1159-1160, 2009*

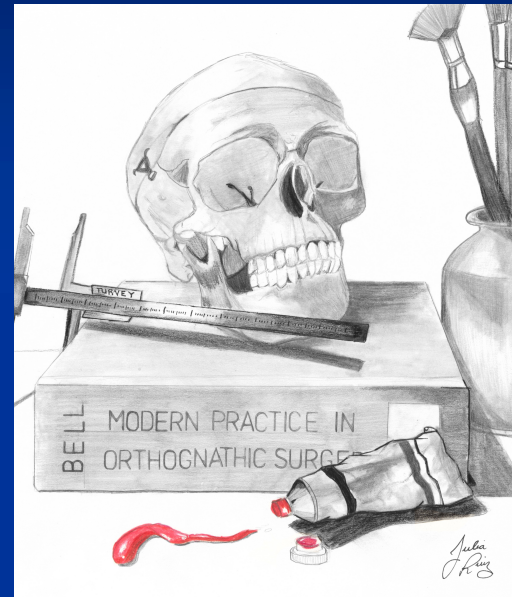
# Pediatric Craniomaxillofacial Surgery Fellowship: Goals

- Capitalize on training opportunities across specialties:
  - ◎ Fellows with “core” training in various specialties (OMS, Otolaryngology, PRS)
  - ◎ Regional referral centers/Teams.
- International opportunities
- *Follow the Hand Surgery Fellowship model !!!*

# APHC Peds Craniomaxillofacial Surgery Fellowship

- Started in 2009
- Co-sponsored by the Department of Children's Surgery (Divisions of Peds CMF & Neurosurgery)
- Fellows:
  - Michael S. Jaskolka DDS, MD
  - Brent A. Golden DDS, MD
  - Stephanie L. Reeder DMD, MD
  - David Trent DDS, MD
  - Michael Gentile DMD
  - Michael Markiewicz DDS, MD, MPH
  - Joshua Stone DDS, MD
  - Mark Miller DDS, MD
  - Bryan Swanson DDS

# Contemporary Management of Facial Clefts



**Ramon L. Ruiz D.M.D., M.D.**

*Director, Pediatric Craniomaxillofacial Surgery*

*Department of Children's Surgery*

*Arnold Palmer Hospital for Children*

*Associate Professor of Surgery*

*University of Central Florida, College of Medicine*

*Orlando, Florida*



# WINNIE PALMER HOSPITAL

## For Women & Babies

*Supported by Arnold Palmer Medical Center Foundation*



Photograph by John Stanmeyer

### **United States**

Bundled newborns on September 1, 2010, are arranged for a portrait at Orlando's Winnie Palmer Hospital, the second busiest birth facility in the U.S. Unusual among industrial nations, the U.S. has a comparatively high fertility rate, due in part to the significant rate of teenage pregnancies and a steady influx of immigrants. By 2050 America's population is expected to top 400 million.



# Arnold Palmer Hospital for Children Craniofacial Disorders Program

- Cleft Lip and Palate
- Orthognathic Surgery
- Abnormal Head Shape/Craniosynostosis
- Tumors of the Craniofacial Region
- Complex Congenital Malformations
- Facial Trauma Management



ARNOLD PALMER HOSPITAL  
For Children

*Supported by Arnold Palmer Medical Center Foundation*



# Prevalence: Cleft Lip/Palate

- Cleft Lip +/- Cleft Palate 1:700
- Native American 1:280
- Asian 1:425
- African American 1:1700
- Cleft Palate Alone 1:2000

# Associated Conditions

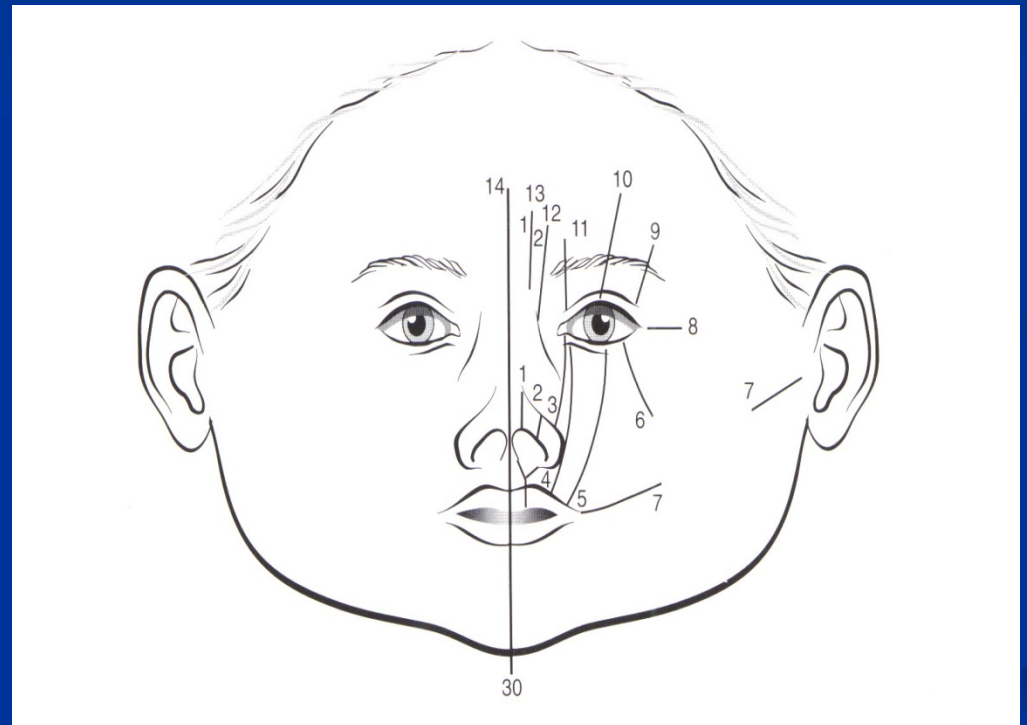
- Pierre Robin Sequence
  - Stickler Syndrome
  - Van der Woude Syndrome
  - Velocardiofacial Syndrome
- Likelihood of syndromic association much greater with isolated cleft palate.



# Holoprosencephaly, Trisomy 13, 18

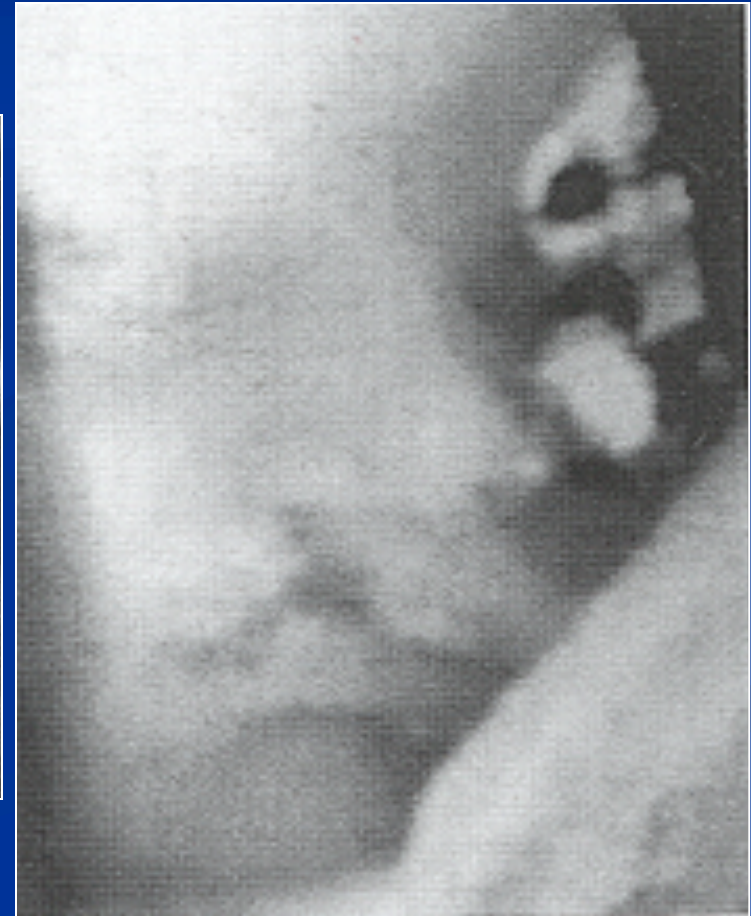


# Embryology & Classification



# Prenatal Diagnosis

- 3-D Ultrasound:



# Team Approach to Care

- C. Everett Koop, 1987
  - Children with special health care needs
- ACPCA, 1993
  - Parameters of Care
  - Protocols that emphasize thoughtful timing
- Psychosocial care through teenage and adult years
- “Patient and Family Centered”

# Sequence of Treatment

- Lip Repair: 12 weeks
- Cleft Palate Repair: 10 – 18 months
- Speech Surgery (VPI): 2.5 - 6 years \*\*
- Bone Graft: 6 – 8 years
- Orthognathic Surgery: 14 – 18 years \*\*
- Lip and Nasal Revisions \*\*

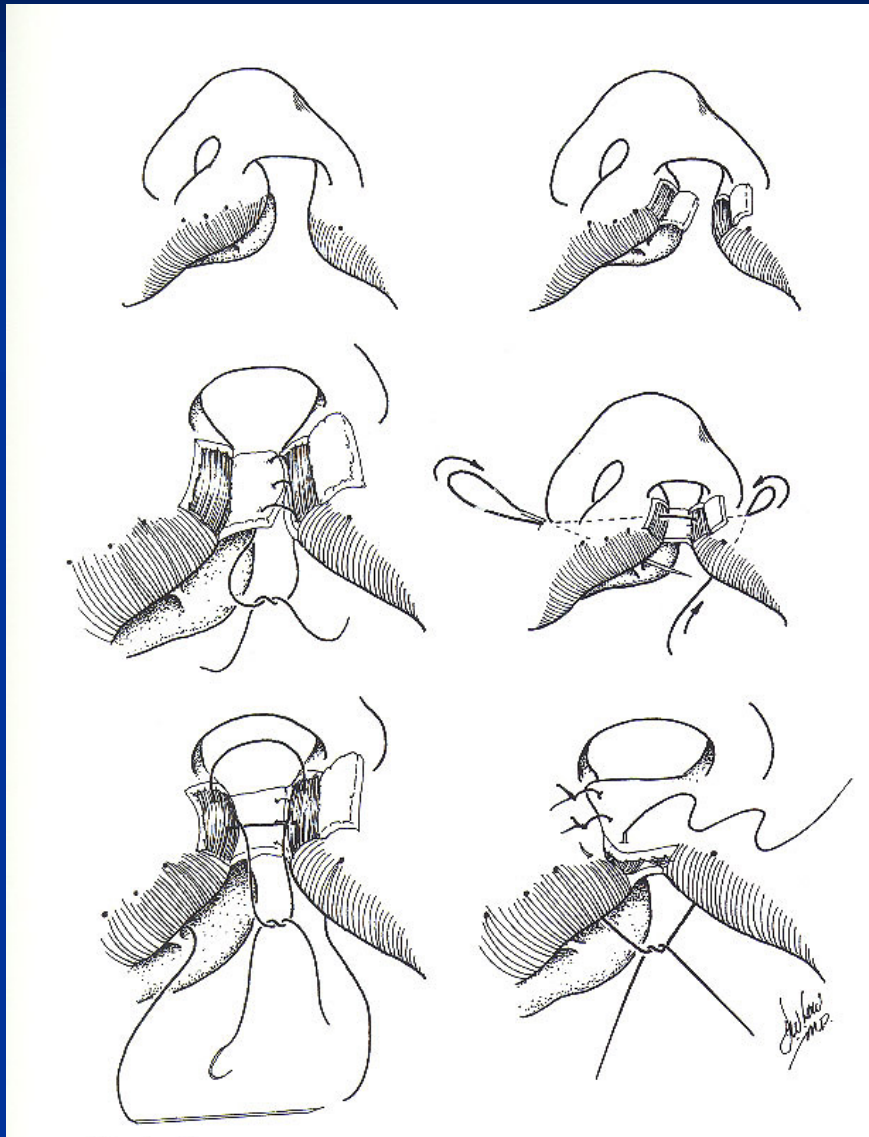
*Biological Consequences:*  
Early Surgery = Decreased Growth



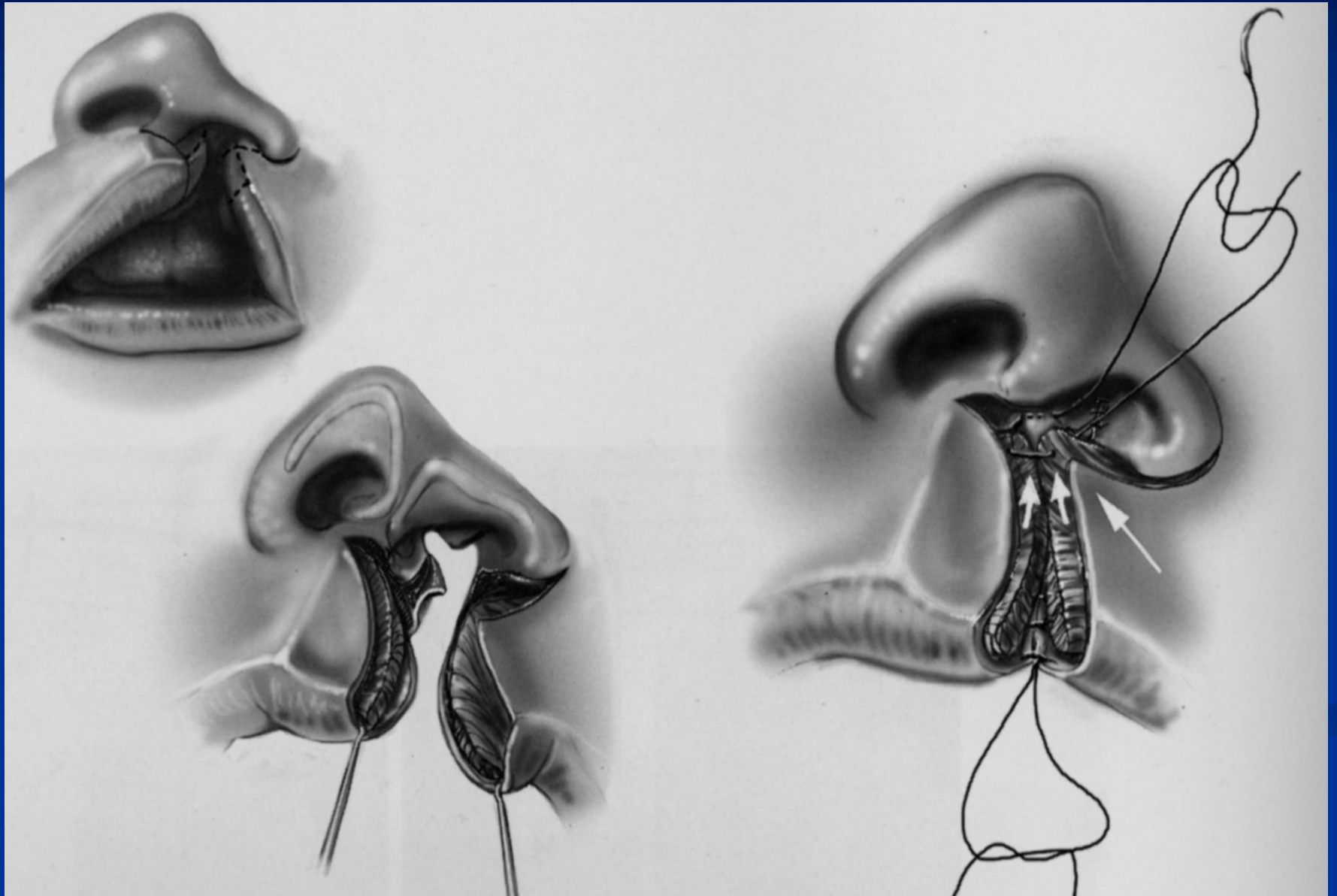
# Cleft Lip: Timing

- 12 to 14 weeks of age
- Rule of 10' s
- Allows for comprehensive work-up
- “Immediate repair” theory
  - “Fetal-like” healing
  - Avoid psychosocial trauma to parents
  - No data to support earlier repair

# Cleft Lip Repair: Lip-Adhesion



# Rotation-Advancement Technique

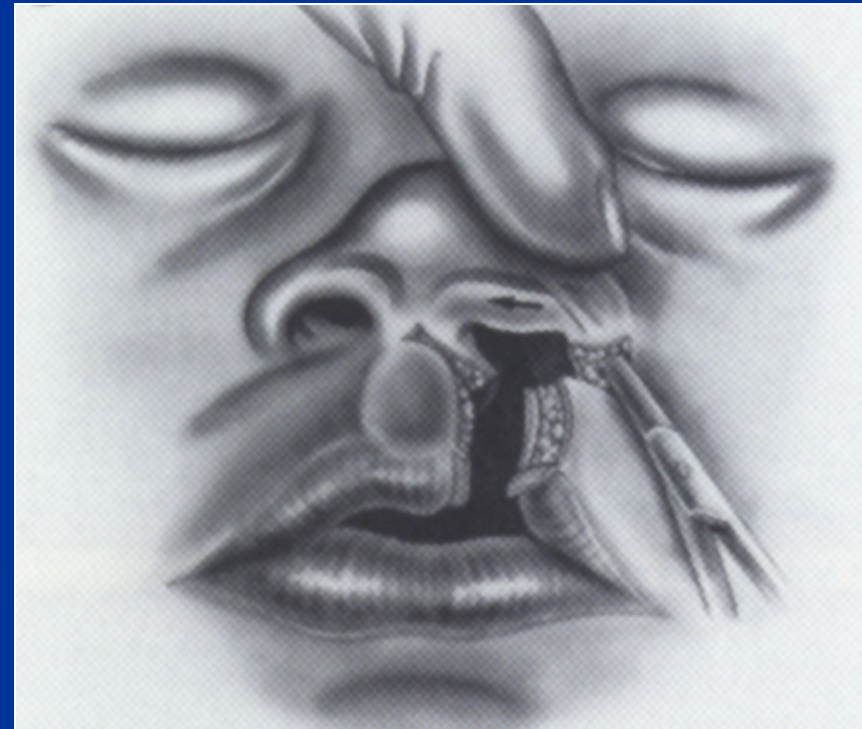


# UCLP Repair: Technique

- Measurements/Markings
- Lateral lip segment incisions and dissection
- Release/mobilize muscle
- Lateral soft tissues of nose (nasal floor)
- Non-cleft (medial) side dissection & Medial nasal floor
- Muscle repair
- Closure
  - Vermillion border, Vestibule, Nasal floor, Philtral column

# Cleft Nasal Deformity: Techniques for Repair

- Primary Nasal Repair
  - “Minimally invasive”
  - Open Rhinoplasty
  - **McComb technique**
    - **alar cartilage release**











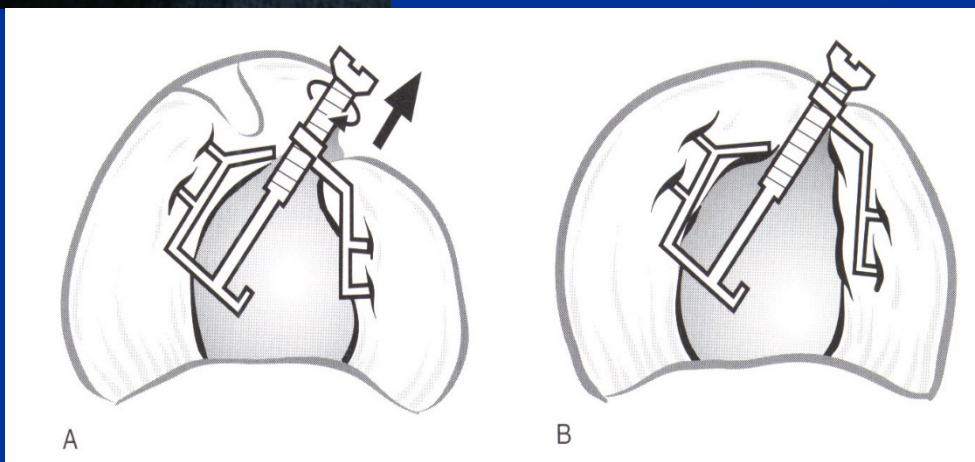
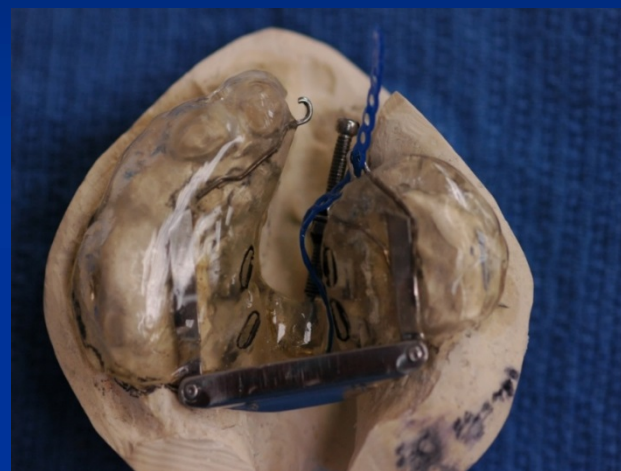
# Pre-Surgical Orthopedic Treatment: *Is it really necessary?*

- **What are your objectives???**
- **Obturator device for feeding**
- **Repositioning of maxillary segments:**
  - **Approximation of segments to prepare for cleft lip and nasal repair.... *May make surgery easier.***
  - **Approximation/alignment of alveolar segments in preparation for Primary Bone Graft or GPP.... *These are poor justifications, but more on this later.....***

# *UCLP: Orthopedic Treatment Options*

- Presurgical Orthopedics (Pin-retained)
- Lip Adhesion (Surgical)
- Naso-Alveolar Molding (NAM)
- Lip Taping
- No Presurgical Manipulation

# Presurgical Orthopedic Treatment: Pin-retained device



# Cleft Lip and Palate: Presurgical Orthopedic Treatment

- No long term data on benefits of lip or nose aesthetics, arch alignment, or occlusion
- Berkowitz: Elastic Traction vs. Millard/Latham
  - Standard repair: 6% Maxillary Hypoplasia
  - Millard/Latham: 100% Maxillary Hypoplasia

Berkowitz S. Plast Recon Surg. 2004 Jan; 113 (1): 1-18.

Millard DR, et. al. Plast Recon Surg. 1999 May; 103(6): 1630-44.

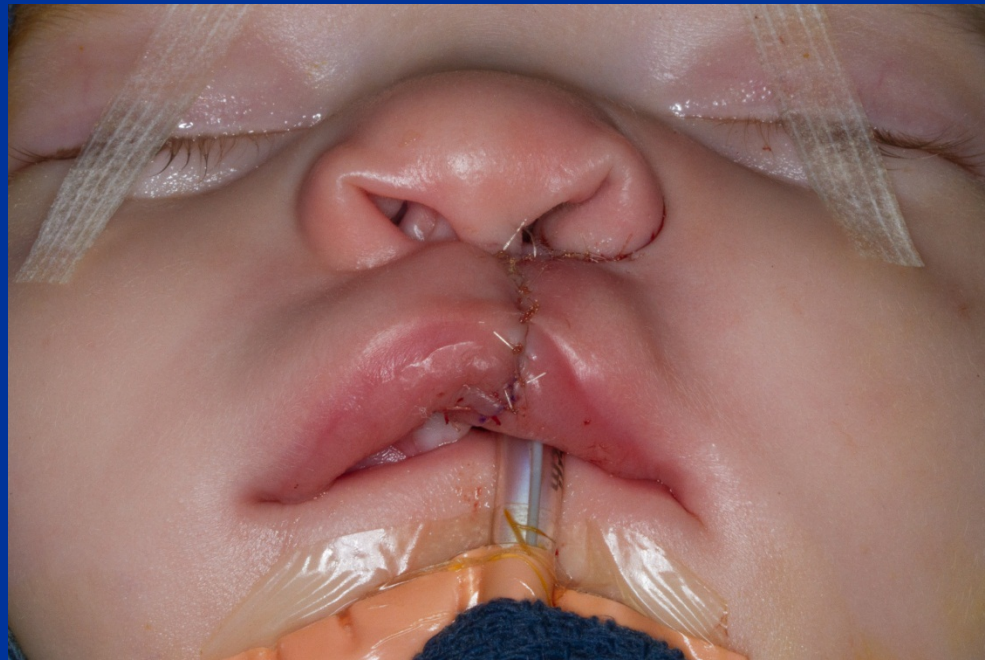


- Orthopedic preparation results in loss of cleft dental gap
  - Loss of the lateral incisor space
  - Distortion of the maxillary arch form

# Naso-Alveolar Molding (NAM)

- Molding of alveolar segments
- Combined with lip taping and nasal conformer
- Delays definitive repair until 4-6 months
- **No Data of improved outcomes !!!**







# Cleft Lip Repair

# Surgery without PSOT

- No repositioning of skeleton
- Separate soft tissue envelope from abnormal skeletal elements
- Release of lower lateral cartilages
- Nasal sill release to inferior turbinate
- **Subperiosteal dissection along piriform rim**



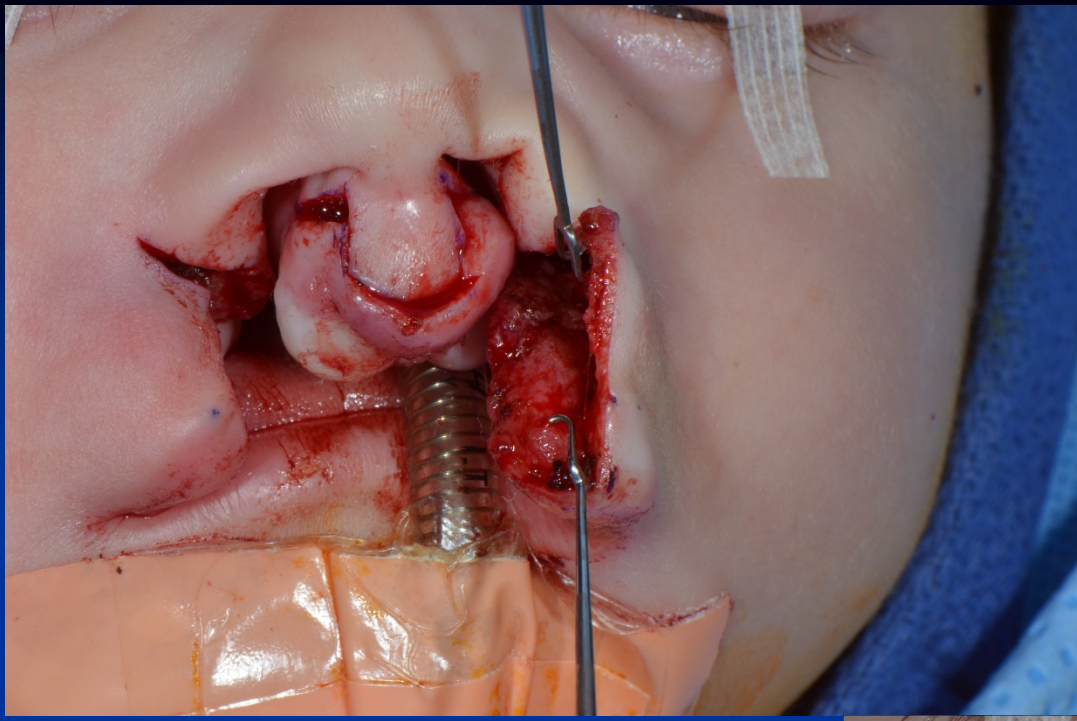


# BCLP Repair: Technique



# BCLP Repair: Technique





# Cleft Lip Repair



# Sequence of Treatment

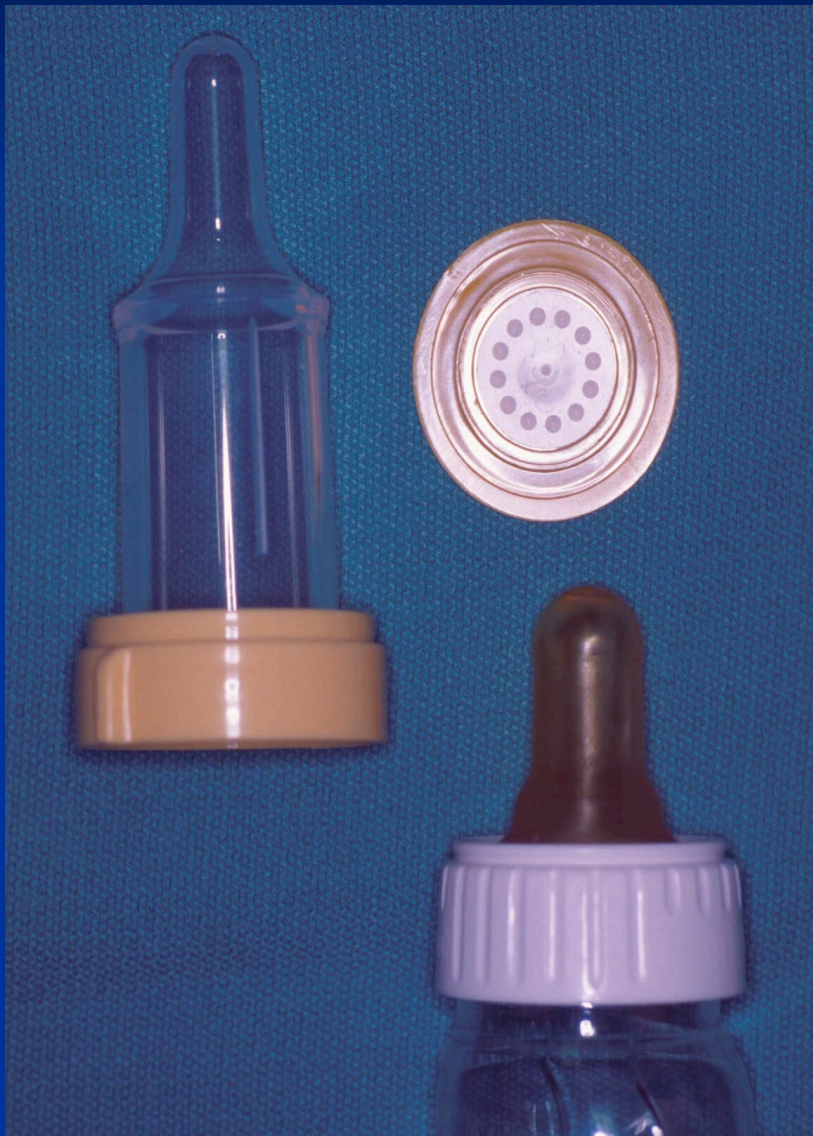
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- Bone Graft: 6 – 8 years
- Orthognathic Surgery: 14 – 18 years \*\*
- Lip and Nasal Revisions \*\*



