

MANAGEMENT OF CLEFT MAXILLA

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GSR Institute of Facial Plastic Surgery



- Non-profit hospital established in 1996
- Dedicated Cleft & Craniofacial Centre of Excellence
- Presently 1,600 cleft and craniofacial surgeries are done every year
- 4 surgeons and 6 fellows with full support team
- More than 40,000 documented cleft & craniofacial surgeries have been performed since 1996
- 600 primary new born cleft children are registered every year



Correction of cleft maxilla

- Cleft maxillary hypoplasia is a deformity involving the maxillary skeletal and soft tissue components
- It is a common sequelae following cleft lip and palate repair
- The prevention, reduction and correction of cleft maxillary hypoplasia starts from infancy and is done at various stages of life
 - ✓ Before primary lip repair (NAM)
 - ✓ At the time of primary lip repair
 - ✓ At mixed dentition phase
 - ✓ After completion of growth



BEFORE PRIMARY LIP REPAIR (NAM)