# Cleft Palate Repair: Presurgical Care

- Feeding
- Otolaryngology
- Speech
- Ophthalmology
- Genetics
- Diagnostic visit with CPT/CFT (outpatient)

# Feeding Considerations



drbrownsbaby.com

# Dr. Brown's

natural flow®

**Newborn Gift Set**

0m+  
28 Level 1

3m+  
28 Level 2

**Reduces Colic**  
Spit-up, Burping & Gas

**Helps Preserve Vitamins**  
C, A + E plus Lipids

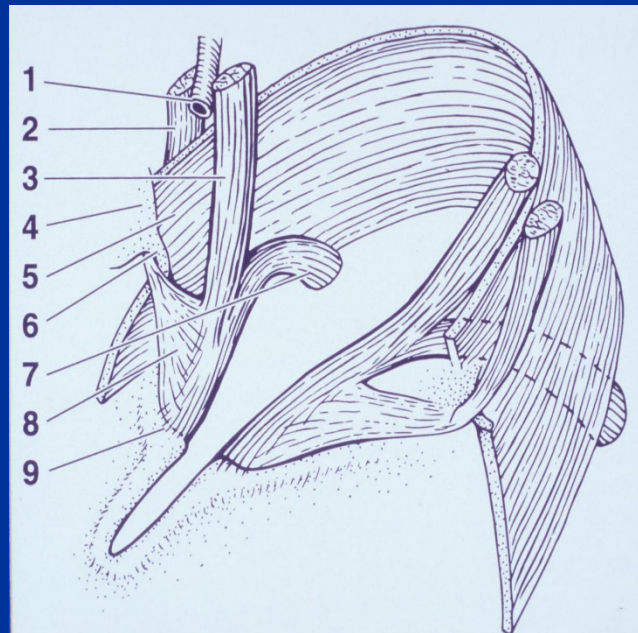
**Dr. Brown's Medical Special Feeding System**  
Includes 10 Infant Feeding Valves

**Set includes:** 3 - 8 oz/250 ml bottles • 2 - 4 oz/120 ml bottles •  
2 - Level 2 nipples • 2 - Storage caps • 3 - Cleaning brushes

**Fits most breast pumps**

# Cleft Palate Repair: Objectives

- Reconstruction of Hard and Soft Palate
- Closure of all oronasal communication from incisive foramen to uvula
- Creation of a dynamic soft palate



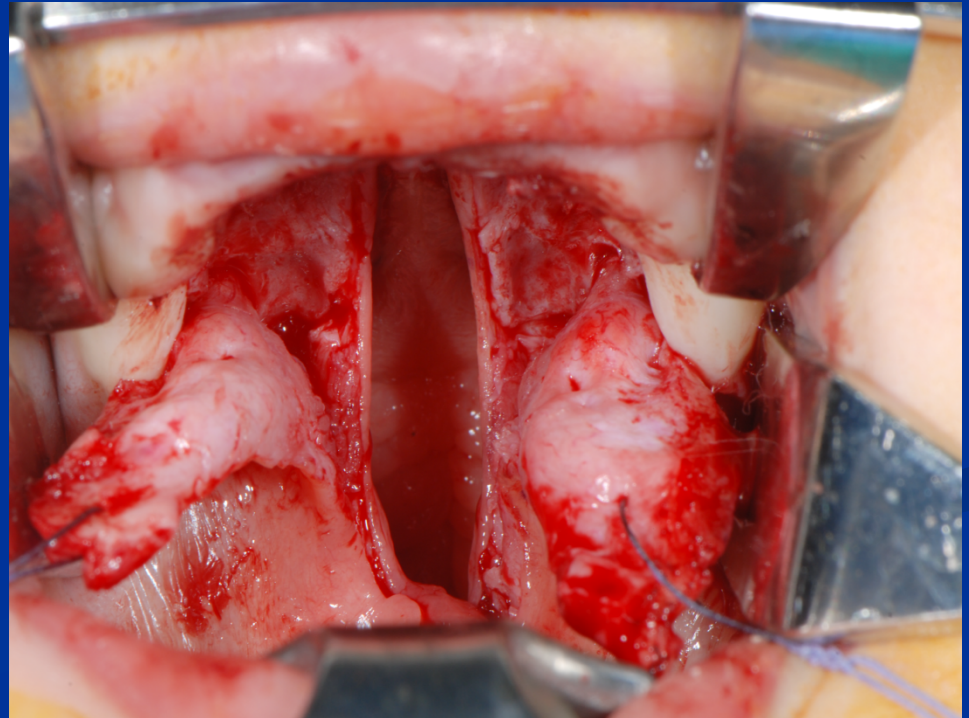
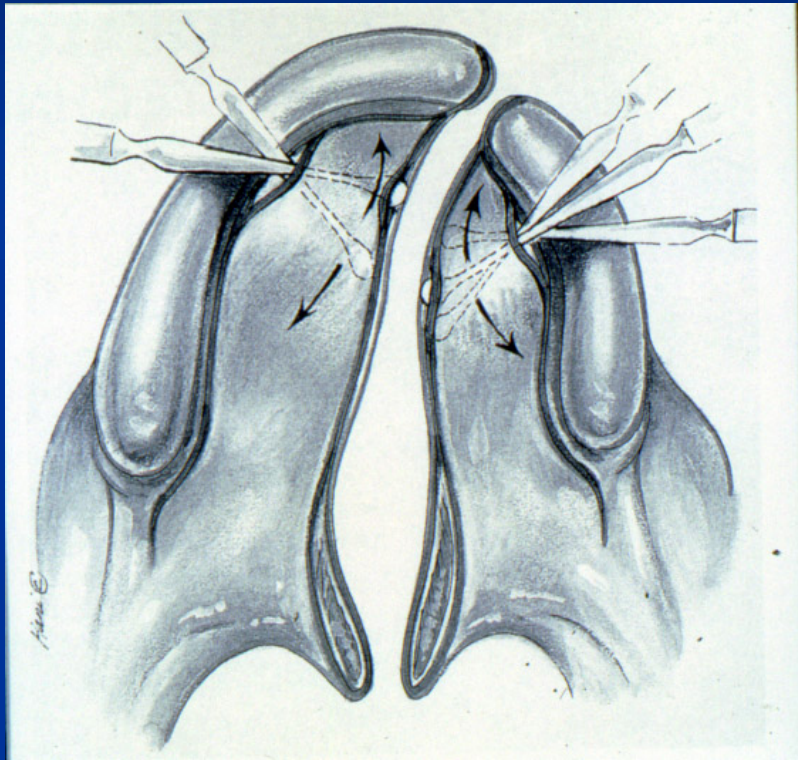
# Cleft Palate Repair

- Contemporary approach is a single-stage repair
- 10 to 18 months; Exact timing is based on “language age”
- Various surgical techniques:
  - 2-Flap (Bardach-type) palatoplasty
  - Von Langenbeck
  - Double opposing Z-plasty (Furlow) technique

# Cleft Palate Repair: 2-Flap (Bardach) Procedure

- Two-flap palatoplasty
- Closure of hard palate in two layers (nasal & oral) and the soft palate in three layers (nasal mucosa, muscles, & oral mucosa)
- Release of the musculature from posterior edge of hard palate
- In wide clefts, area of exposed bone may be left

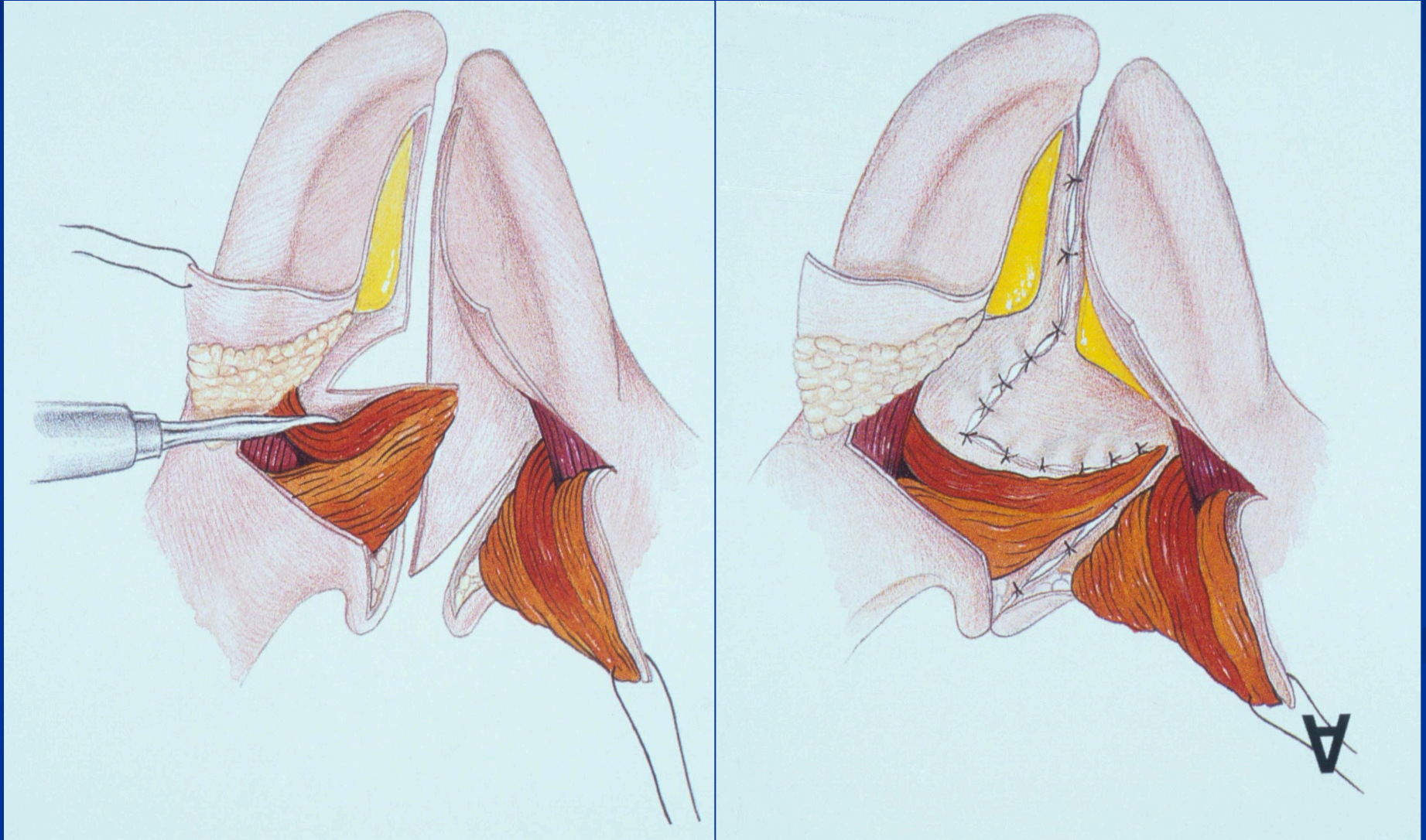
# Cleft Palate Repair: Two Flap Technique



# Cleft Palate Repair: 2-Flap Procedure

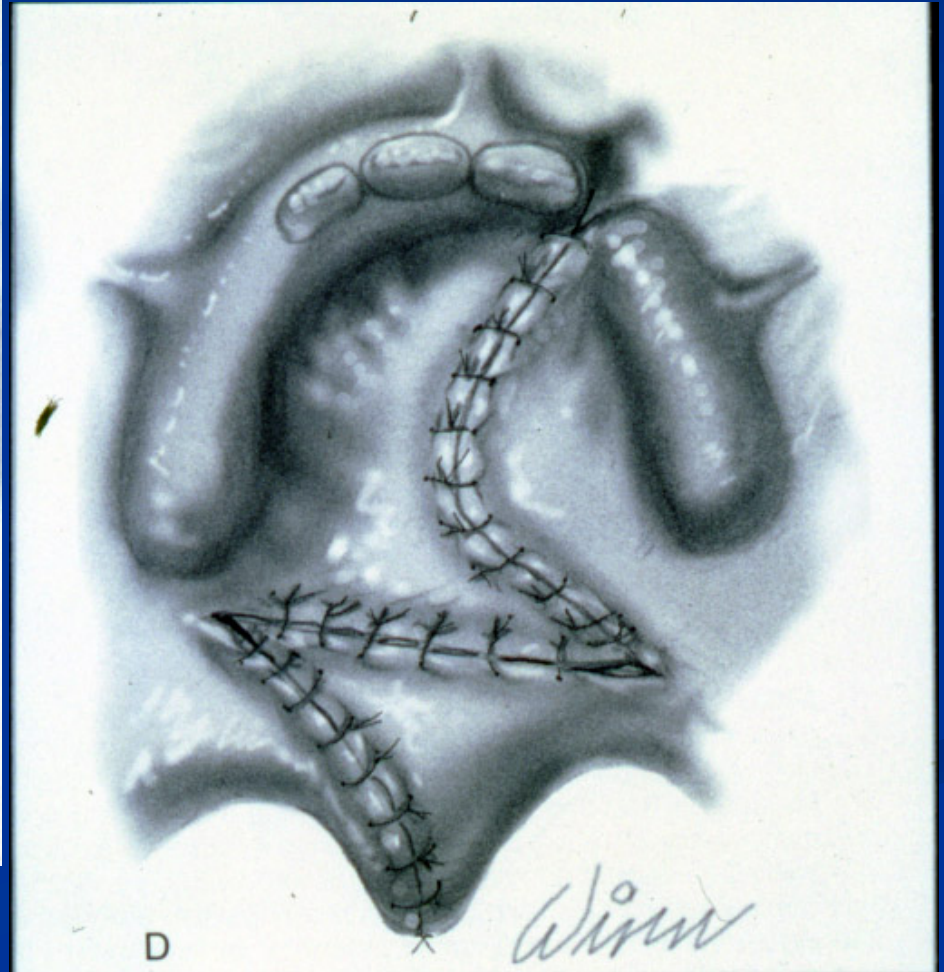
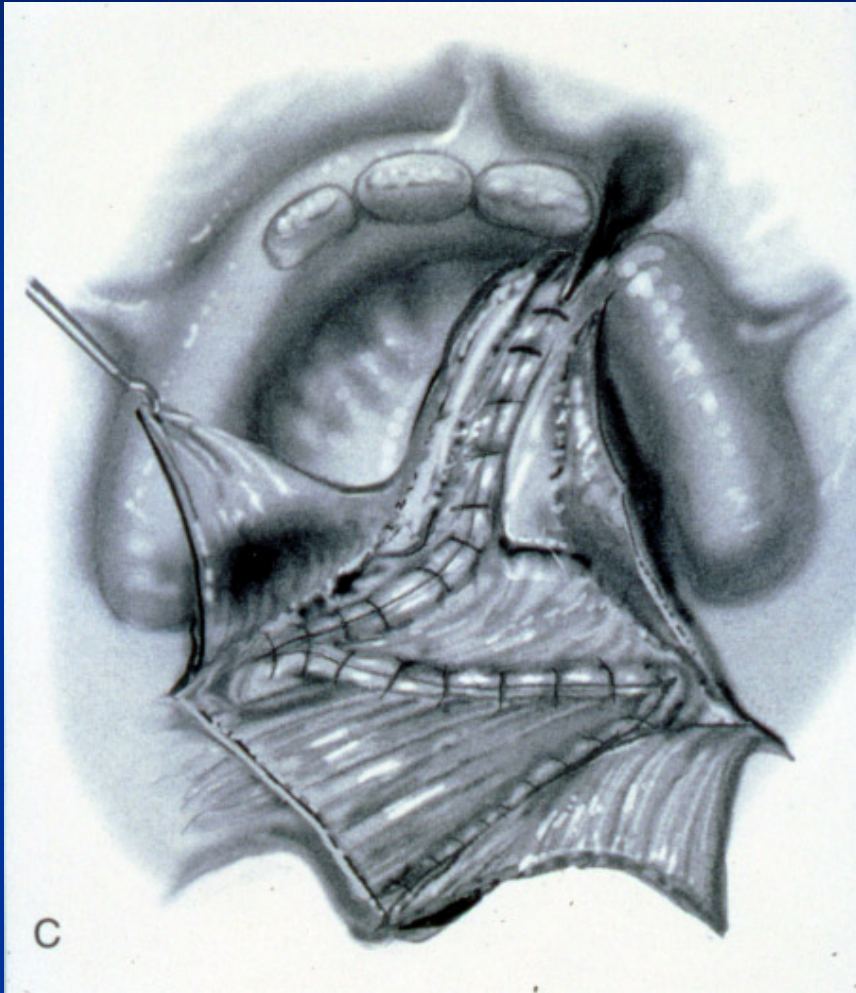
- Advantages
  - ◆ Allows for complete closure of palatal cleft
  - ◆ Very low fistula rate
- Disadvantages
  - ◆ Does not lengthen palate

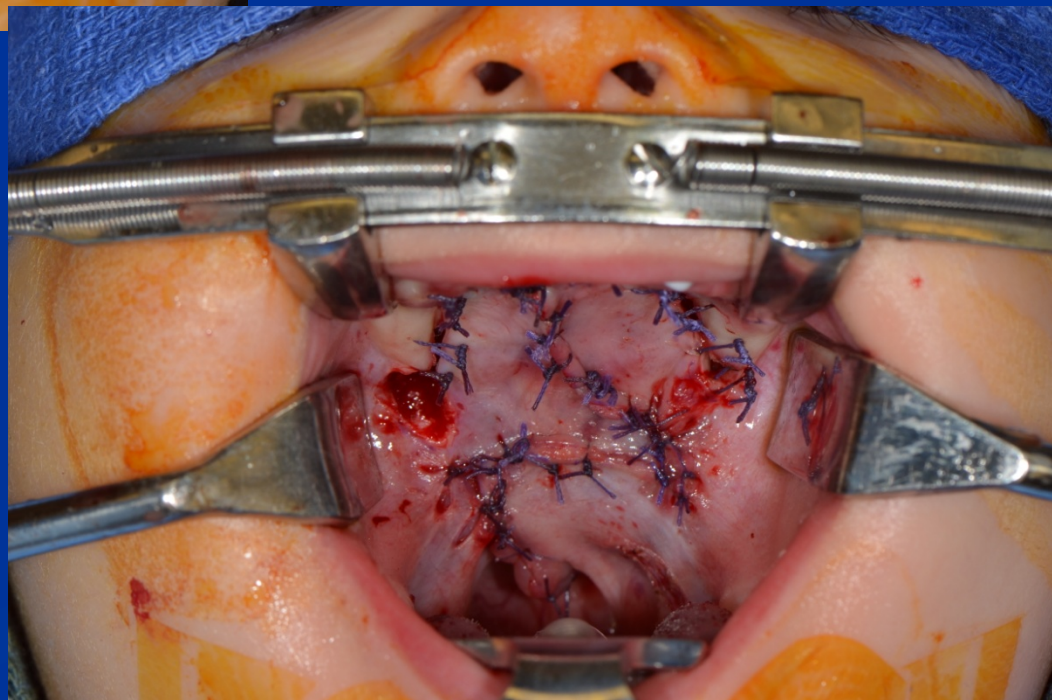
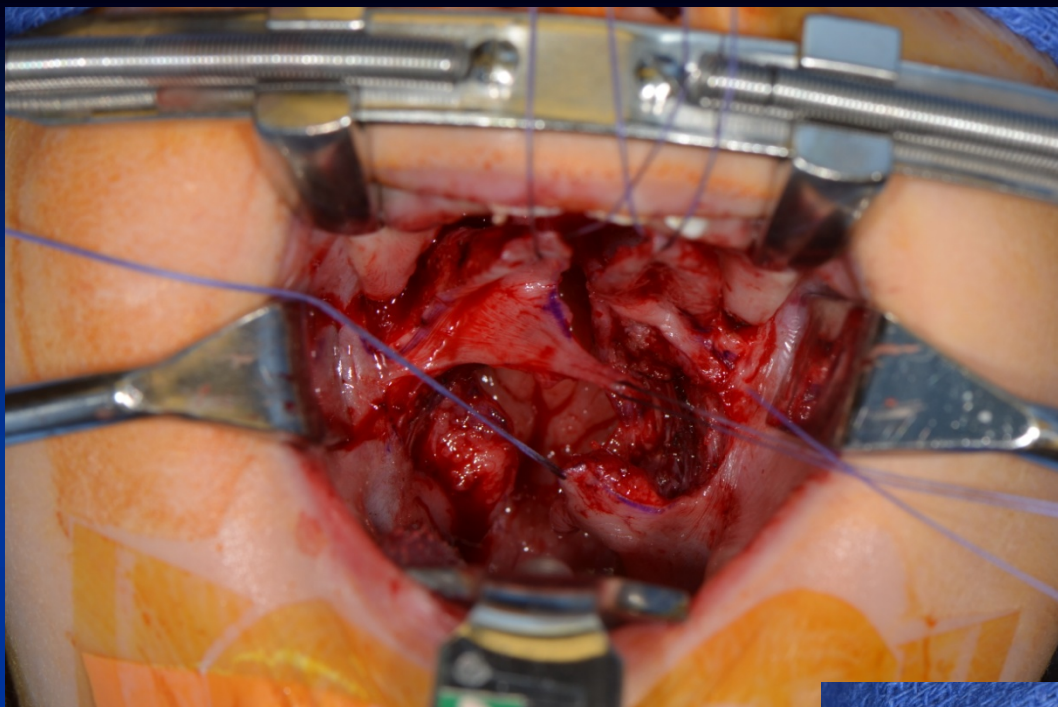
# Cleft Palate Repair: Furlow Z-plasty



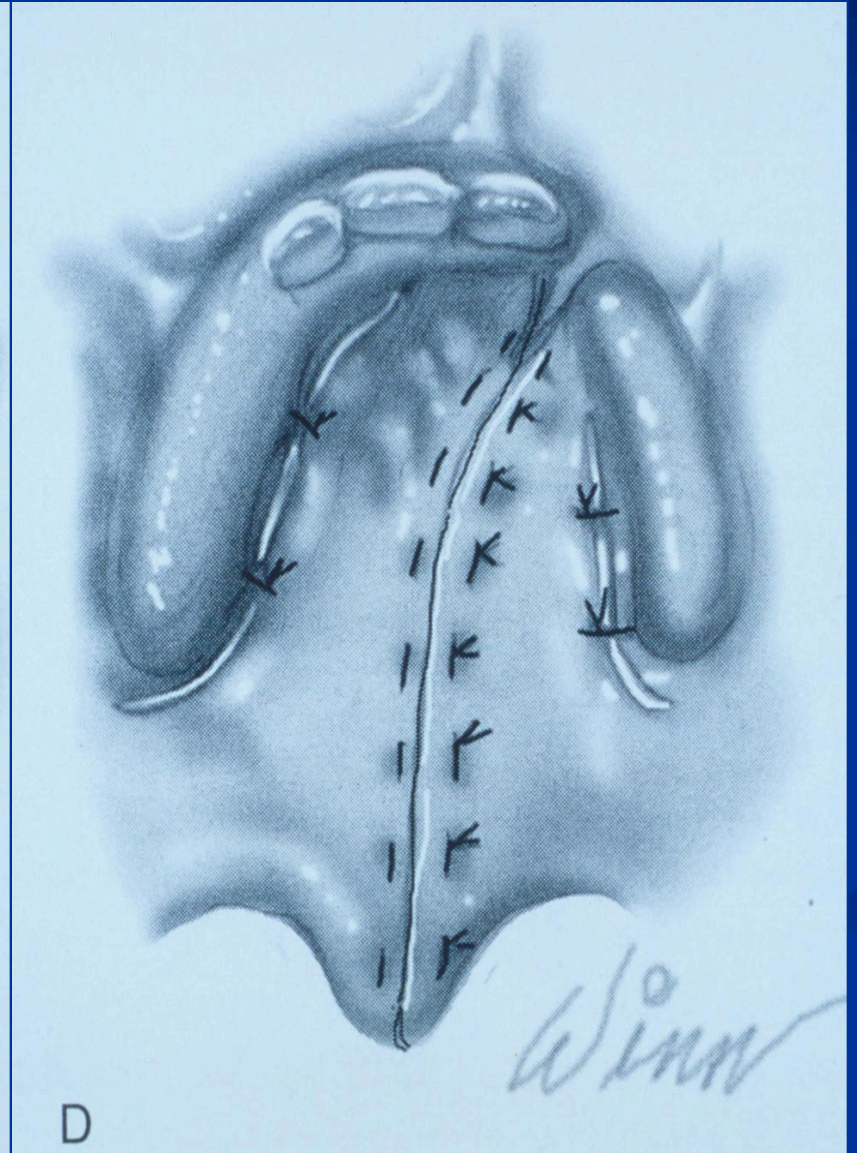
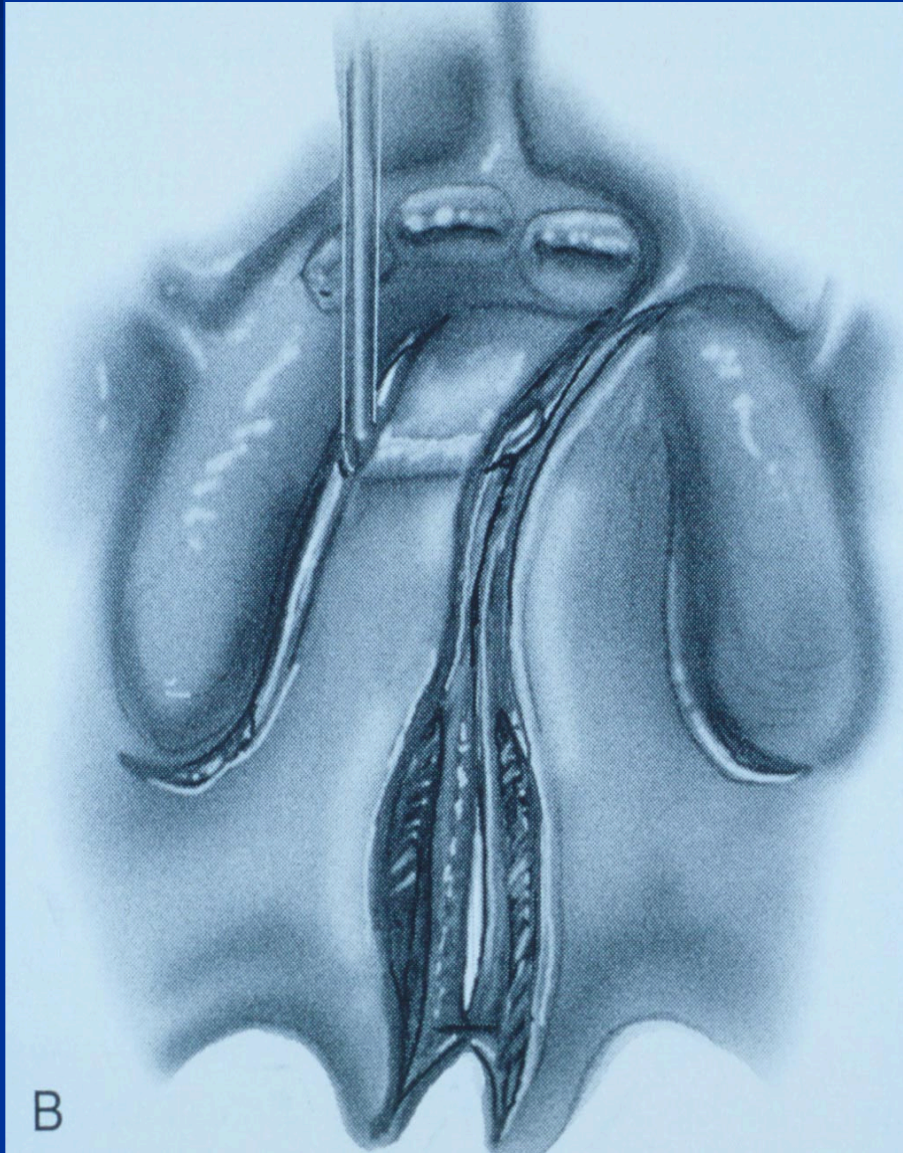


# Cleft Palate Repair: Furlow Z-plasty



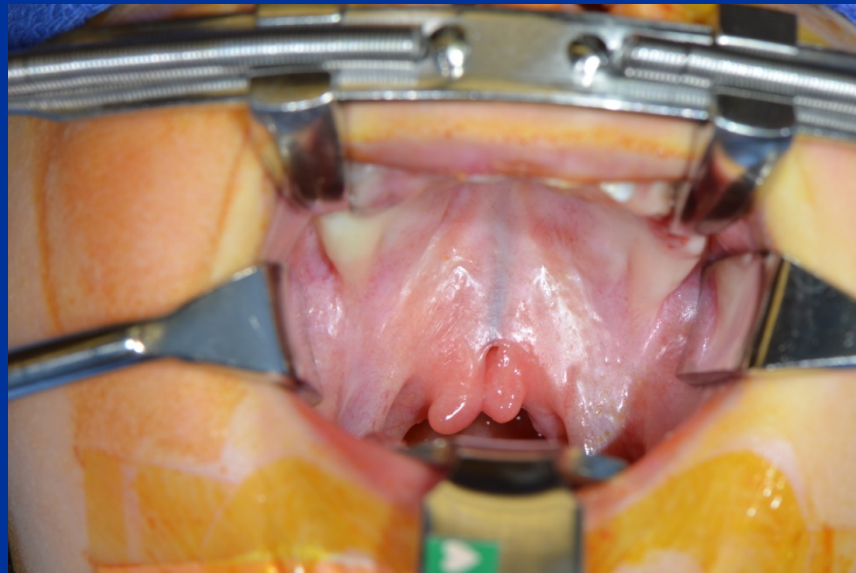


# Cleft Palate Repair: von Langenbeck



# Submucous Cleft Palate (SMCP)

- Bifid Uvula
- Separation of soft palate (Muscular diastasis)
- Notching at posterior border of hard palate



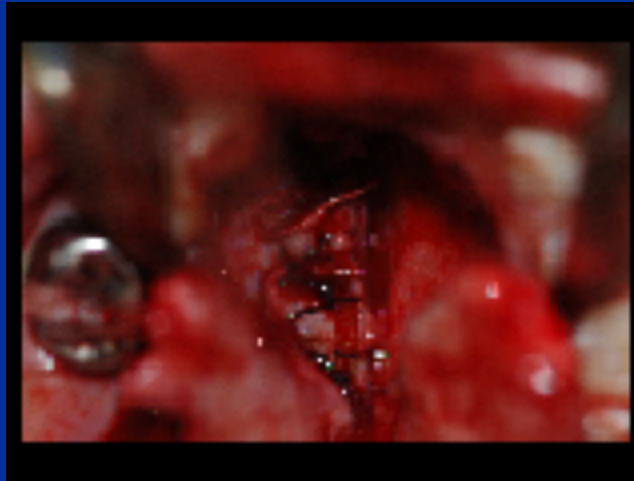
Calnan J. (1954) Submucous Cleft Palate. *Br J Plast Surg.* 6: 264-272.

# Residual Palatal Fistulas

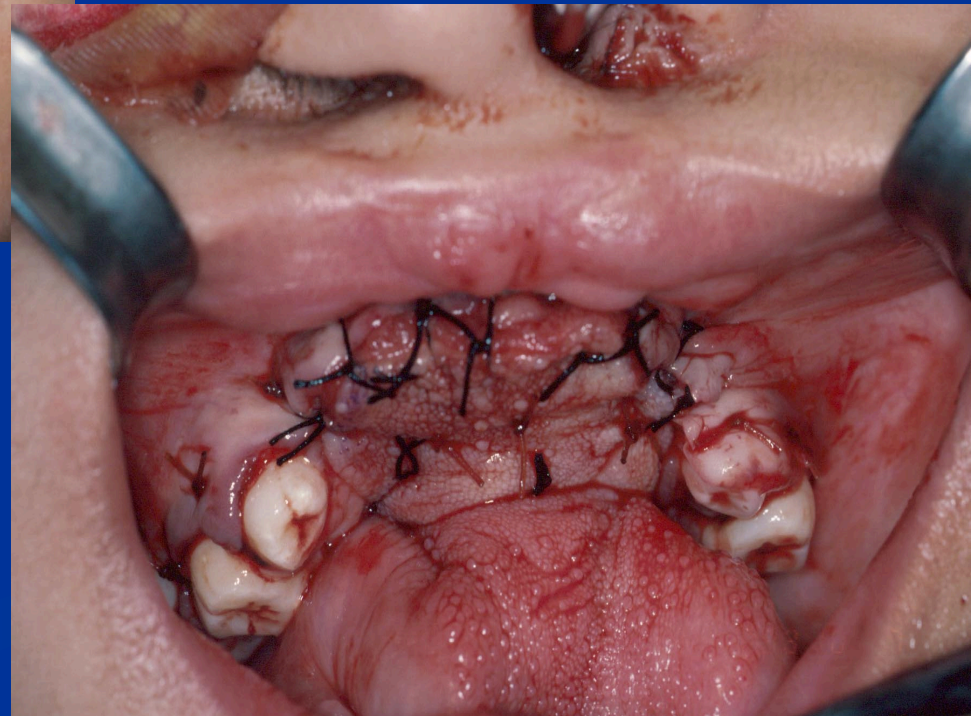
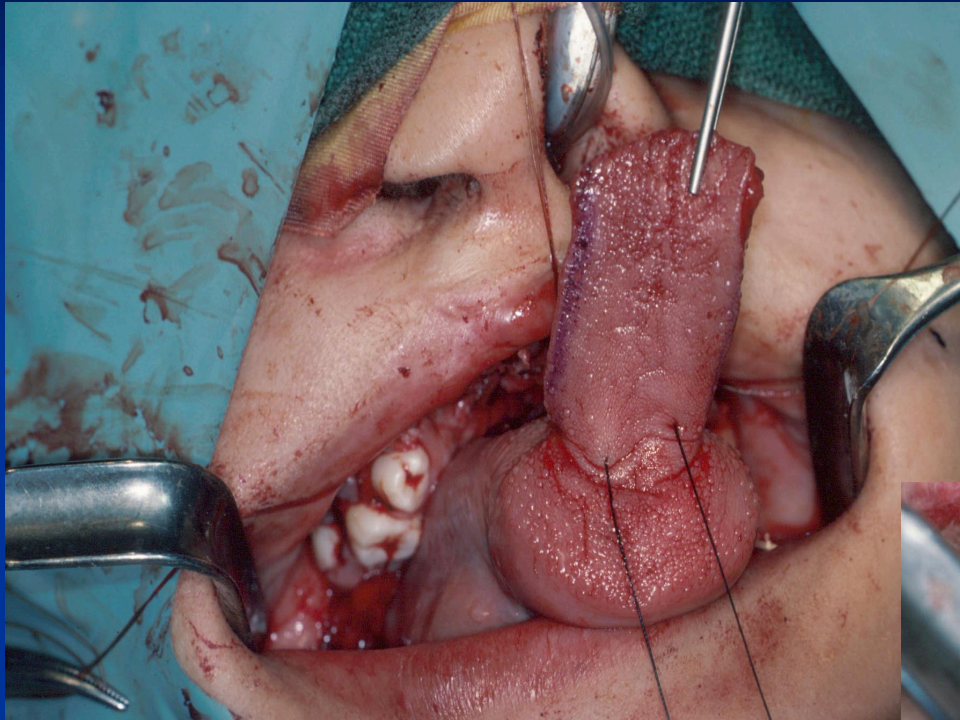
- Common Locations:
  - Junction of hard and soft palate
  - Incisive foramen region
  - Nasolabial region
- Management:
  - Early surgical intervention only when based upon speech/functional indications
  - Closure at the time of bone graft procedure

# Residual Palatal Defects

- Limited “finger” flaps should be avoided due to high failure rate
- Best results with modified palatoplasty
- Adjuncts may include Alloderm, Stent, etc.



# Anteriorly Based Tongue Flap



# Sequence of Treatment

- Lip Repair: 12 weeks
- Cleft Palate Repair: 10 – 18 months
- Speech Surgery (VPI): 2.5 - 6 years \*\*
- Bone Graft: 6 – 8 years
- Orthognathic Surgery: 14 – 18 years \*\*
- Lip and Nasal Revisions \*\*



# Management of VPI

- Debilitating consequence of CP
- Surgical intervention when VPI is:
  - Consistent
  - Related to an anatomic problem
- 2 1/2 to 8 yrs of age (based on speech)
  - Language and Articulation Development
  - Accurate Assessment
  - Patient Compliance

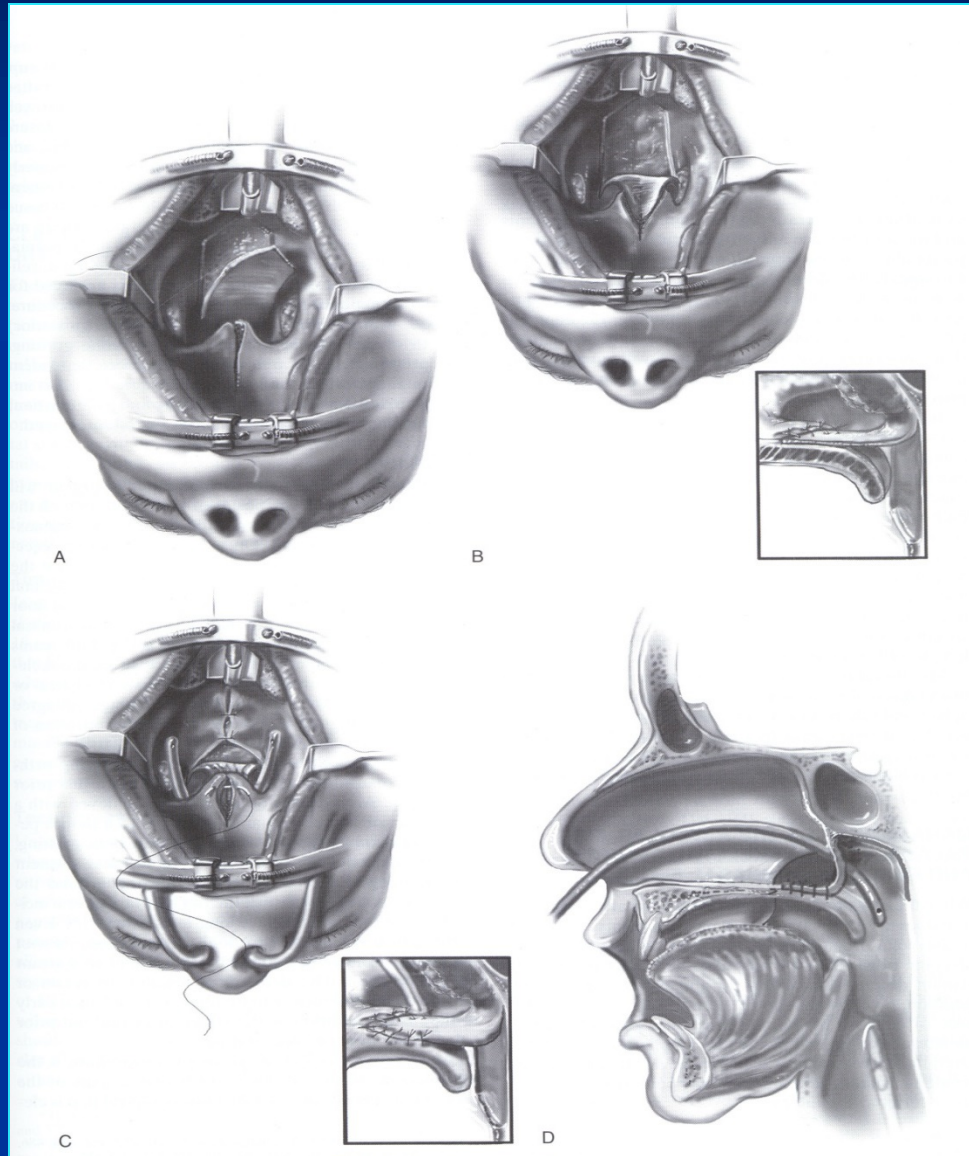
# Management of VPI

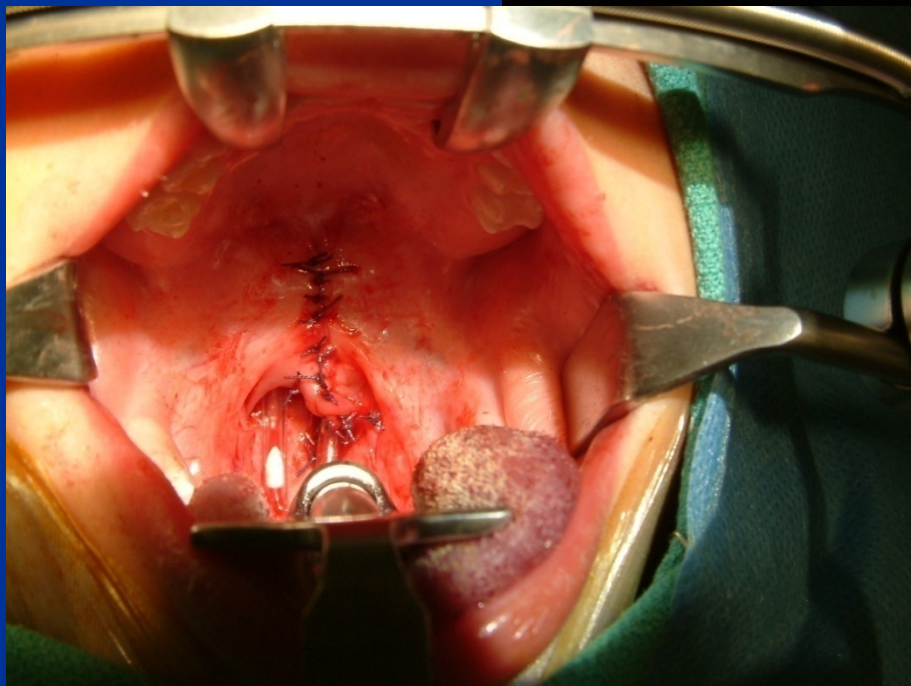
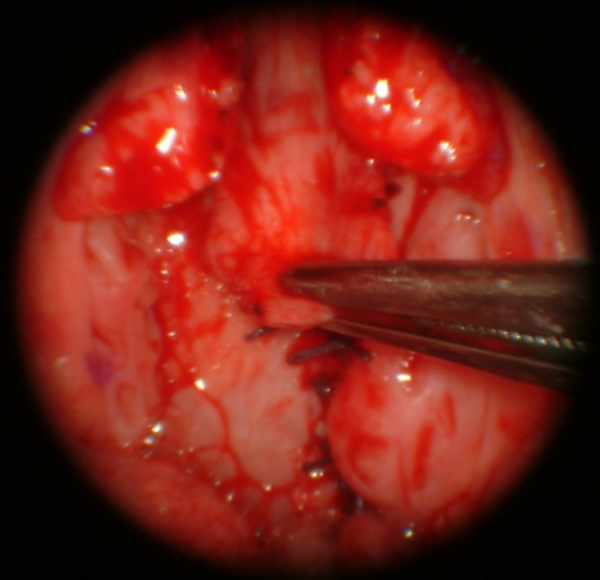
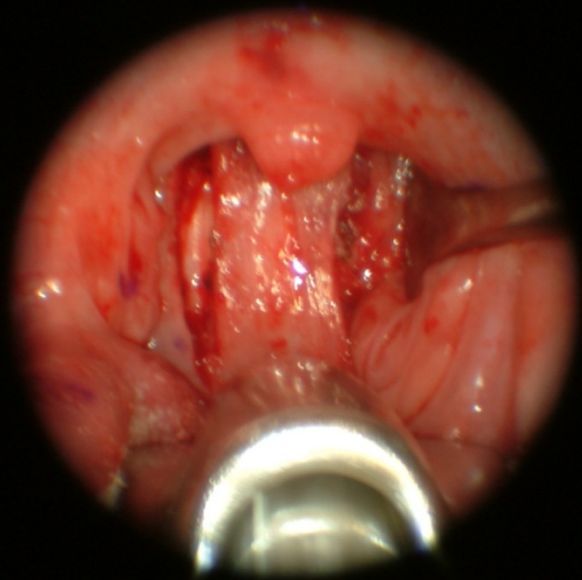


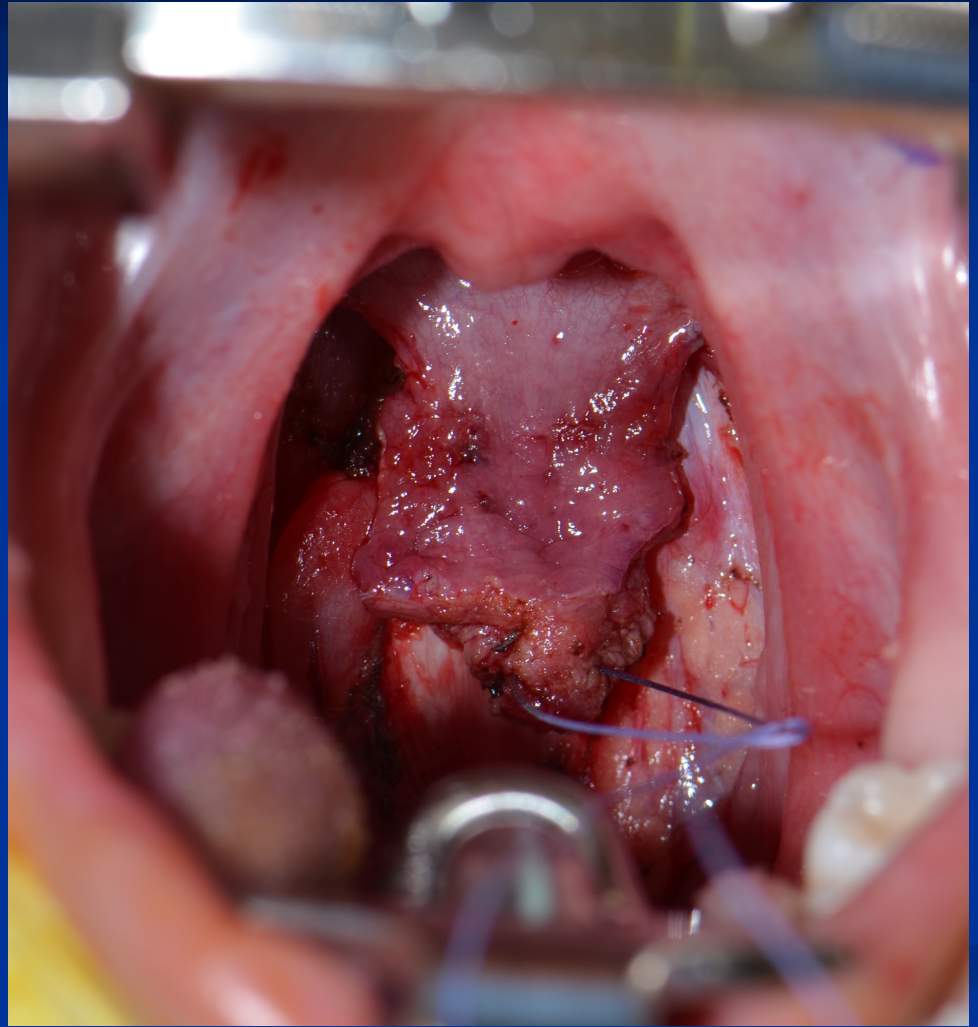
# Surgical Techniques for VPI

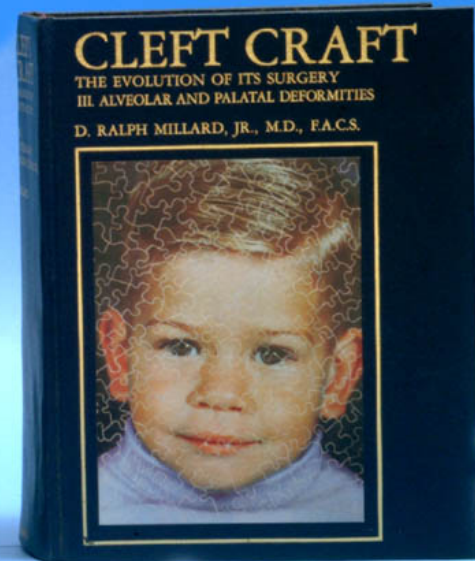
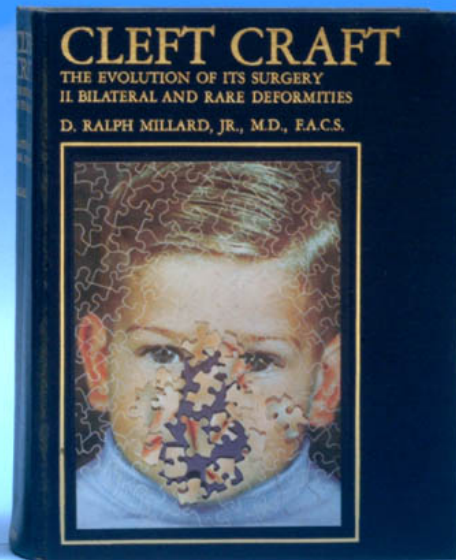
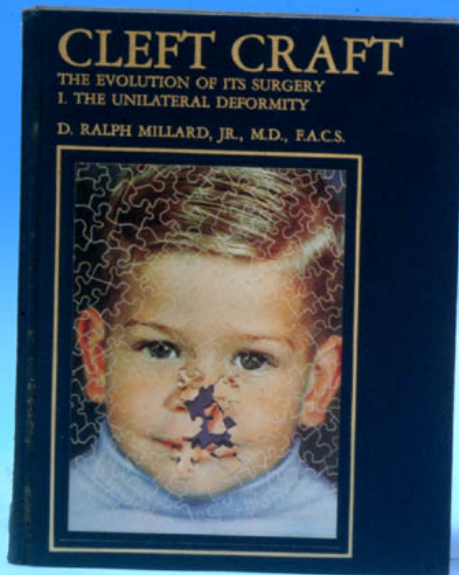
- Goal:
  - Allow complete VP sphincter closure with specific speech sounds eliminating hypernasality
- Inferiorly Based Flap
- Superiorly Based Flap
- Palatal Pushback with Lining Pharyngeal Flap
- Sphincter Pharyngoplasty
- Augmentation of Posterior Pharyngeal Wall

# Superiorly Based Pharyngeal Flap









# Sequence of Treatment

- Lip Repair: 12 weeks
- Cleft Palate Repair: 10 – 18 months
- Speech Surgery (VPI): 2.5 - 6 years \*\*
- Bone Graft: 6 – 8 years
- Orthognathic Surgery: 14 – 18 years \*\*
- Lip and Nasal Revisions \*\*



# Management of the Cleft Maxilla & Alveolus: Objectives

- Provide support for teeth adjacent to the cleft
- Closure of oral-nasal fistulas
- Create continuous alveolar ridge
- Elevate and support nasal base
- Stabilize the premaxilla (bilateral cases)



***Secondary grafting remains the standard !***

# Reconstruction of the Cleft Maxilla/Alveolar Ridge

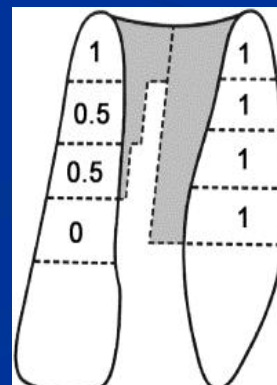
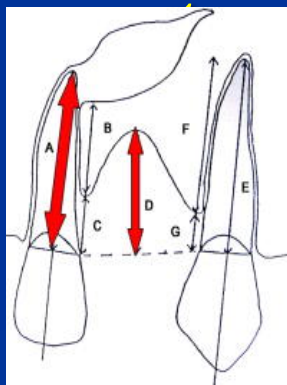
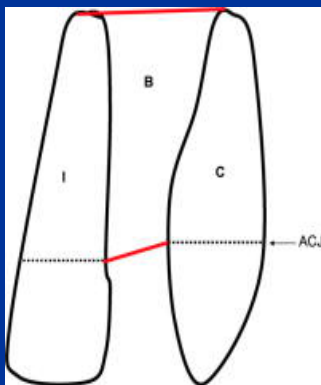
- Primary bone grafting
- Secondary bone grafting
- Gingivoperiosteoplasty (GPP)

Santiago PE, Grayson BH, Cutting C, et al . Reduced need for alveolar bone grafting by presurgical orthopedics and primary gingivoperiosteoplasty. Cleft Palate Craniof J. 35:77. 1997.

- 18 patients (20 cleft sites) studied
- Success in avoiding secondary bone graft = 61%
- All subjects evaluated earlier than 10 years of age
- Long term outcome???
- Objective grading scale not used
- Failed GPP was “still beneficial” in that subsequent bone grafting would result in better results than secondary bone grafting alone.

# Matic DB & Power S. Evaluating the Success of Gingivoperiosteoplasty versus Secondary Bone Grafting. PRS. 121(4): April 2008, pp. 1343-1353.

- 86 patients evaluated (retrospectively)
  - *Bergland, Long, Witherow scales*
  - Mean age of 17 years
  - **GPP Group had 41% success rate**
  - 59% Failure rate! & 33% Fistula rate
- **Secondary Bone Grafting had 88% success**



# Effects on Growth?

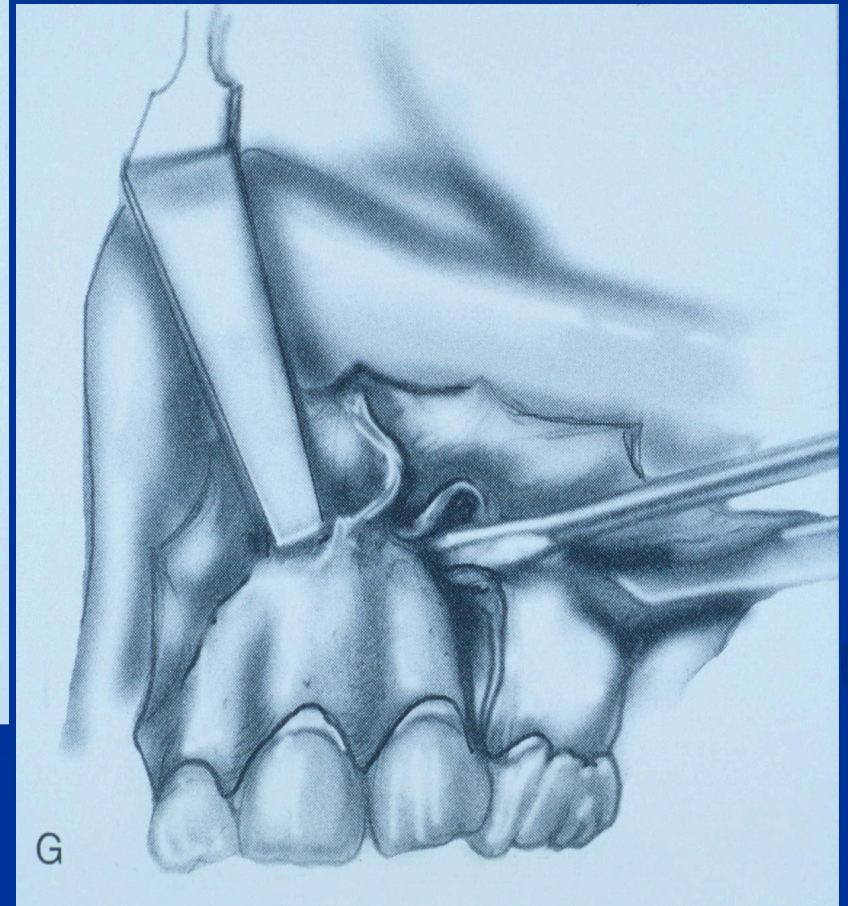
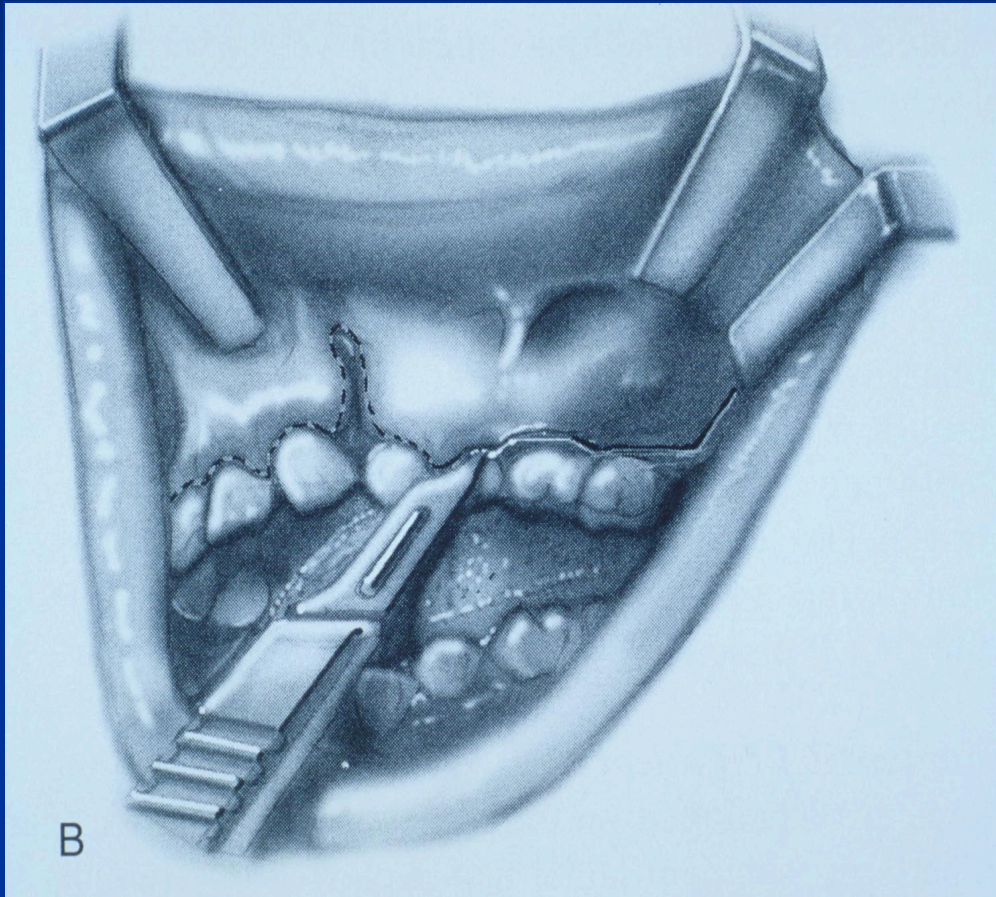
- Gingivoperiosteoplasty (GPP)
  - Presurgical Orthopedics + GPP + LA
  - Presurgical NAM + GPP
  - **When GPP is avoided, Growth is better.**
- 
- Hsin-Yi C, et. al. Cleft Palate Craniof J, Sep 2010. Vol 47(5): 439-446
  - Berkowitz S. Plast Recon Surg 2004 Jan; 113(1): 1-18
  - Matic DB. Plast Recon Surg 208 Sep; 122(3): 863-70
  - Henkel KO & Gundlach KK. J Craniomaxillofac Surg 1997 Oct; 25(5): 266-9

# Management of the Cleft Maxilla & Alveolus: **Secondary Bone Grafting**

- **Boyne PJ, Sands NE**
  - Secondary Bone Grafting of Residual Alveolar & Palatal Clefts. J Oral Surg 30: 87; 1972
  - Combined Orthodontic Surgical Management of Residual Alveolar Cleft Defects. Am J Orthod 70: 20; 1976

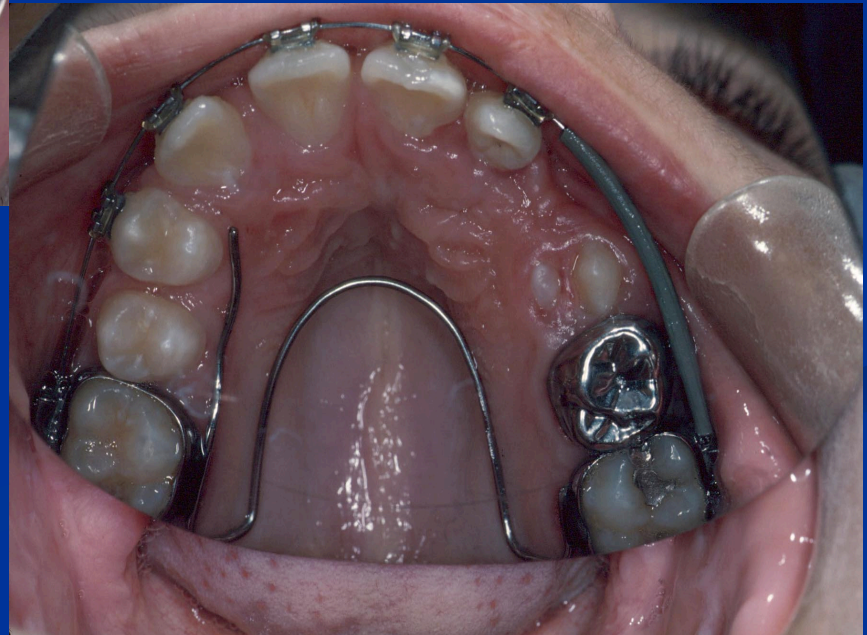
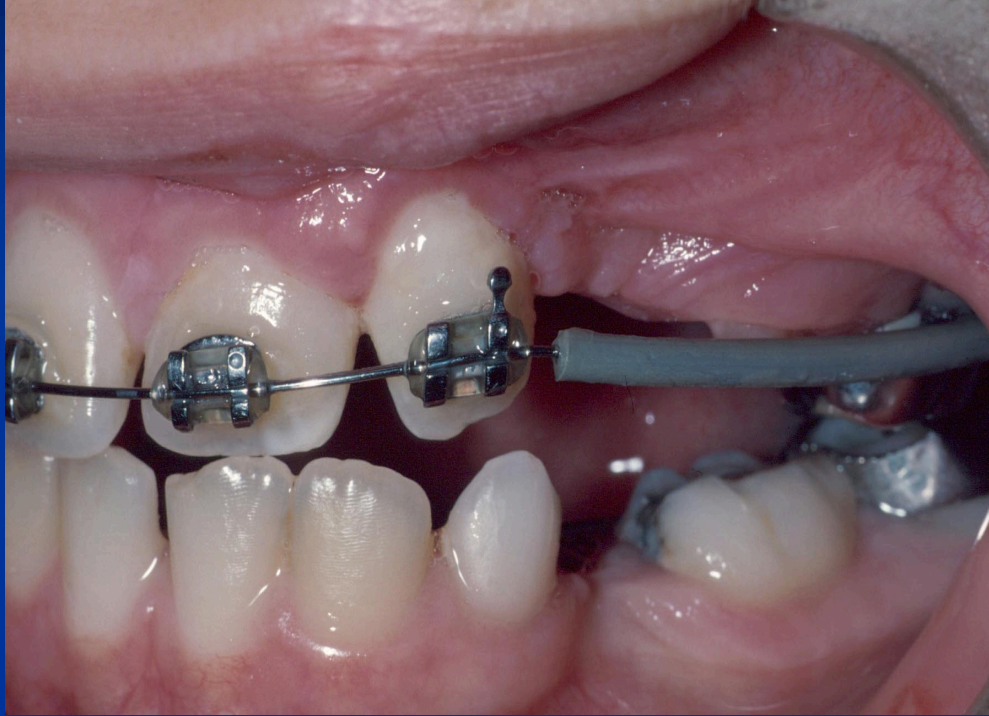
# Bone Graft: Technique

## Sliding Gingival Advancement Flap



# Bone Graft: Technique

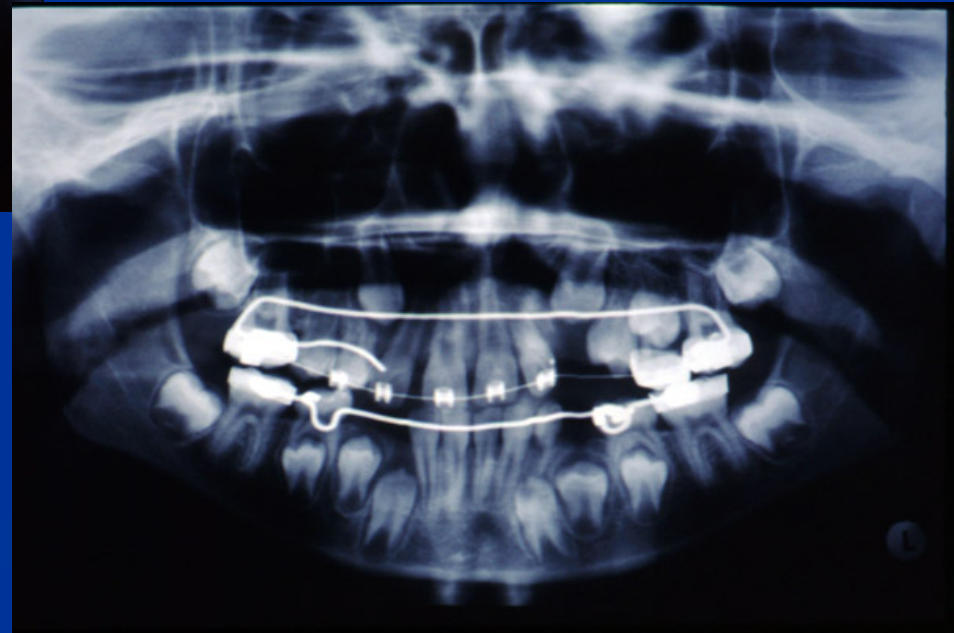
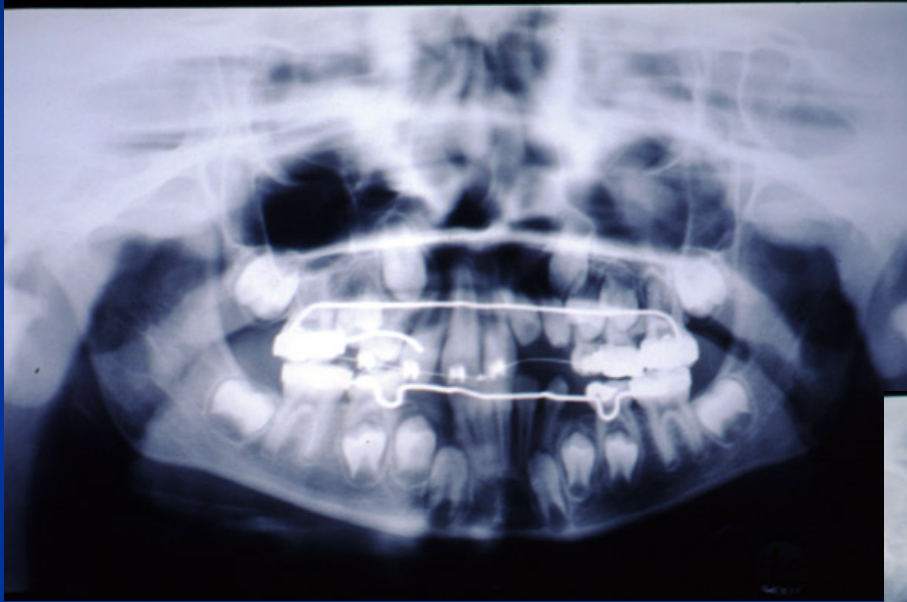
## Sliding Gingival Advancement Flap





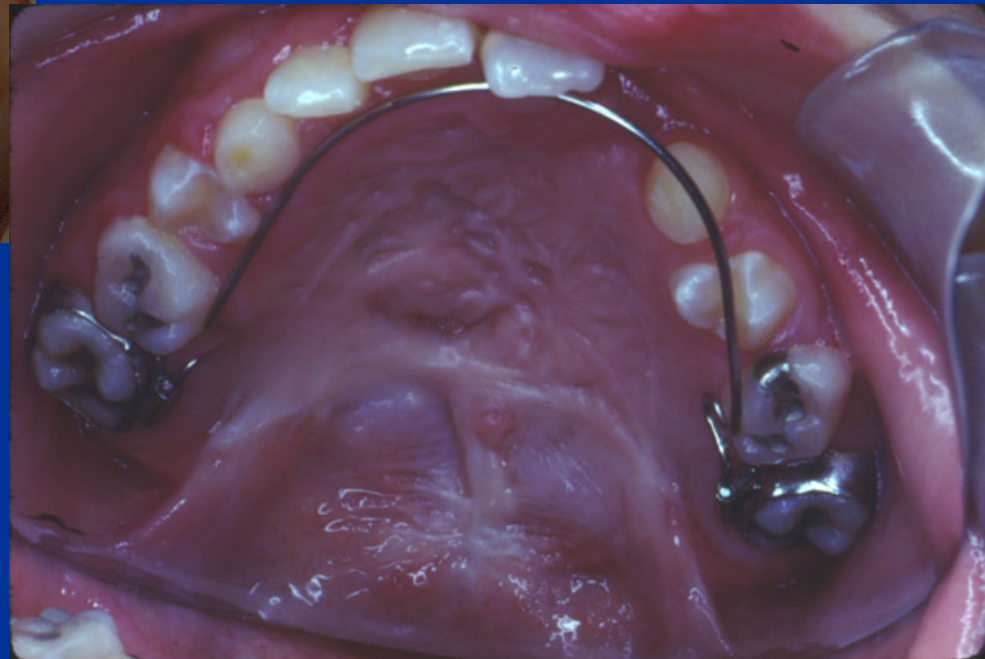
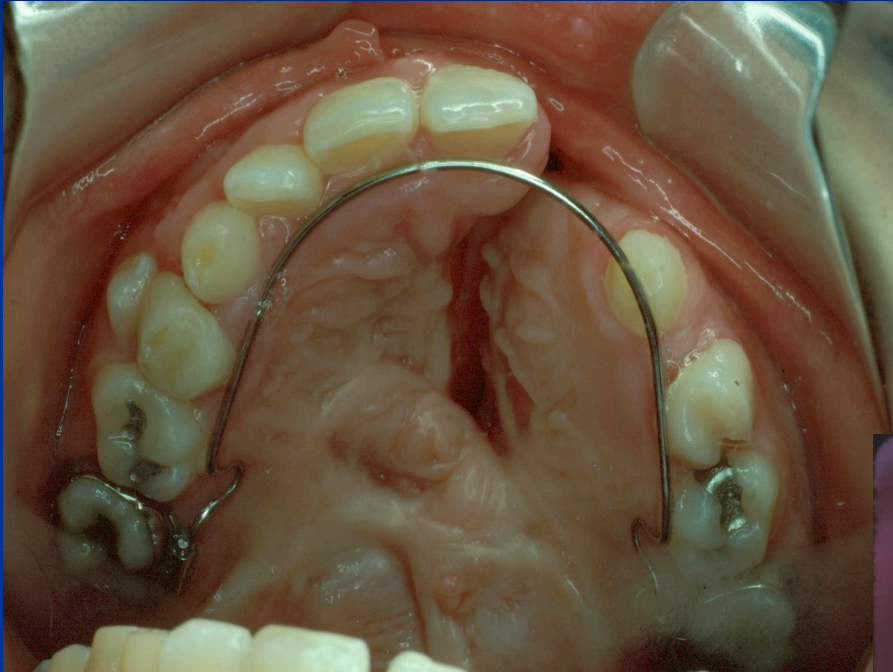
# Bone Graft: Technique

## Sliding Gingival Advancement Flap

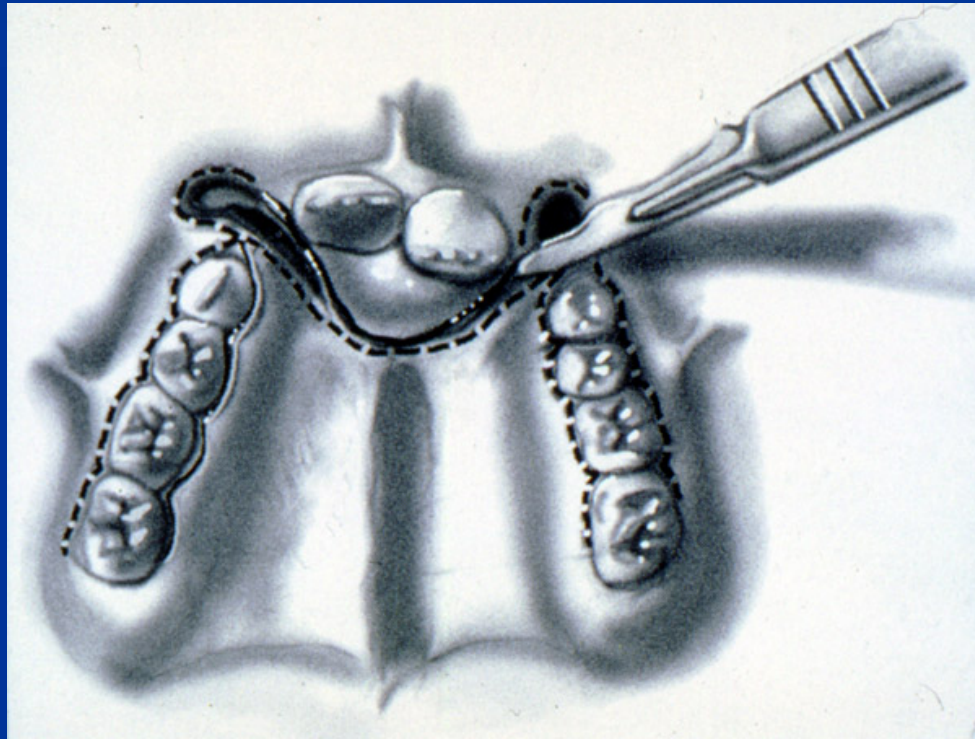


# Bone Graft: Technique

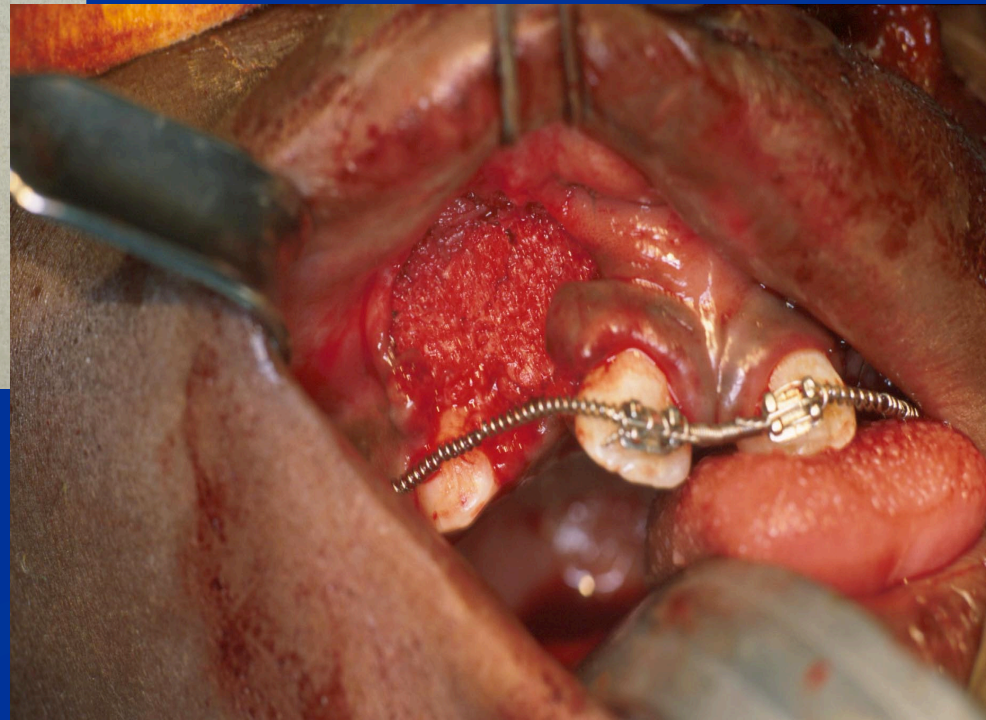
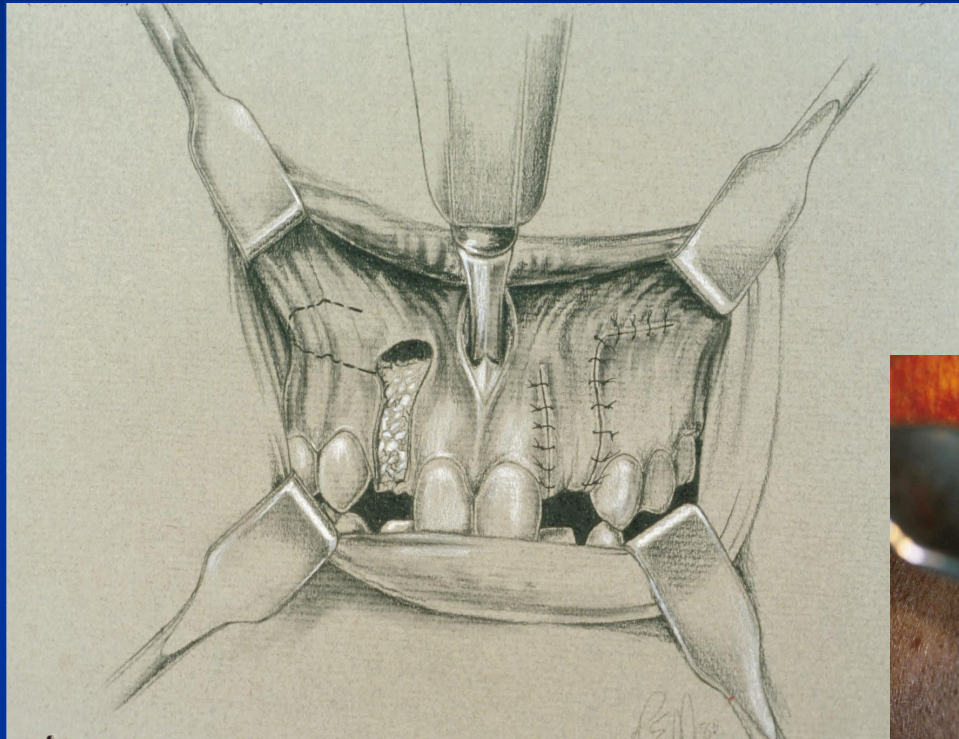
Local soft tissue (rotational) flaps



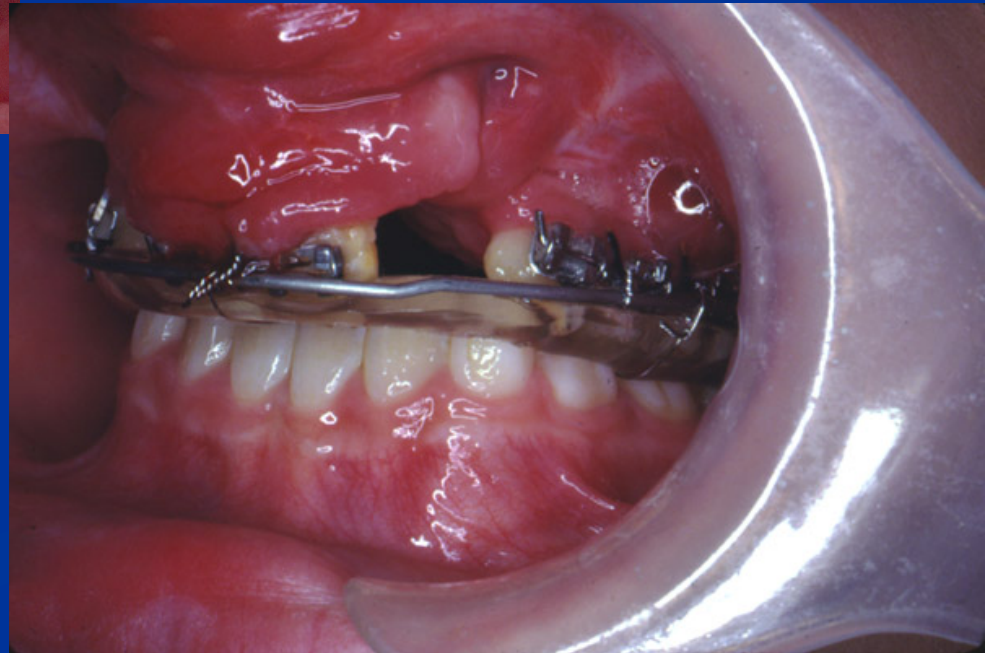
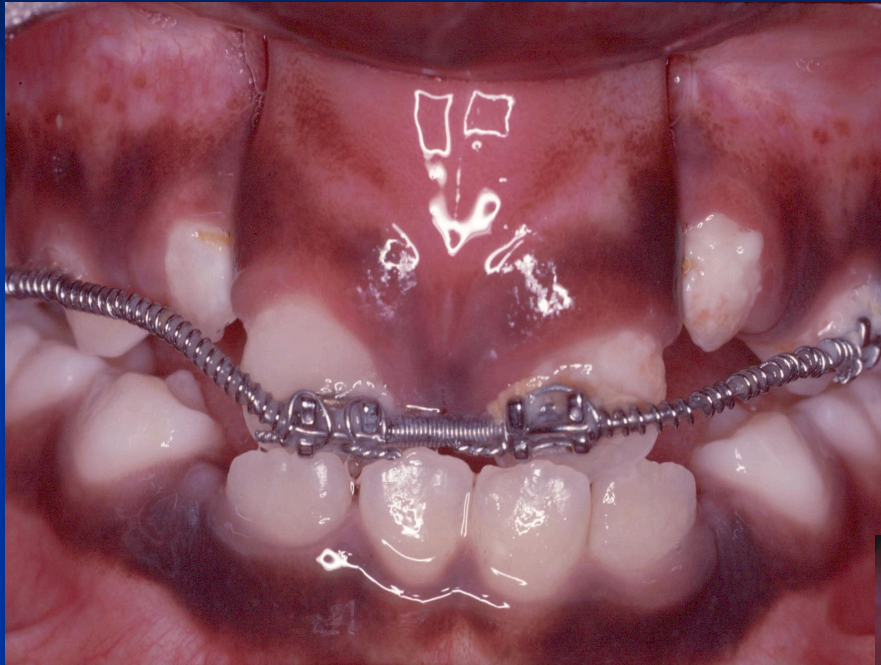
# Bilateral Clefts: Technique

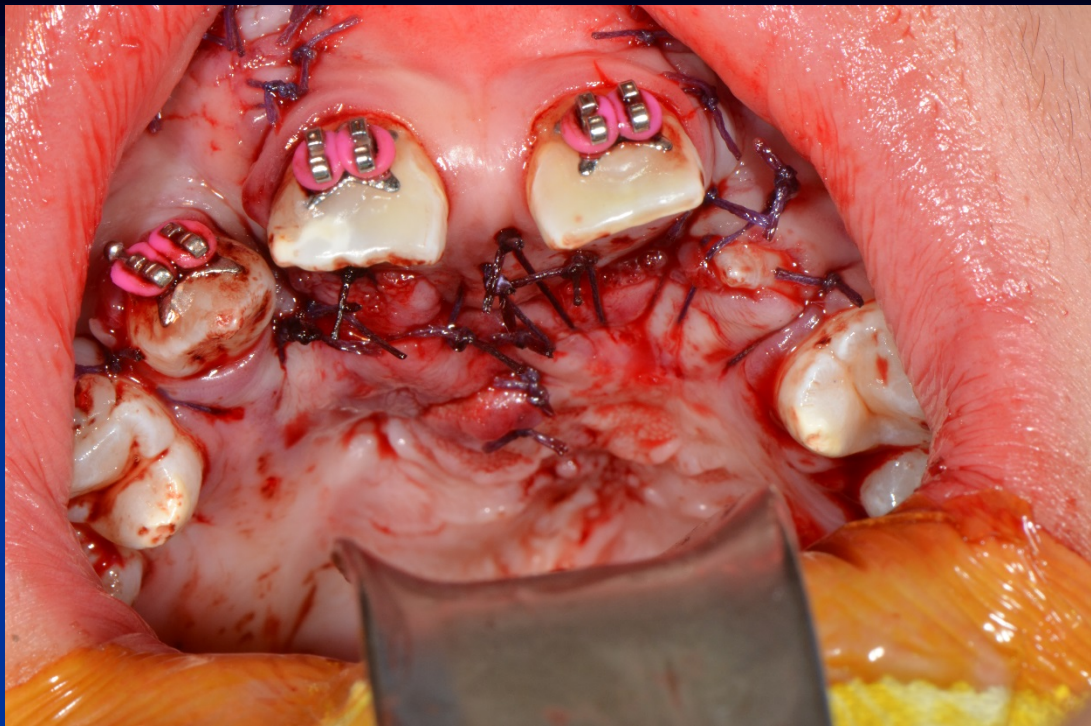


# Bilateral Clefts: Technique



# Bilateral Clefts





# Bone Graft Reconstruction of the Cleft Maxilla: Bone Sources

- Iliac crest (Preferred)
- Cranial vault
- Tibia
- Mandibular symphysis
- Rib
- Allogenic
- Bone Morphogenetic Protein ?

# Bone Harvest Technique: Anterior Iliac Crest





# Sequence of Treatment

- Lip Repair: 12 weeks
- Cleft Palate Repair: 10 – 18 months
- Speech Surgery (VPI): 2.5 - 6 years \*\*
- Alveolar Bone Graft: 6 – 8 years
- Orthognathic Surgery: 14 – 18 years \*\*
- Lip and Nasal Revisions \*\*

# Residual Deformities in CL & P

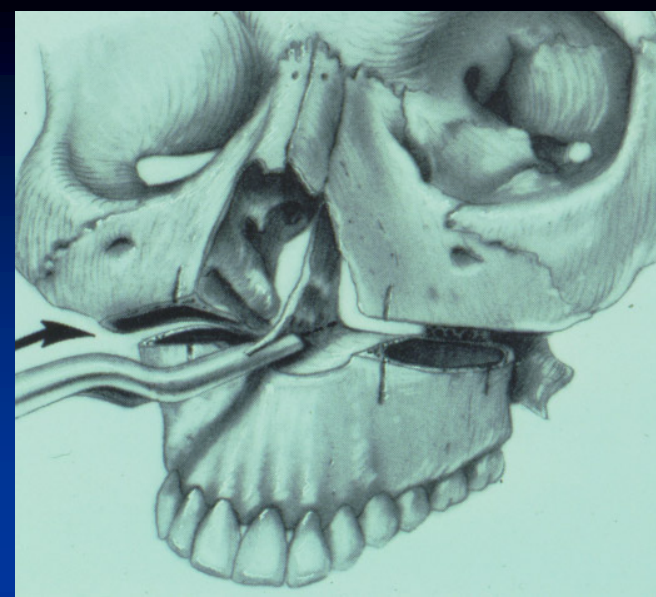
- Maxillary hypoplasia
- Bony defects
- Oronasal fistula
- Missing/dysmorphic lateral incisor
- Cleft dental gap(s)
- Mobile premaxilla (un-grafted BCLP)
- Palatal scarring
- Congenital malformation + Iatrogenic



# Midfacial Advancement in the Cleft Patient



# Hard or Soft Tissue Problem??



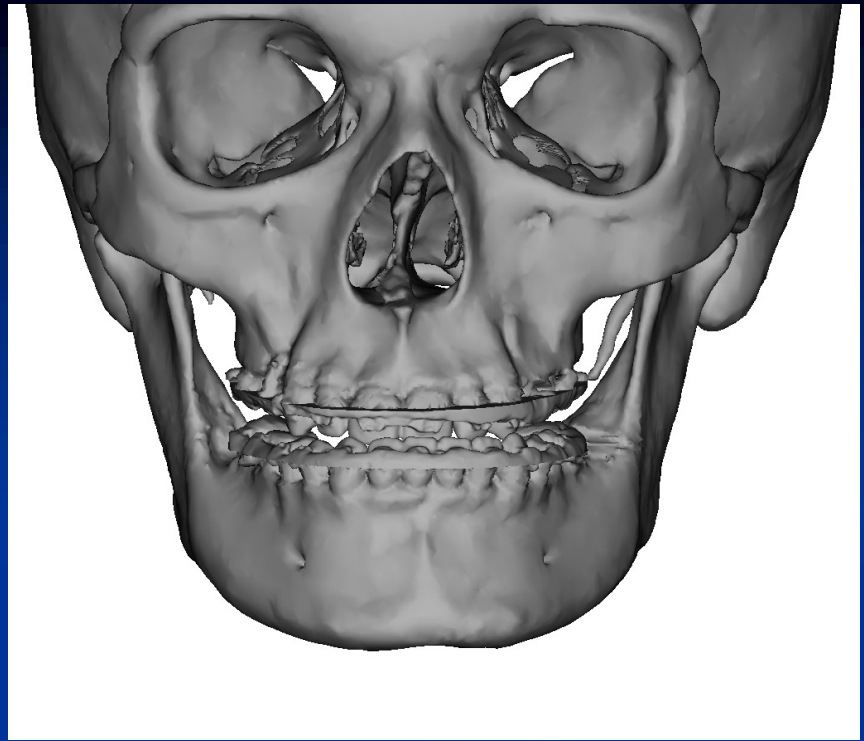
# Cleft-Midfacial Advancement

# Cleft-Midfacial Advancement

# Cleft-Midfacial Advancement

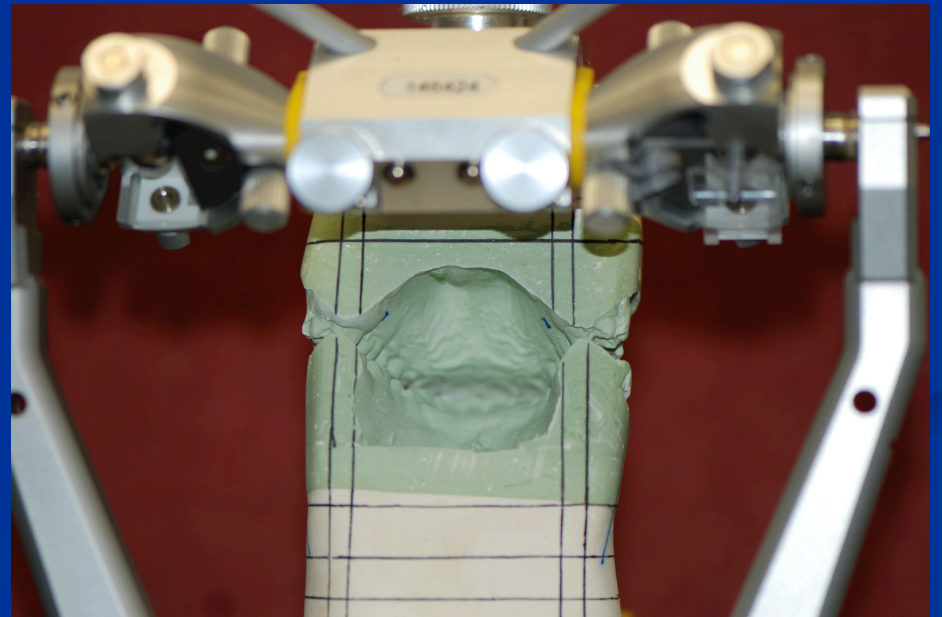
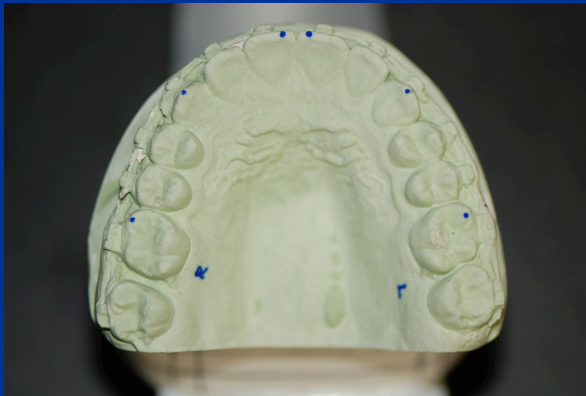
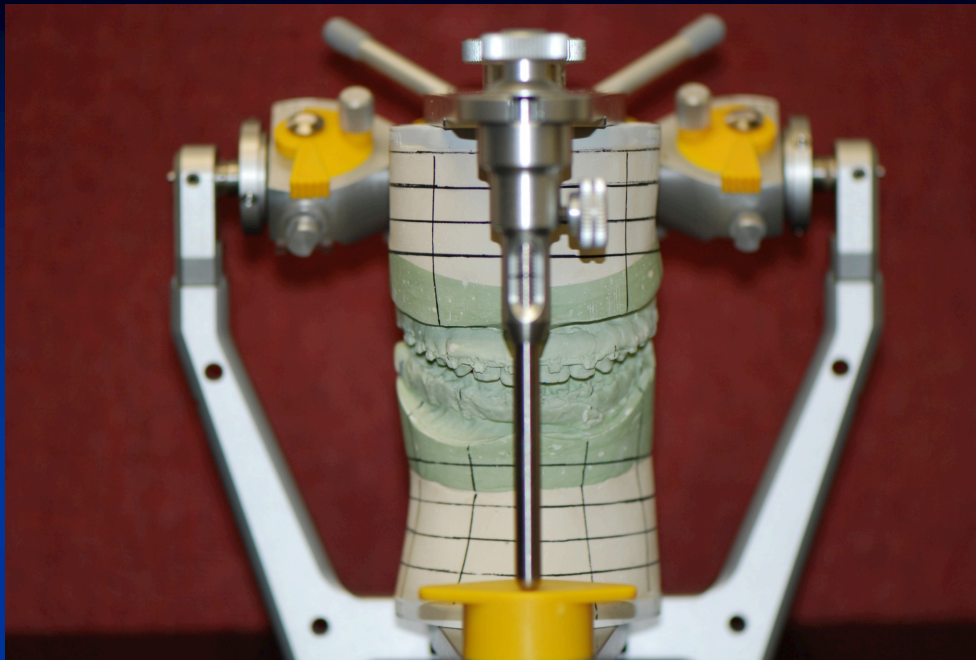


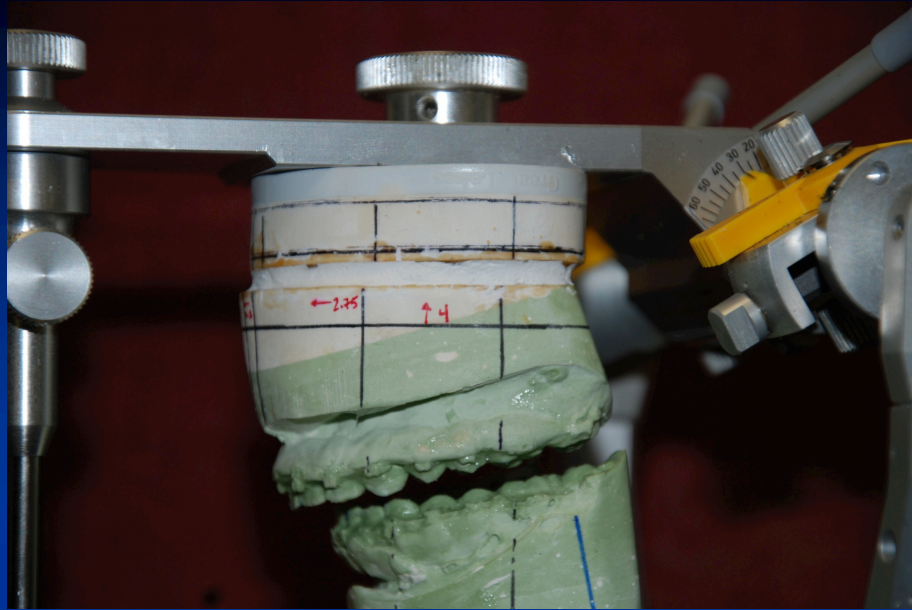


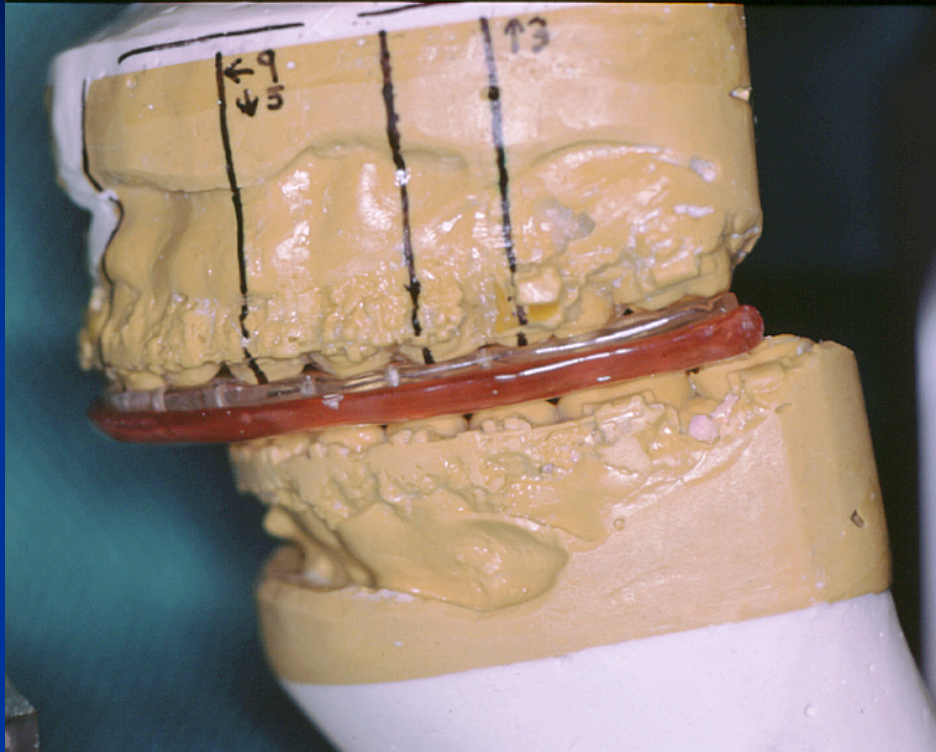


# Cleft Orthognathic Surgery: Operative Sequence

- Nasal RAE endotracheal tube
- K-wire in Nasal bones as external vertical reference
- BSSO corticotomies
- Le Fort I osteotomy to completion
  - Intranasal surgery (septoplasty, turbinate reduction, fistula closure, nasal floor recontouring) when needed
- Completion of BSSO with application of RIF.
- Genioplasty







## Accuracy of Model Surgery: Evaluation of an Old Technique and Introduction of a New One

EDWARD ELLIS III, DDS, MS\*

This article evaluates the ability of 4th-year residents to accurately perform maxillary model surgical repositioning in the conventional manner. Using a special model surgery-measuring platform, measurements of the maxillary dental casts were recorded before and after model surgery was performed by residents in 20 bimaxillary cases. The model surgery was performed in the usual manner described in several texts, using reference lines scored on the casts and measurements made to the incisal pin and upper member of the articulator. Analysis of the differences between the planned movements and the postsurgical position of the maxillary model surgery casts showed statistically significant errors in maxillary repositioning for all measures. This indicates that the manner in which model surgery was performed by the residents, as reported in the literature, was inaccurate. A new technique and instrument for more accurately recording measurements and repositioning the maxillary cast is introduced.

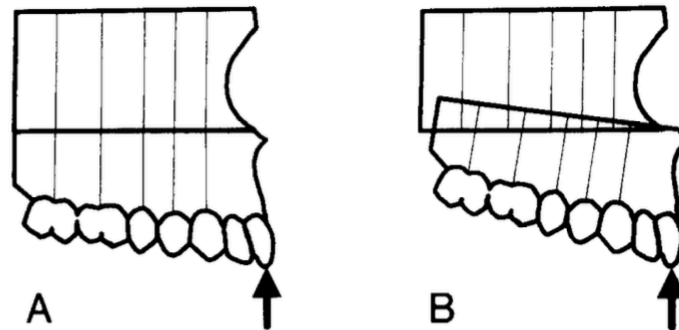


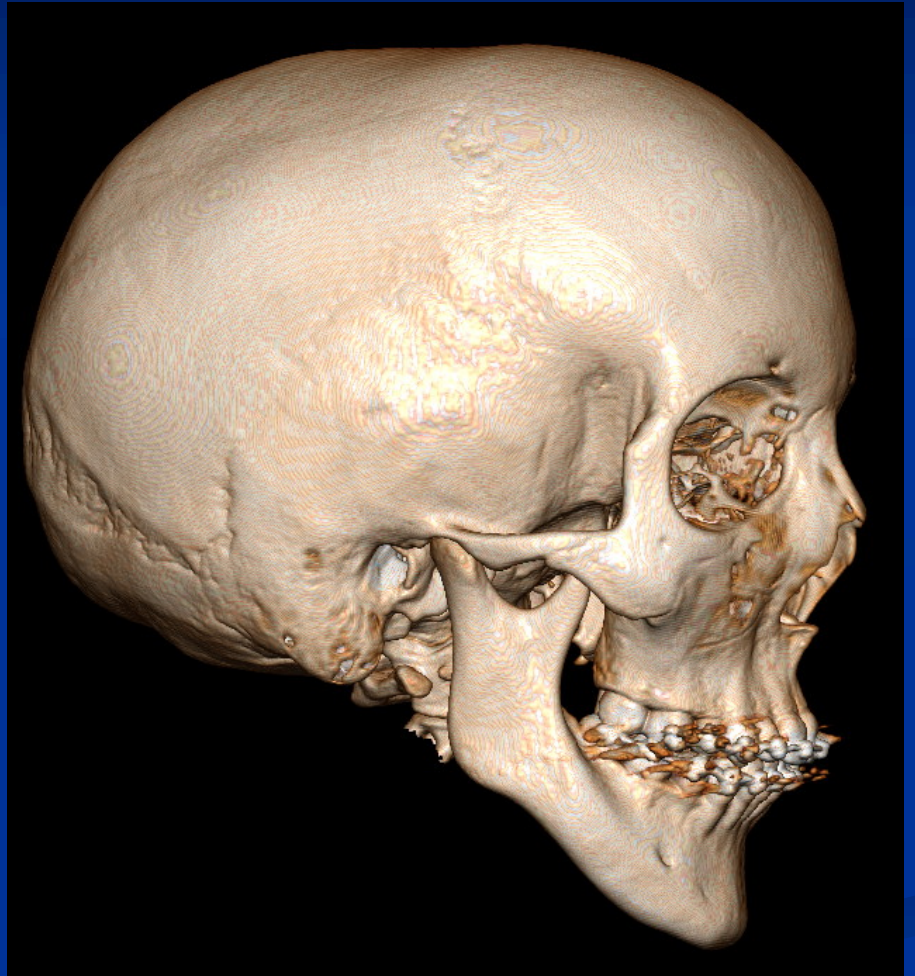
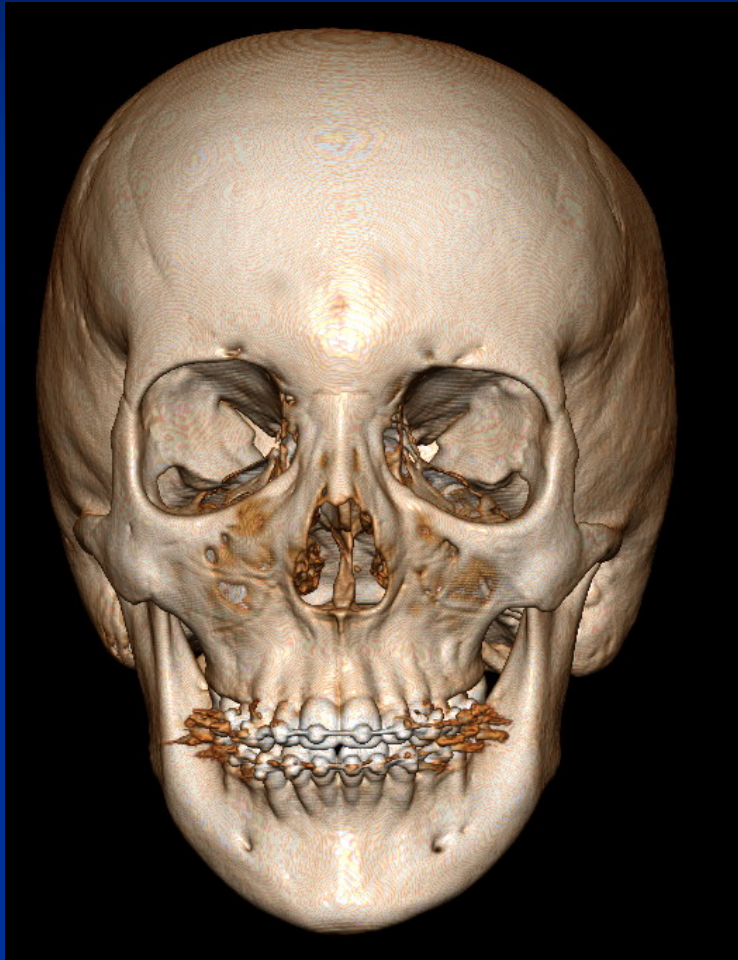
FIGURE 7. Illustration showing how measurements made at the level of the osteotomy provide inaccurate information about the movement of the dentition when the occlusal plane is changed. *A*, Prior to model surgery. *B*, After model surgery to close an anterior open-bite by posterior maxillary impaction. If measurements are made at the level of the osteotomy, they would indicate that the maxilla had moved anteriorly approximately 5 mm. However, the arrows in both *A* and *B* are at the same location with respect to the base of the dental cast, showing that the incisal edge did not move in the anteroposterior plane.

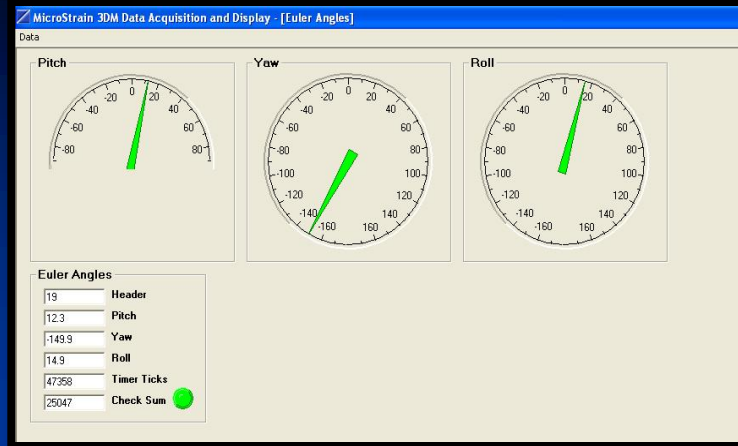
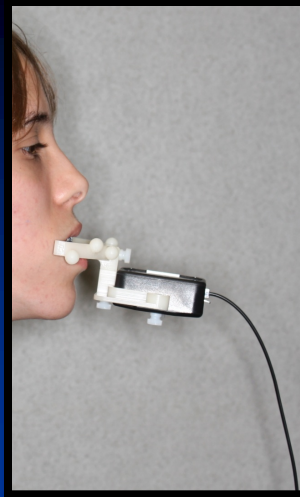


# Virtual Planning for Orthognathic Surgery: Workflow

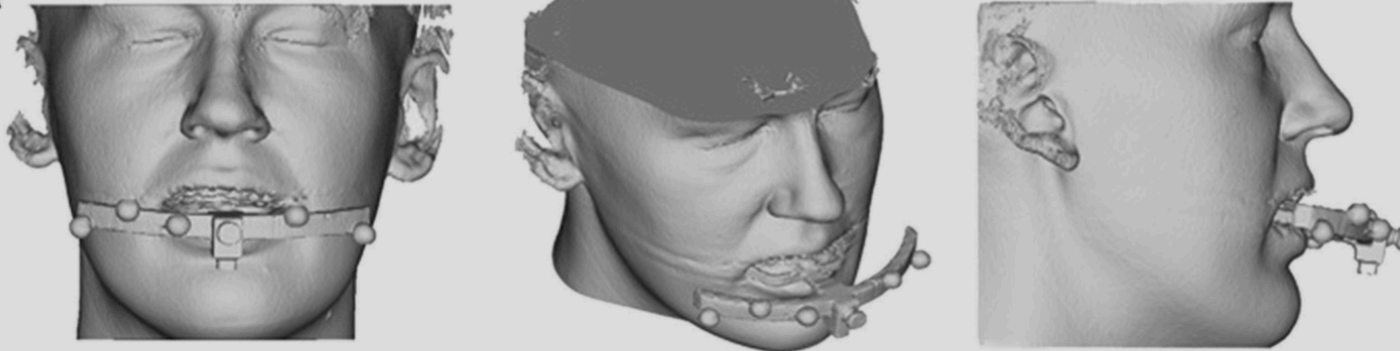
- Final pre-surgical records
  - Cone Beam CT in Centric Relation (Wax Bite)
  - Scanned Dental Casts:
    - Open Casts
    - Preop Occlusion (with Wax Bite)
    - Final Occlusal Set Up
    - **Segmental Cases; Reconstructed Maxilla**
- Web-based Planning Meeting
- Splint Fabrication



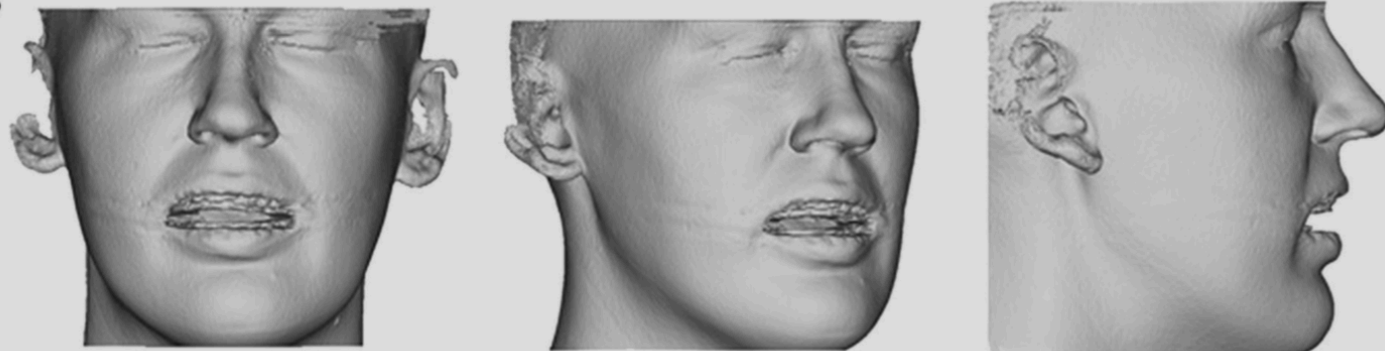




A

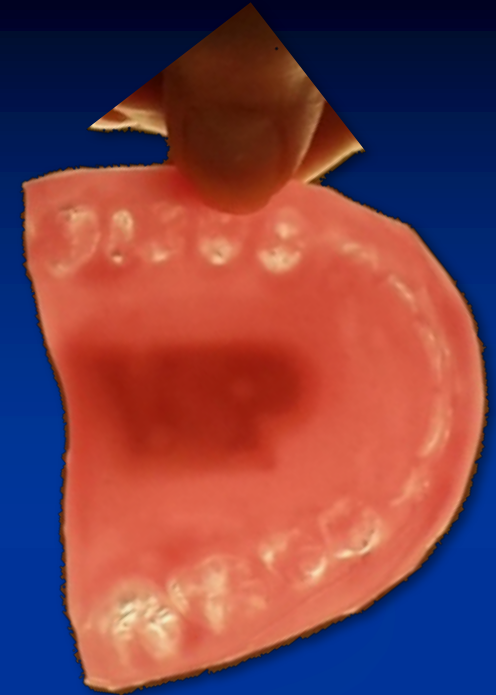
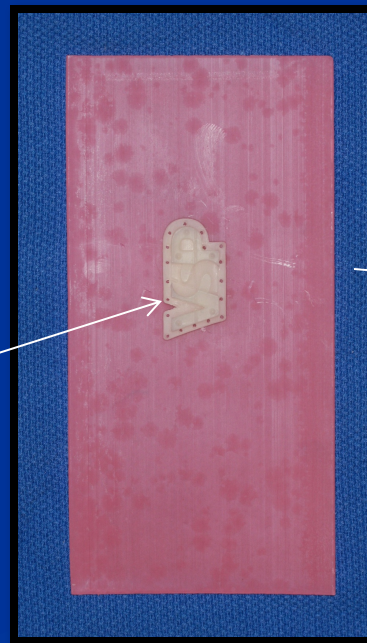


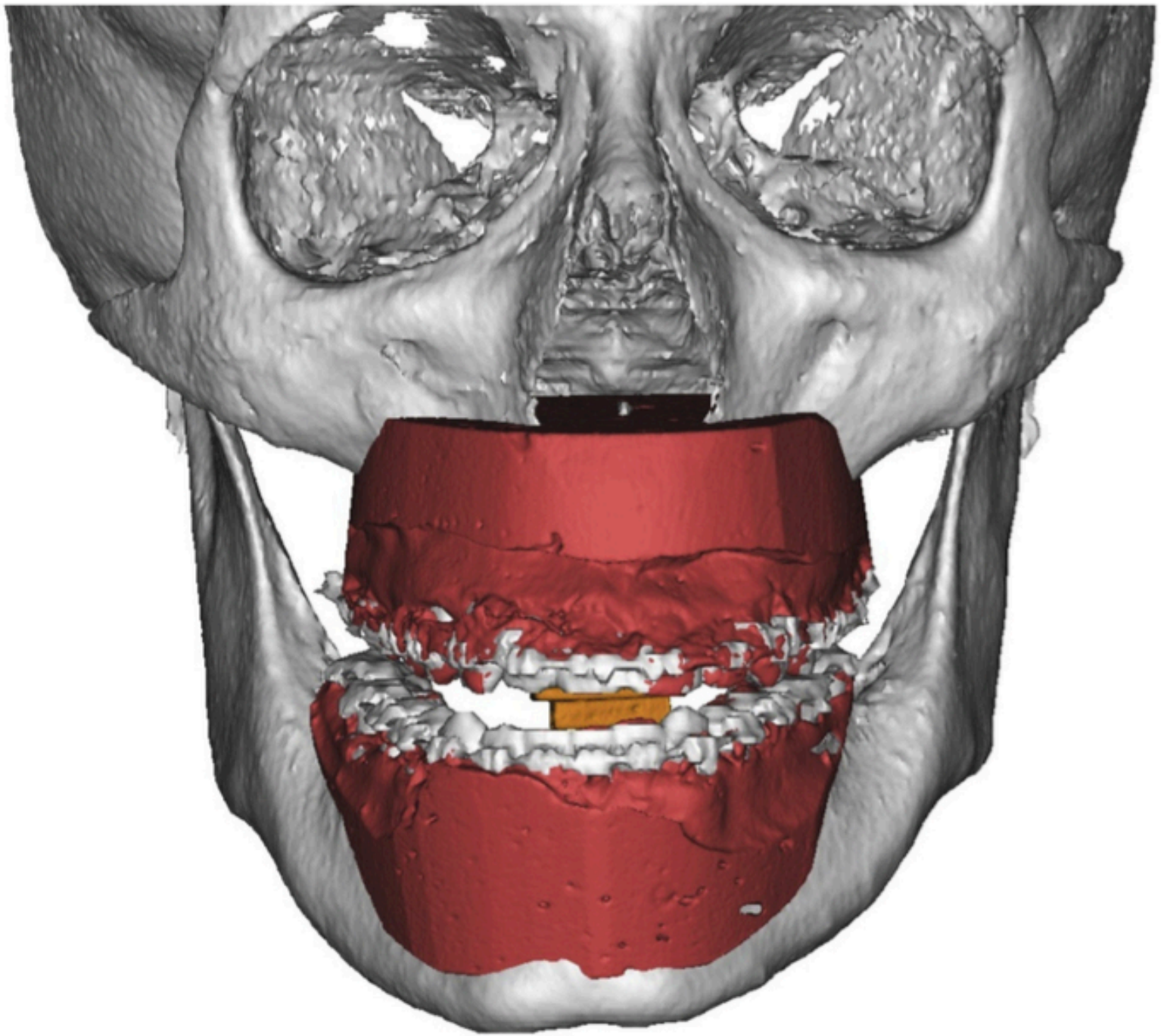
B

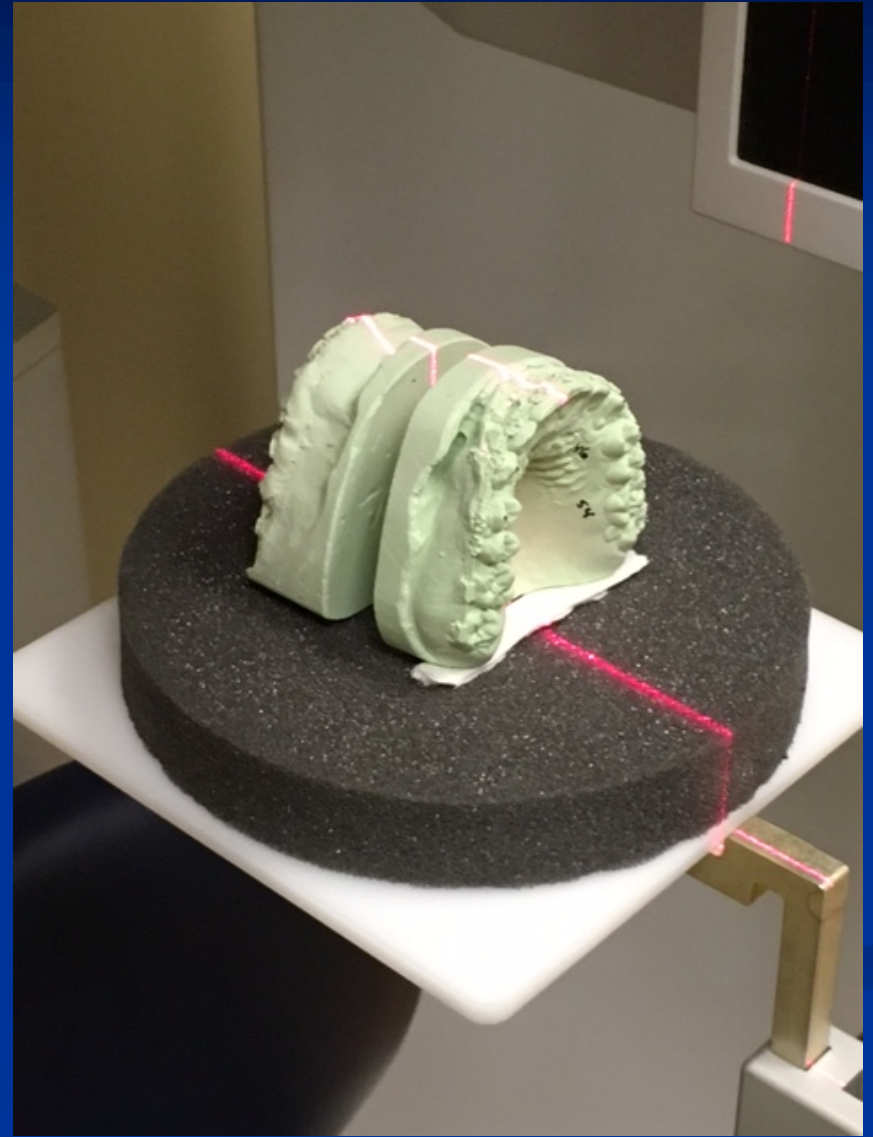


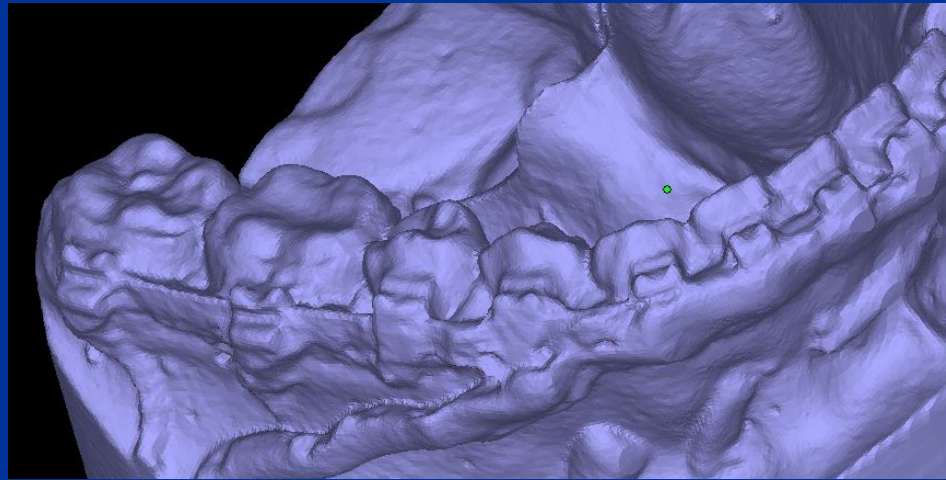
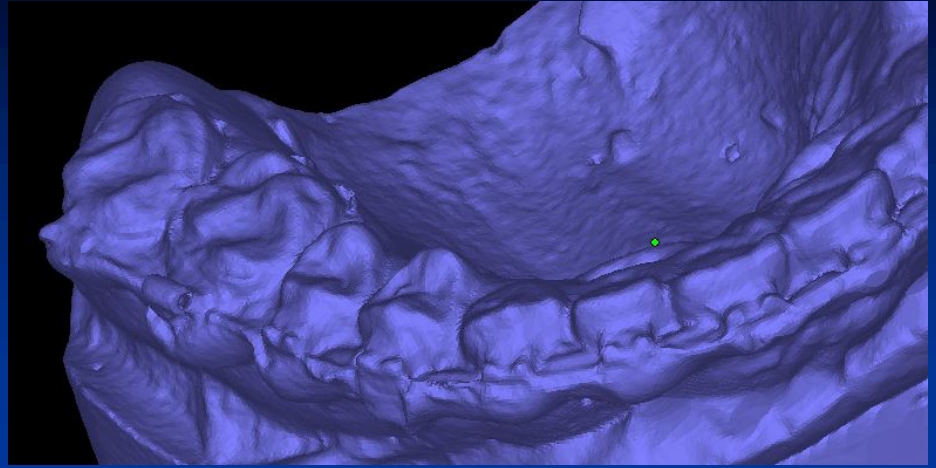
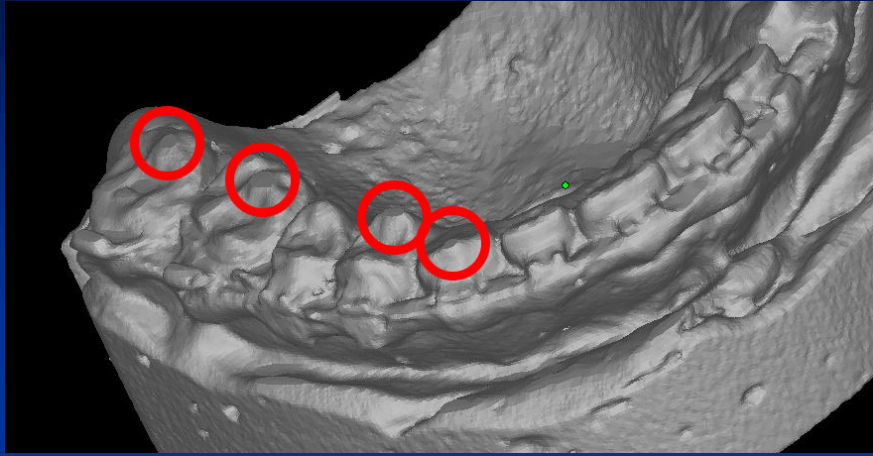


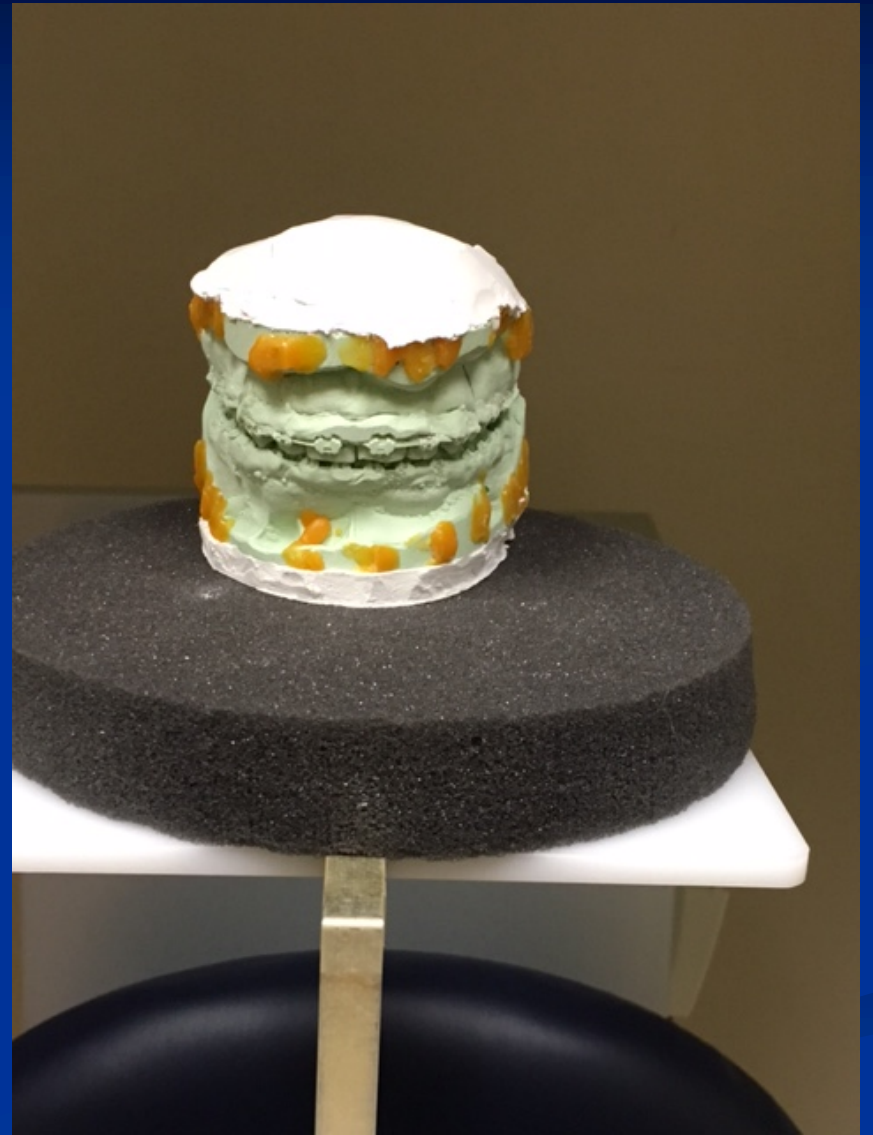
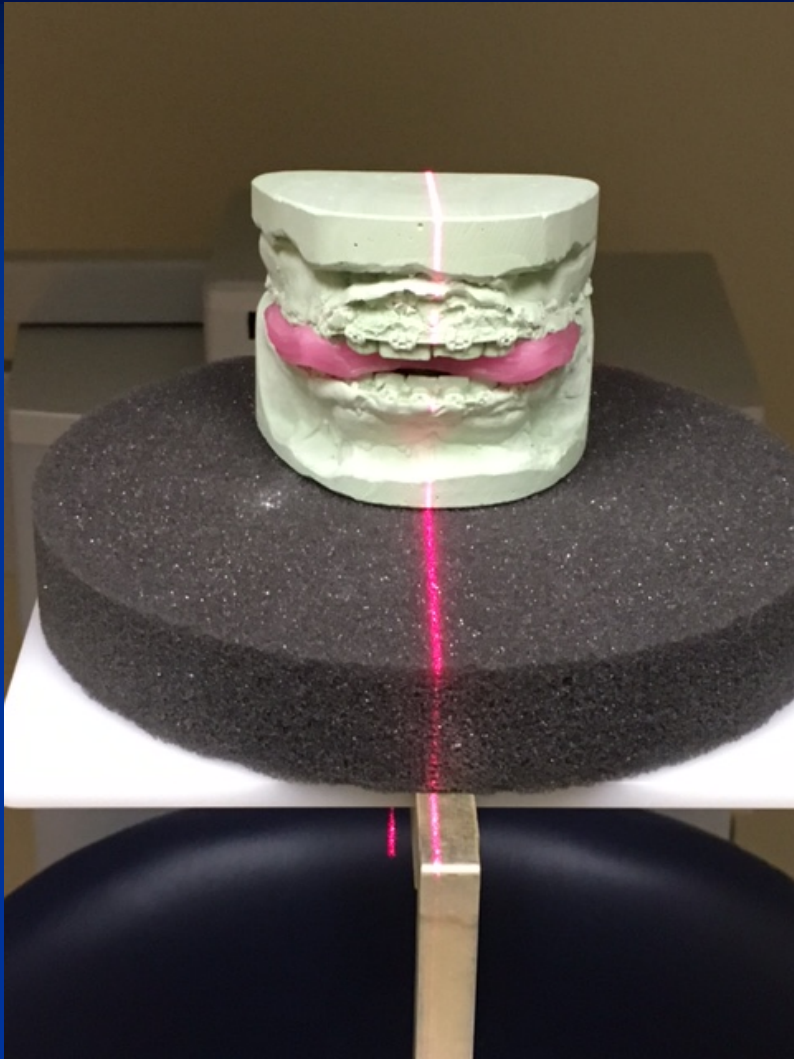
- Pink base plate wax
- VSP radiographic marker



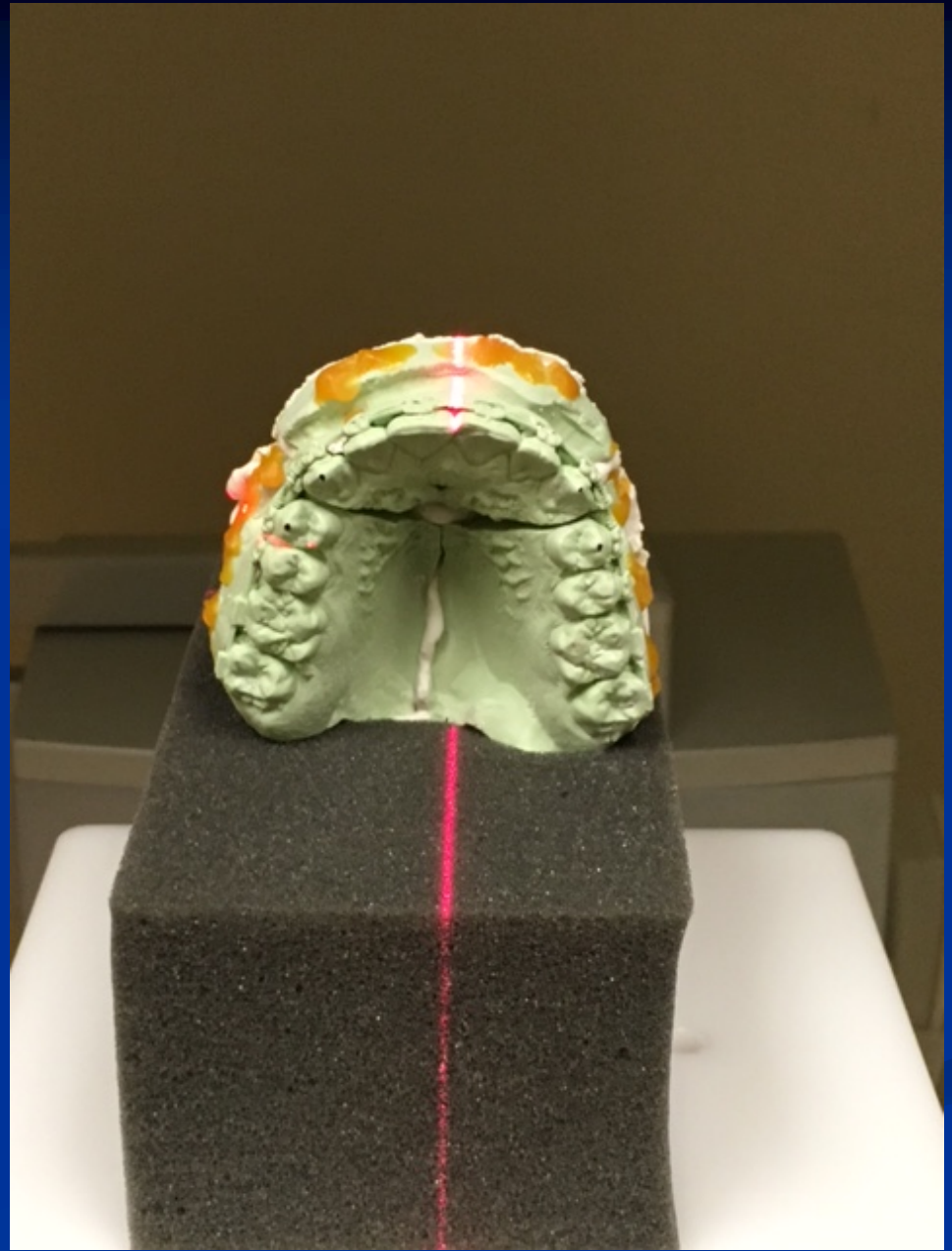
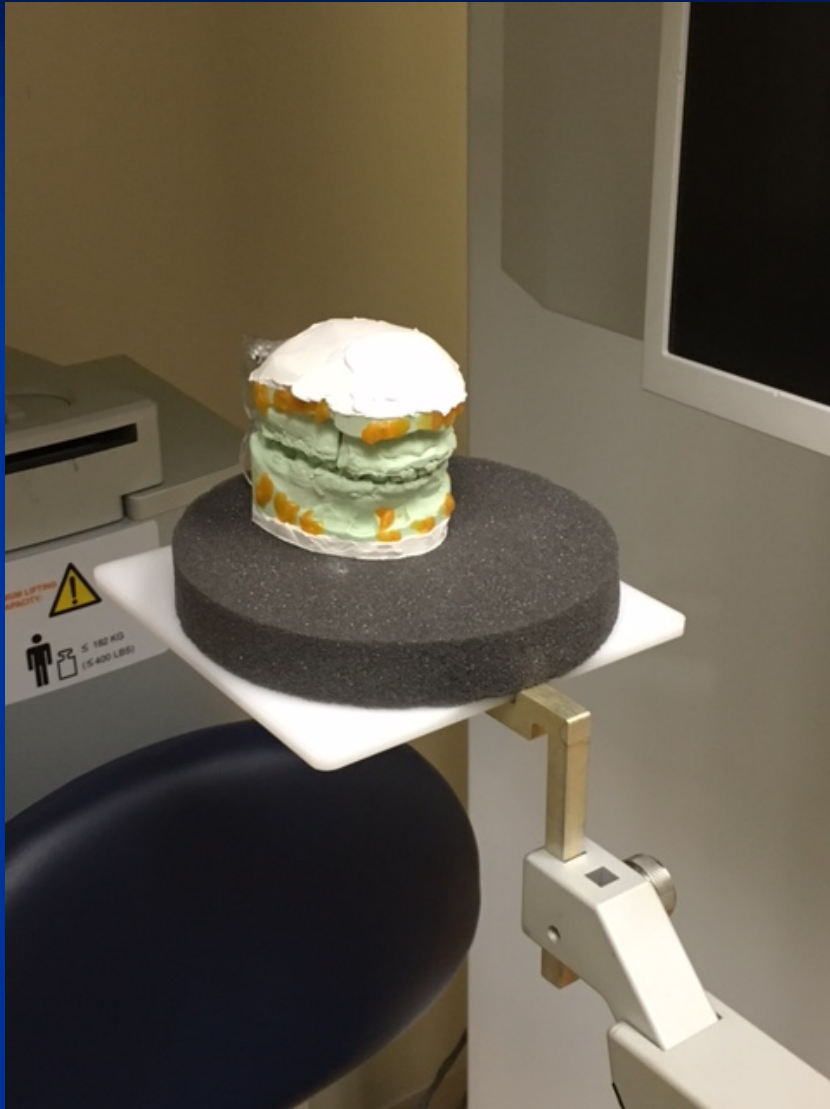




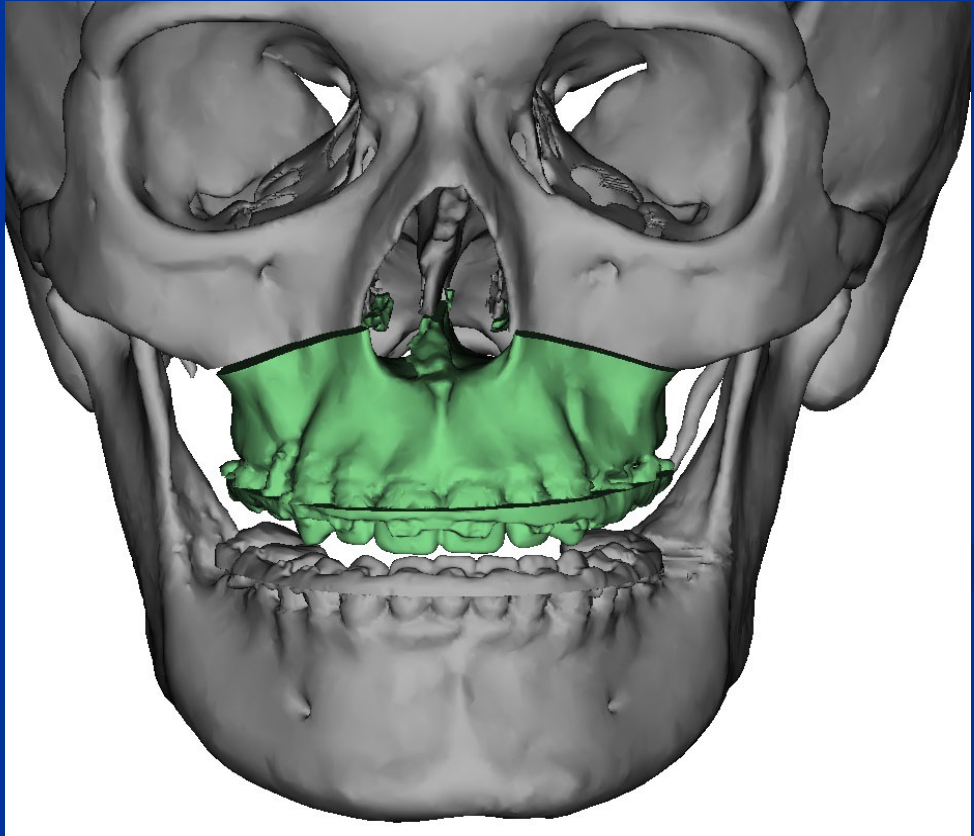
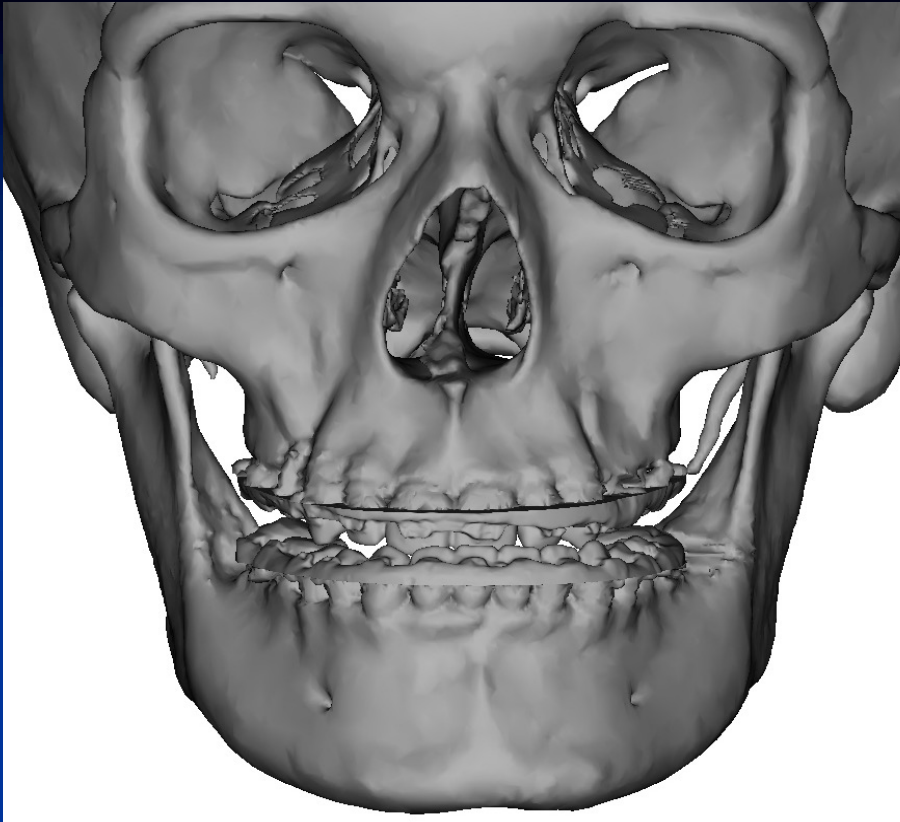




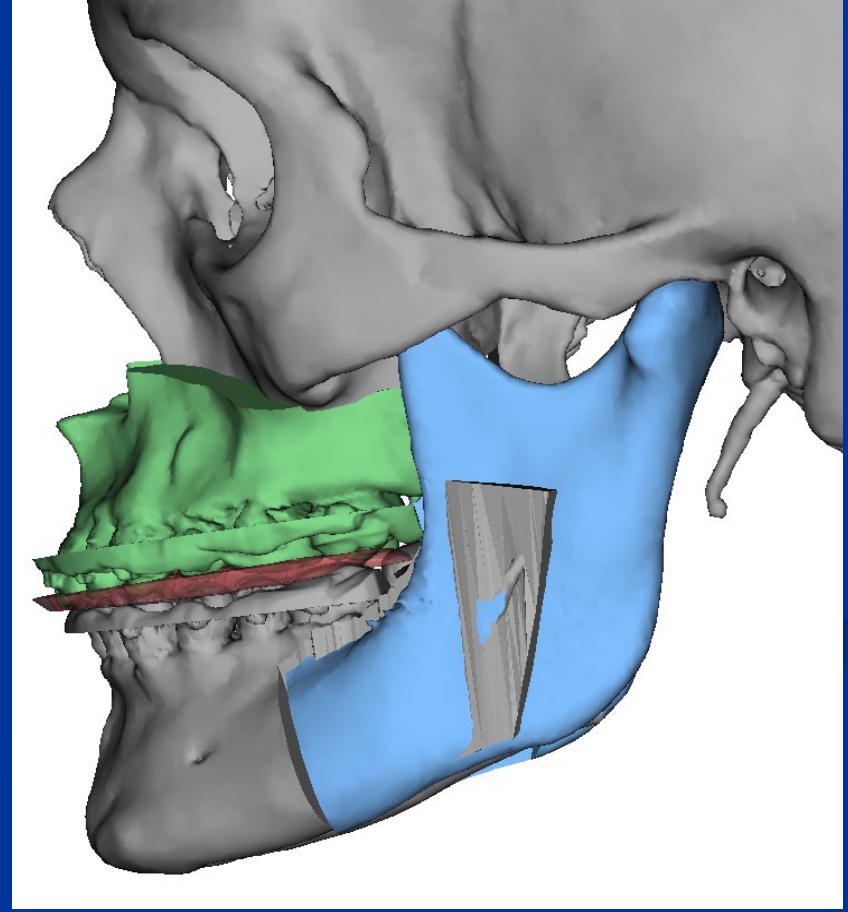
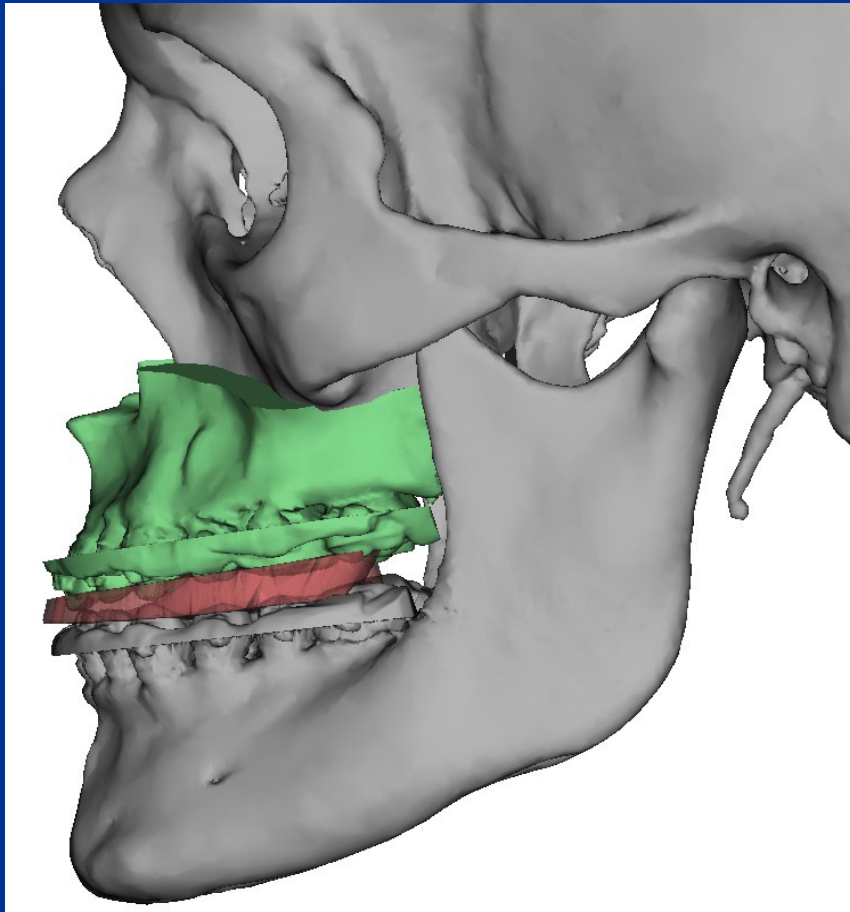
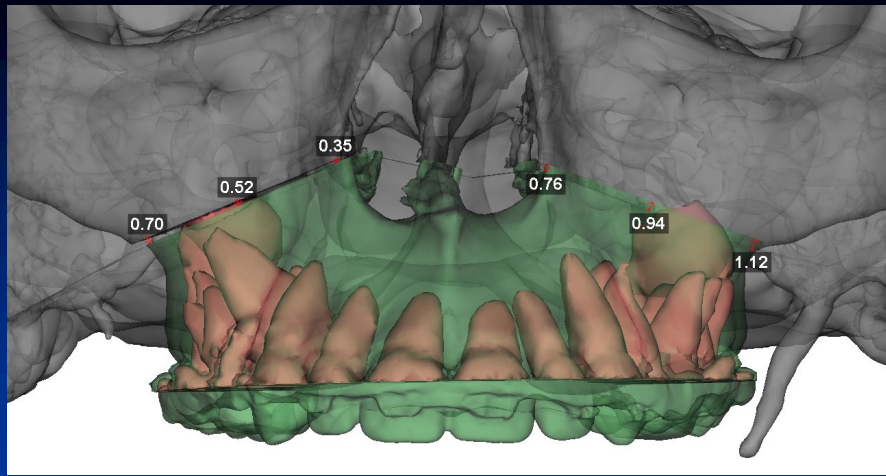


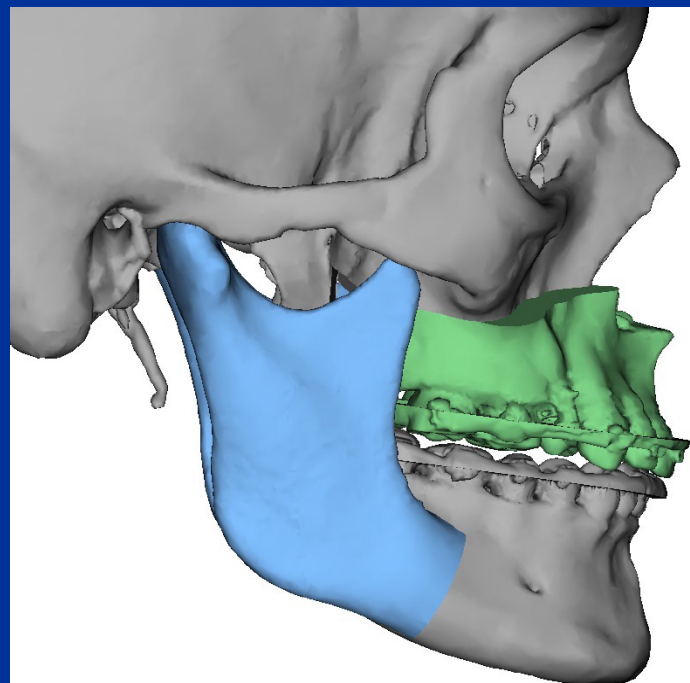
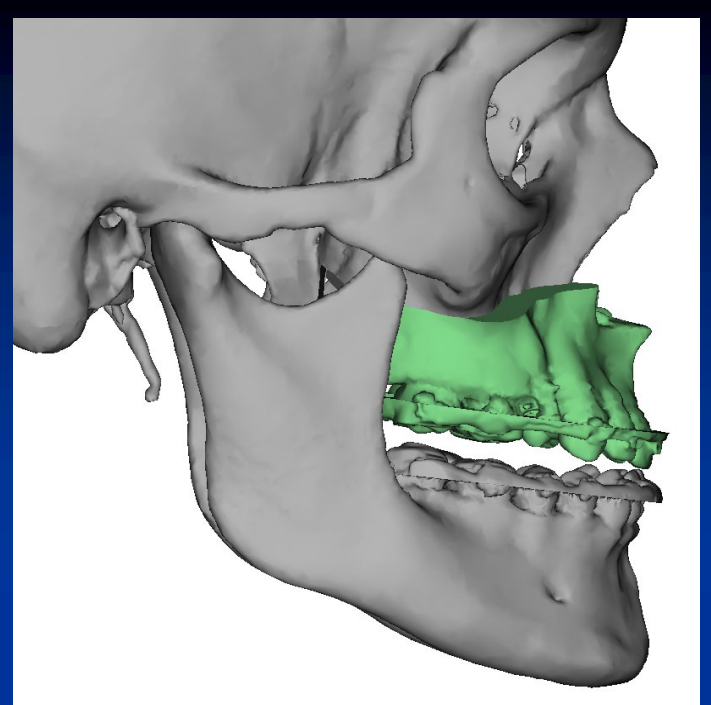
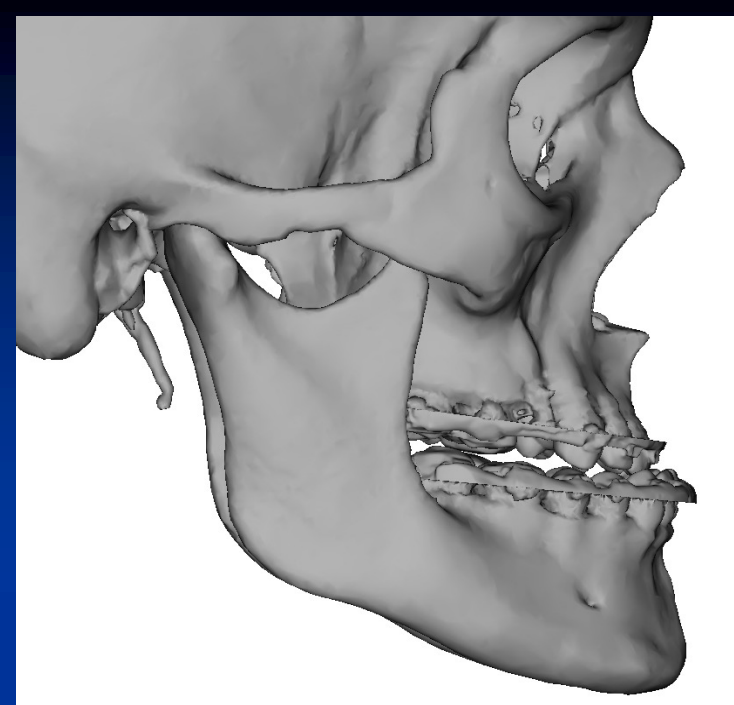




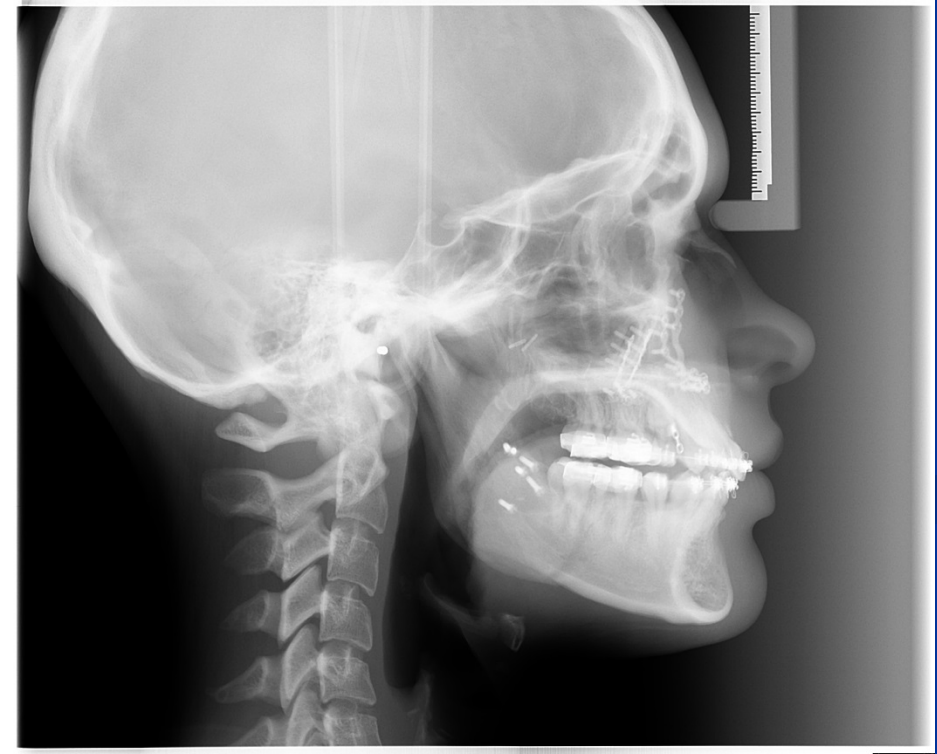
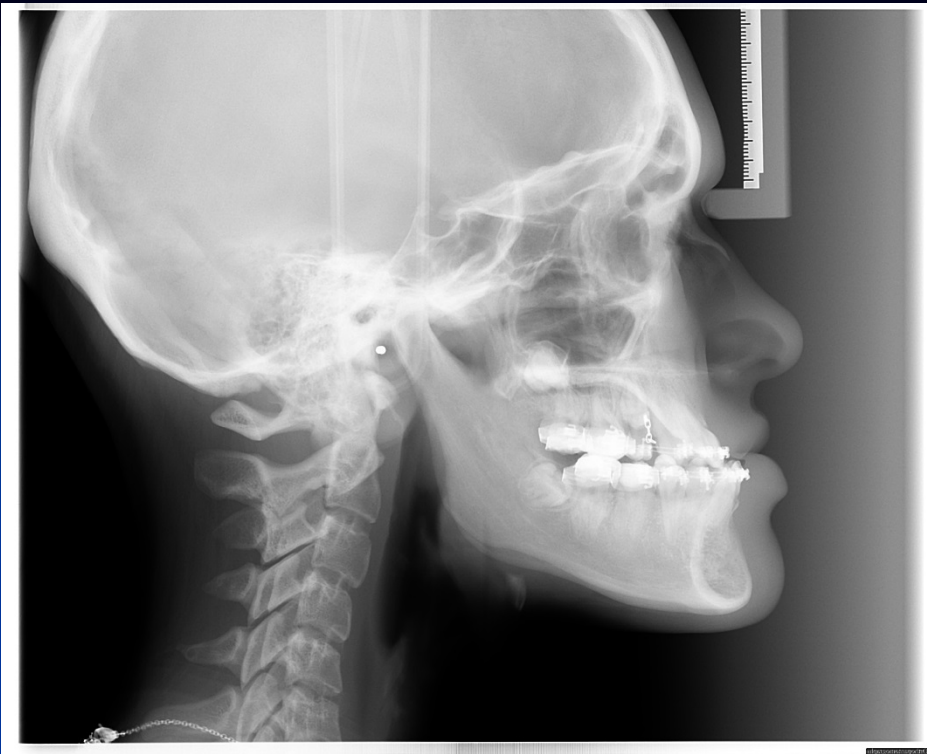


Point	Name	Anterior/Posterior	Left/Right	Up/Down
ANS	Anterior Nasal Spine	5.00mm Anterior	1.12mm Left	0.00
A	A Point	5.00mm Anterior	1.21mm Left	0.00
ISU1	Midline of Upper Incisor	5.00mm Anterior	1.50mm Left	0.00
U3L	Upper Left Canine	5.00mm Anterior	1.48mm Left	0.30mm Up
U6L	Upper Left Anterior Molar (mesiobuccal cusp)	5.00mm Anterior	1.43mm Left	0.37mm Up
U3R	Upper Right Canine	5.00mm Anterior	1.48mm Left	0.30mm Down
U6R	Upper Right Anterior Molar (mesiobuccal cusp)	5.00mm Anterior	1.42mm Left	0.35mm Down
ISL1	Midline of Lower Incisor	3.76mm Posterior	5.08mm Right	0.87mm Up
L6L	Lower Left Anterior Molar (mesiobuccal cusp)	0.20mm Anterior	0.40mm Left	0.98mm Up
L6R	Lower Right Anterior Molar (mesiobuccal cusp)	8.27mm Posterior	0.28mm Right	2.90mm Up
B	B Point	4.54mm Posterior	5.43mm Right	0.99mm Up
Pog	Pogonion	5.23mm Posterior	6.91mm Right	0.86mm Up







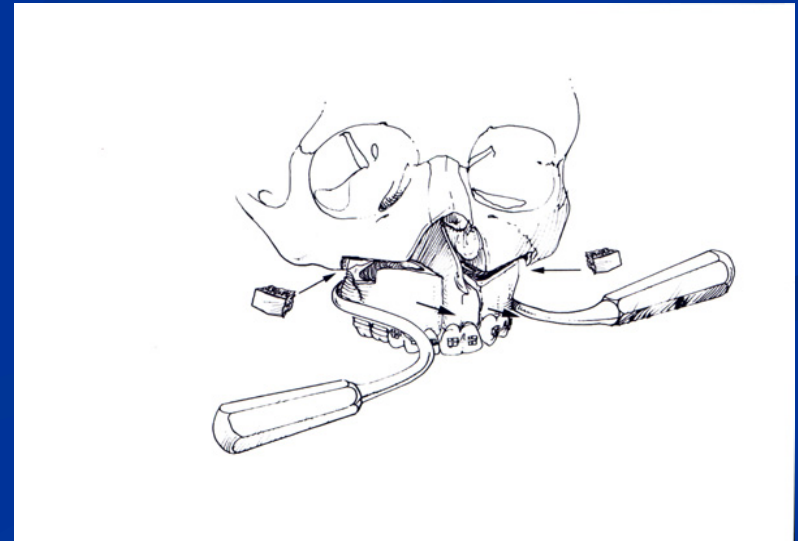
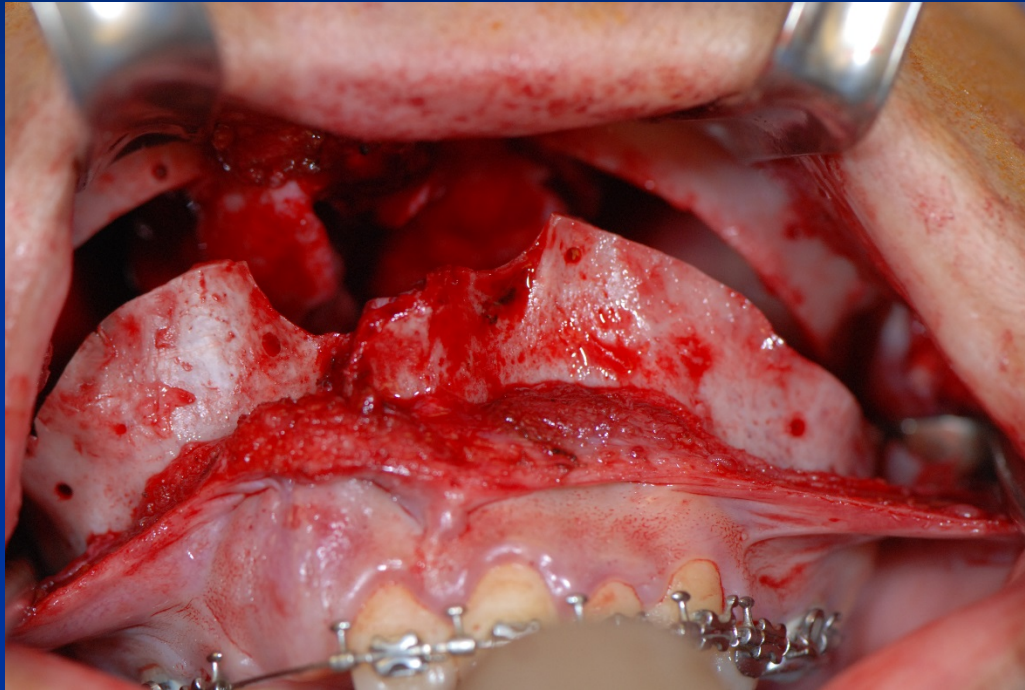




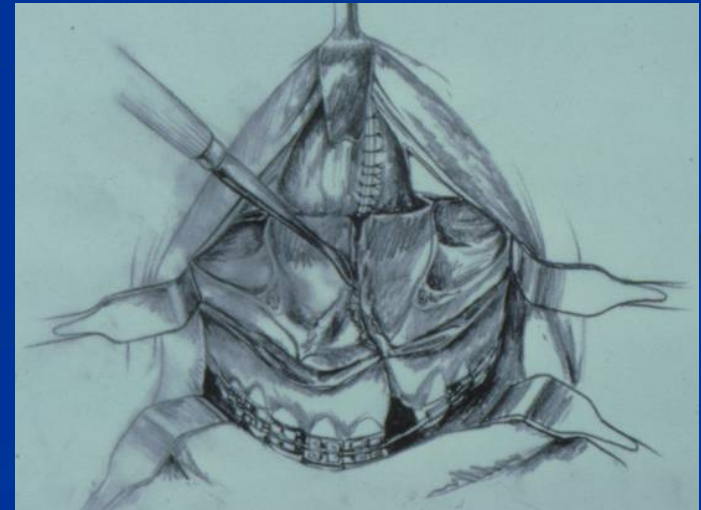
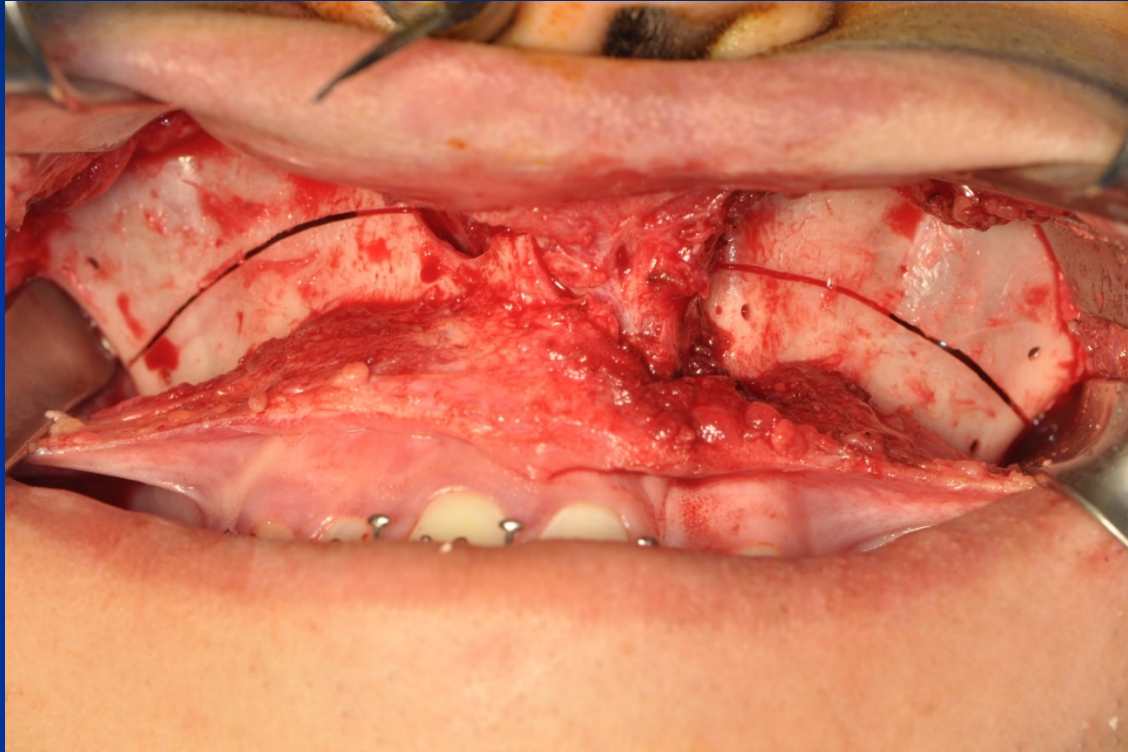
# Cleft Orthognathic Surgery: Technical Considerations

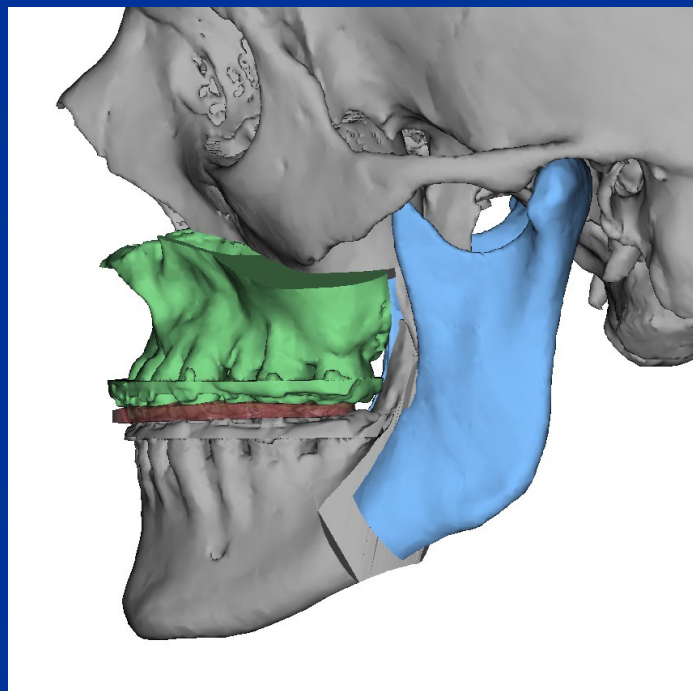
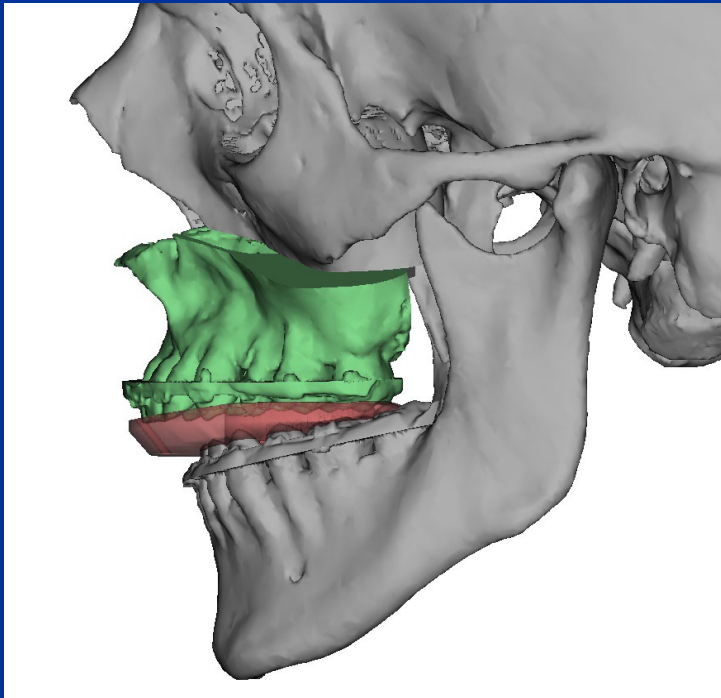
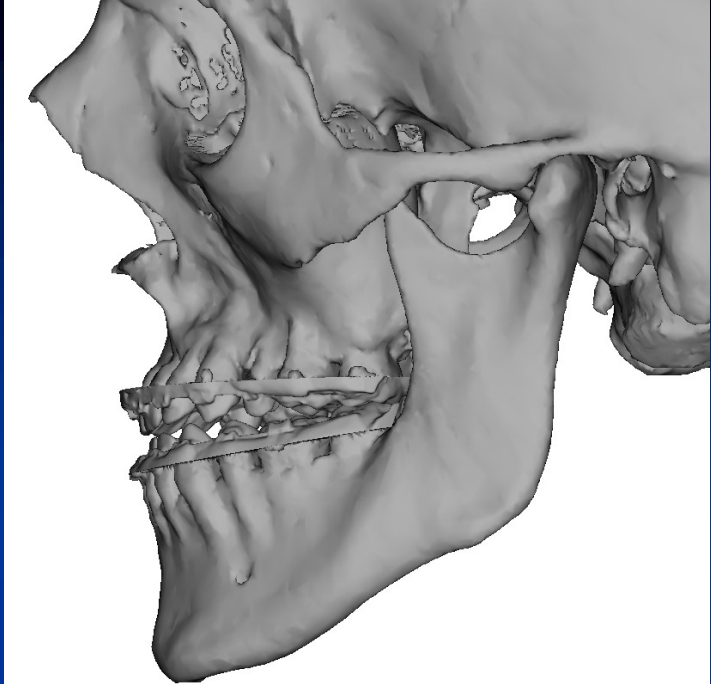
- Incision design to preserve perfusion of dentoalveolar segments
- Keep it simple.... Closing dental gaps when possible
- Sequence bone cuts to reduce hemorrhage
- Weaken perpendicular plate prior to down fracture
- Adequate mobilization
- Stabilization (Rigid Internal Fixation)
- Bone grafts:
  - Interpositional (contribute to healing and stability)
  - Onlay (contour)

# Cleft Orthognathic Surgery: Operative Technique



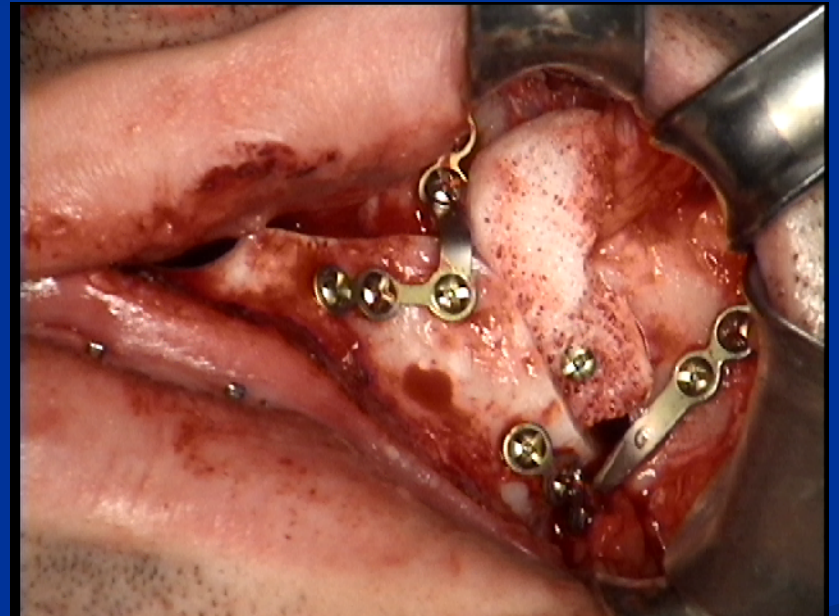
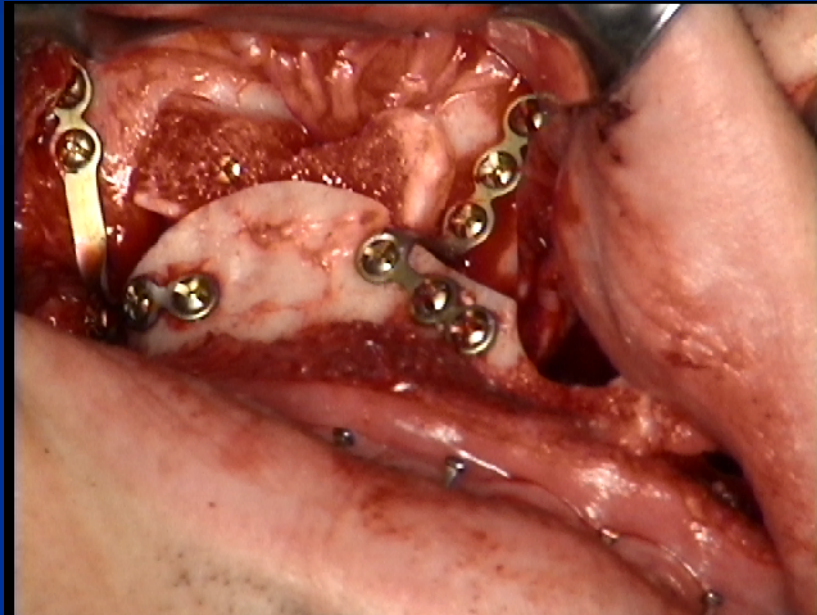
# Cleft Orthognathic Surgery: Operative Technique



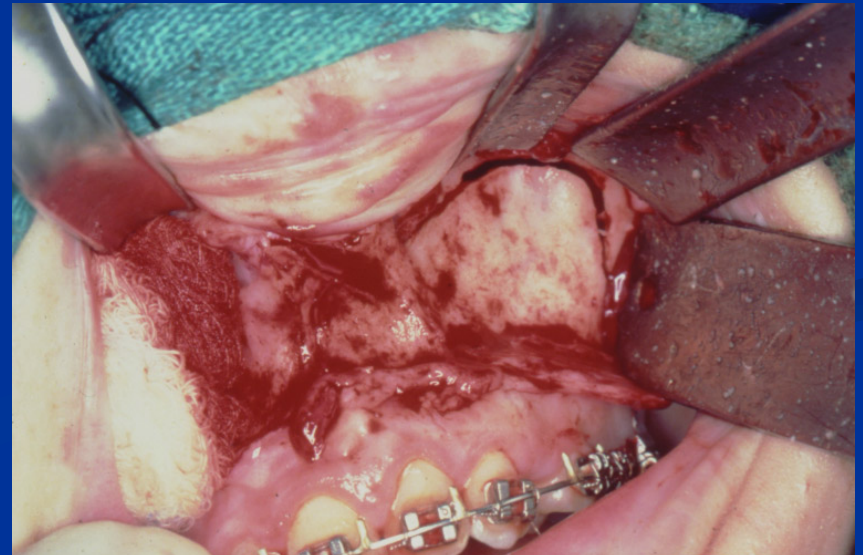
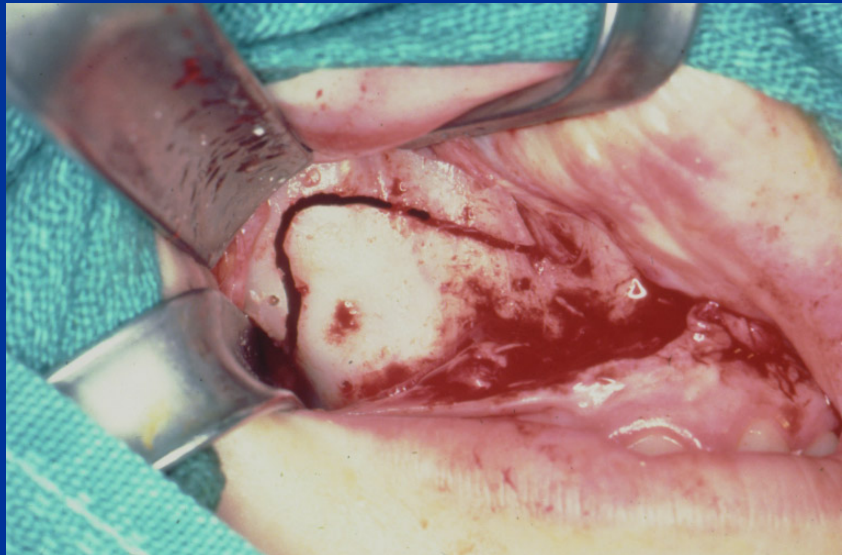
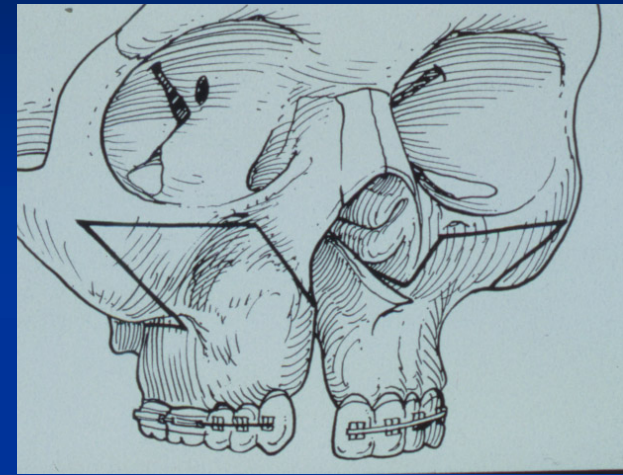
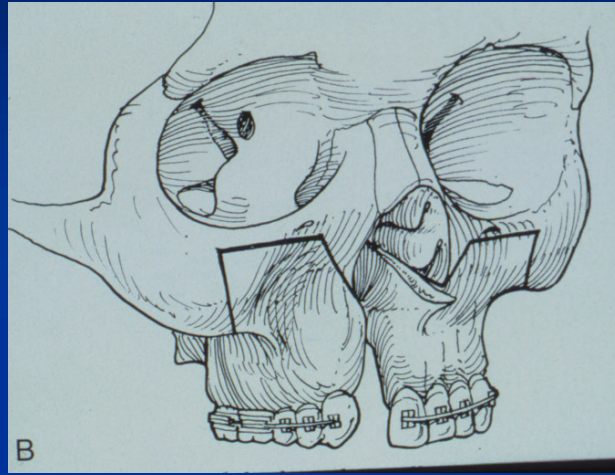
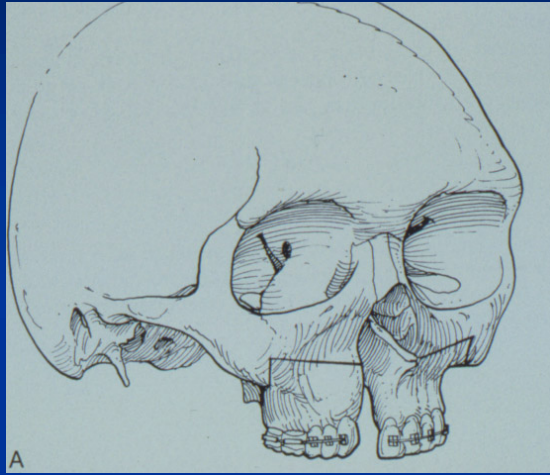






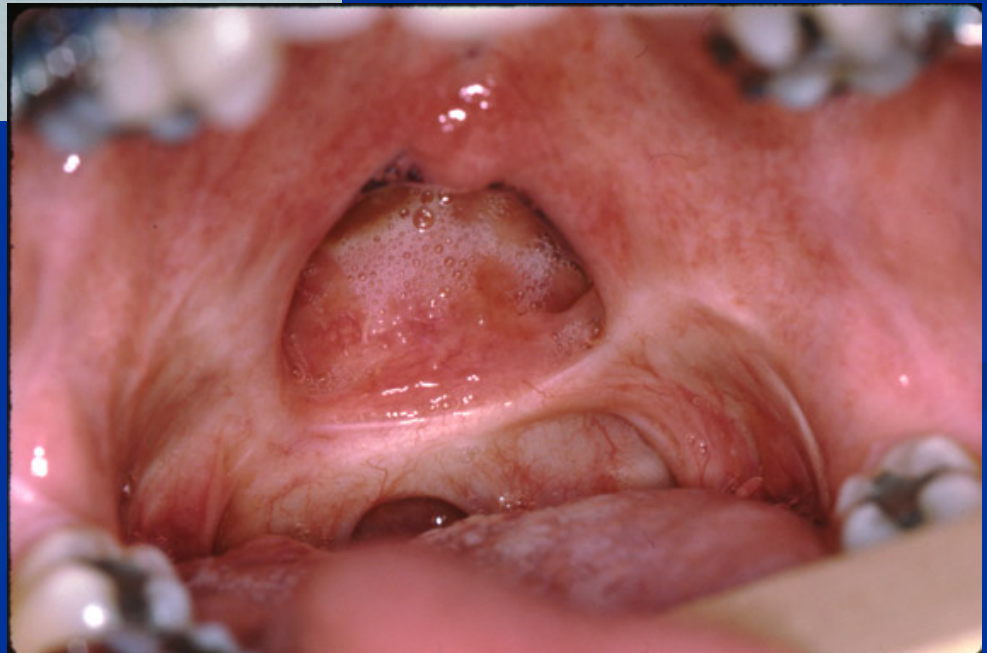
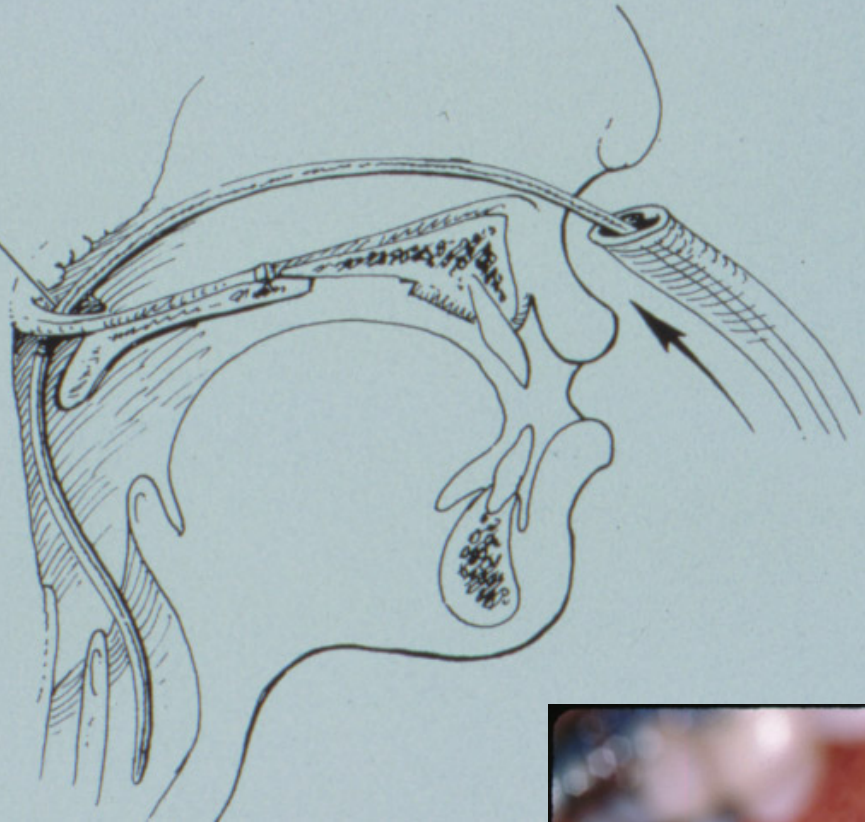


# Osteotomy Design?



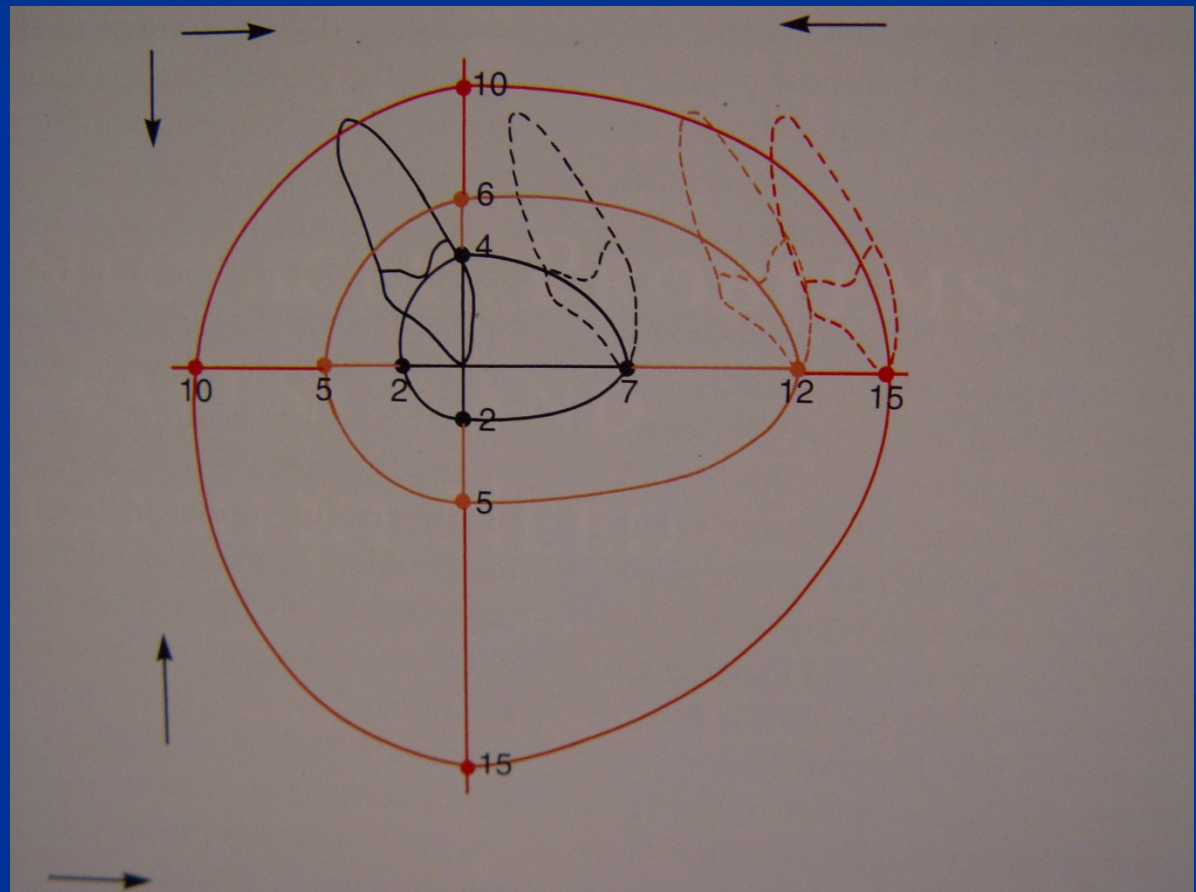


Pharyngeal port



# Indications for Maxillary Distraction

- When is DO applied relative to other treatment modalities?



# Indications for Distraction Osteogenesis

- Skeletal movements not possible via conventional osteotomies.
  - >10mm movement
  - <10mm movement in the presence of extensive scar!



# Indications for Maxillary Distraction

- When osteotomy with gradual distraction may produce a degree of improvement not achievable any other way (e.g. advancement beyond the scope of conventional osteotomy).
- If DO evolves to be a cost-effective method of producing similar results.
  - Must define “cost-effective” in a broad sense:
    - Burden of treatment for patients
    - Economic costs.

# Advantages of Conventional Maxillary Advancement

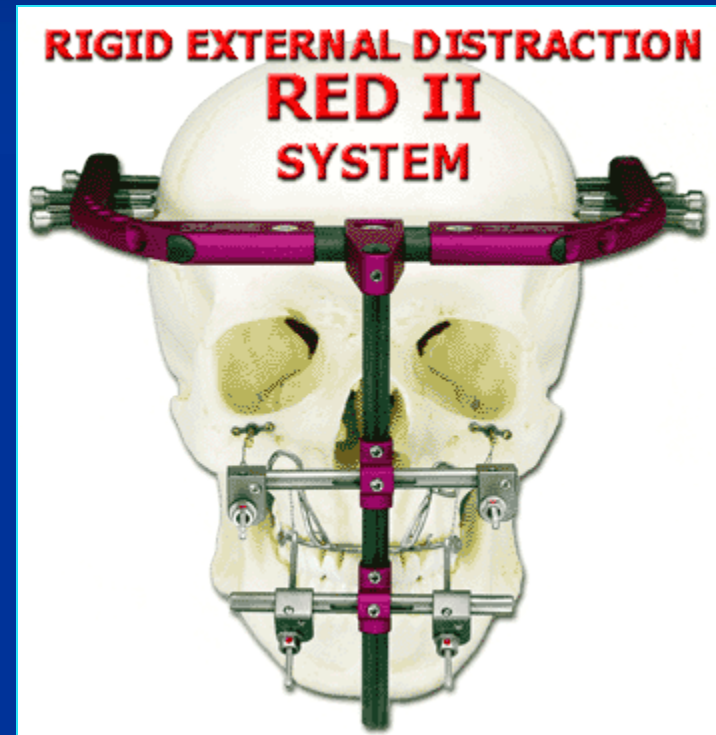
- Results (occlusal and facial esthetics) are achieved during one procedure in the OR.
- Three-dimensional movements are possible with high degree of accuracy.
- Residual defects may be simultaneously addressed:
  - Oronasal fistulas
  - Cleft dental gaps
  - Bony defects
  - Intranasal surgery

# Advantages of Conventional Maxillary Advancement

- Allows for simultaneous bone graft recontouring of dysmorphic skeletal components.
- After surgery, only limited cooperation by the patient and family is required.
- Better patient comfort; no internal/external appliances.
- No facial or scalp scars are produced.

# Theoretical Advantages of DO

- DO results in absolute stability (no relapse)
- During DO, soft tissue volume (skin, subcutaneous tissue, muscle, nerve) is created
- Velopharyngeal function is not disturbed
- DO is a “noninvasive” method with less morbidity
- DO allows “early correction” in the young cleft patient



# Theoretical Advantages of DO: Stability and Relapse

- Chanchareonsook N, et al. CPCJ:
- 2006
  - Le Fort I vs. Le Fort I with Distraction Osteogenesis
  - No significant difference in meta-analysis
- 2007
  - No significant difference in 22 randomized patients



# Theoretical Advantages of DO: Creation of Soft Tissue

- Muscle changes associated with DO are largely characterized by adaptation and regeneration rather than hyperplasia and volumetric increase.
- The hoped-for creation of “new” soft tissue matrix has not been demonstrated scientifically.

# Theoretical Advantages of DO: Avoidance of VPI

“... use of the external distraction approach to gradually reposition the maxilla at the Le Fort I level in the cleft patient resulted in alteration of VP function in a similar way to the classical approach.”

Hung KF, Chen PKT, Lo LJ, et al. Alteration of the velopharyngeal functions after rigid midface distraction. Proceedings of the ISCS. Taipei, Taiwan, November 1999, p28(abst).

# Theoretical Advantages of DO: Minimally Invasive Approach

Lo LJ, Hung KF, and Chen YR. Blindness as a complication of Le Fort I osteotomy for maxillary distraction. *Plast Reconstr Surg.* 2002 Feb; 109(2): 688-98.

- 94 patients over a 4 year period treated via LeFort I osteotomy with external distraction.
  - 2 patients with blindness (irreversible)

# Prosthetic Rehabilitation in CL & P: Three Unit Fixed Prosthesis

- In contemporary practice, the use of a three unit bridge is generally avoided.
  - Requires preparation of adjacent teeth
  - Hygiene is more difficult
  - Restorations will require replacement several times during the patient's lifetime

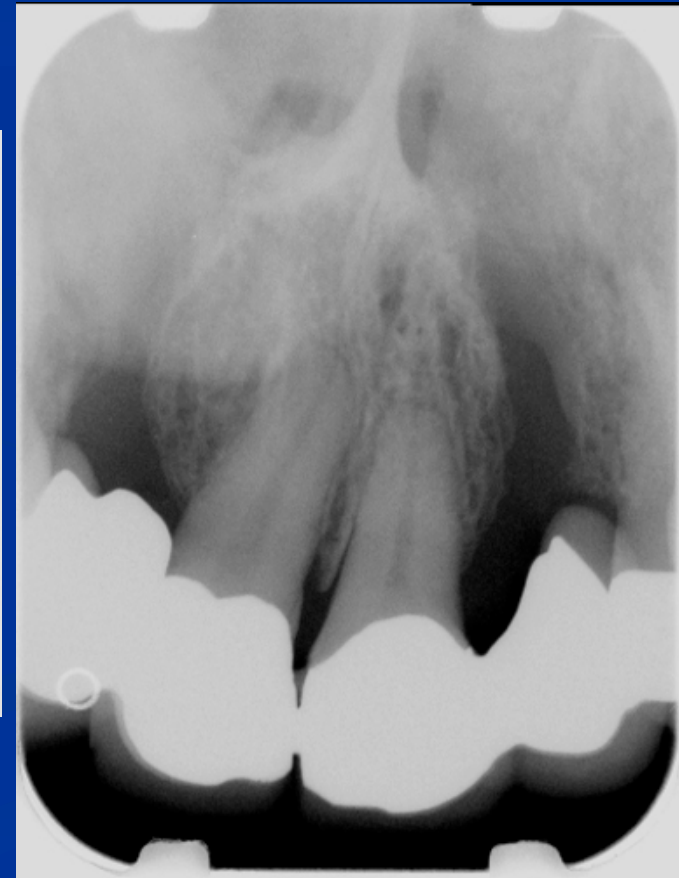
# Prosthetic Rehabilitation in CL & P: Orthodontic Substitution

- May have a role in specific clinical situations
- Positives:
  - Avoids prosth
  - Early treatment
- Negatives:
  - Esthetics
  - Occlusal discrepancy



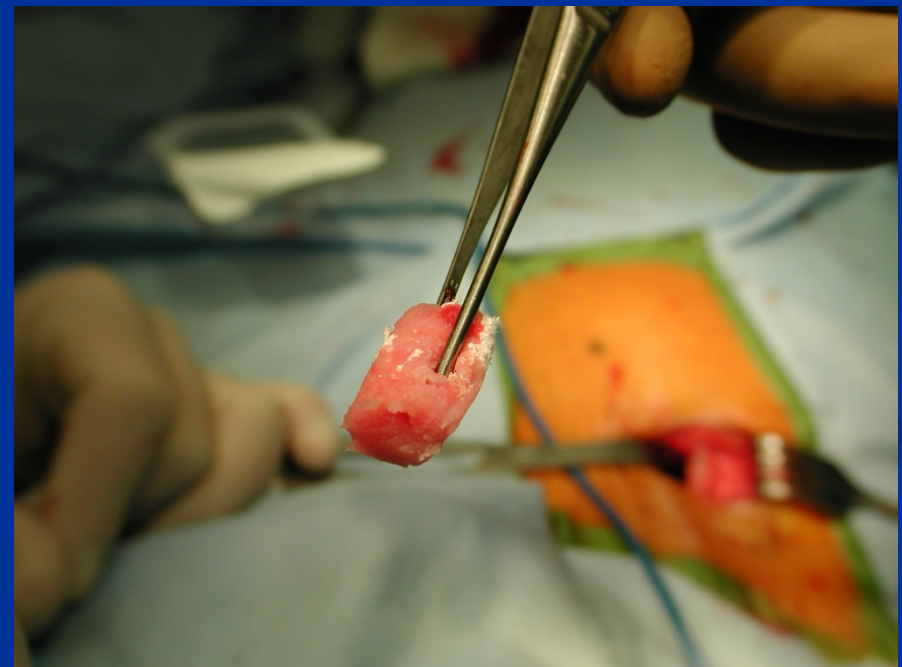
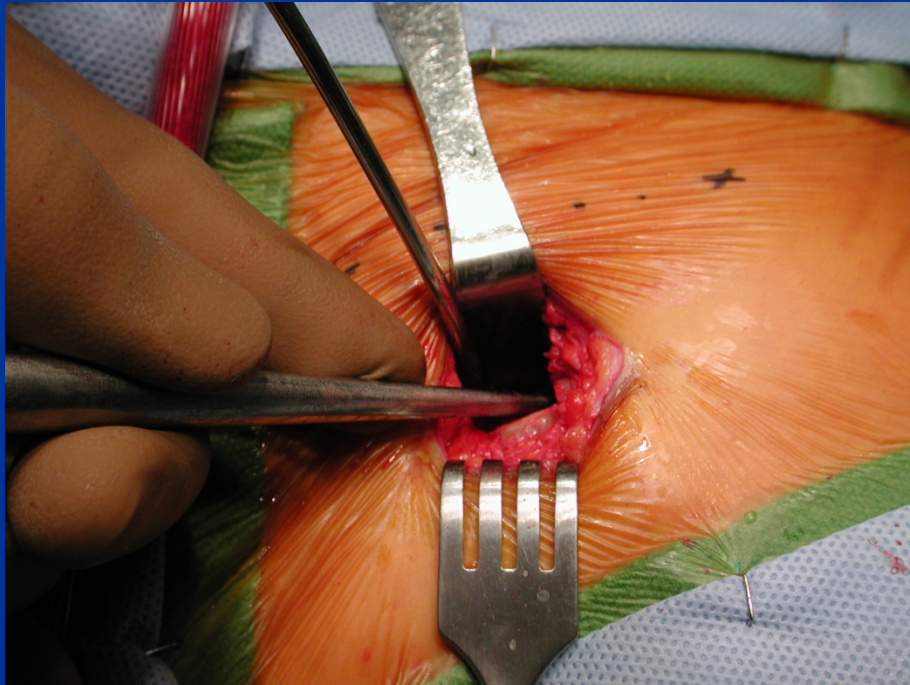
# Prosthetic Rehabilitation in CL & P: Implant Supported

- Ungrafted adult patient



# Prosthetic Rehabilitation in CL & P

- Bone graft reconstruction of the cleft maxilla utilizing anterior ilium



# Summary

- CL & P management requires a thoughtful, staged, reconstructive approach
- Consider interplay between treatment & growth
  - Surgery negatively impacts growth
  - Subsequent growth impacts overall result
- Use PSOT only when less invasive options are not available
  - Not necessary in most cases
  - Improves premaxillary position in BCLP
  - May facilitate repair in wide clefts



# Summary

- Successful bone grafting facilitates subsequent treatment
- **Avoid GPP:**
  - Unfruitful and damages growth!!
- High prevalence of jaw discrepancies requiring orthognathic surgery
- Residual defects (fistulae, alveolar clefts, dental gaps) must be incorporated into treatment plan
- Interdisciplinary care is mandatory

# Thank You

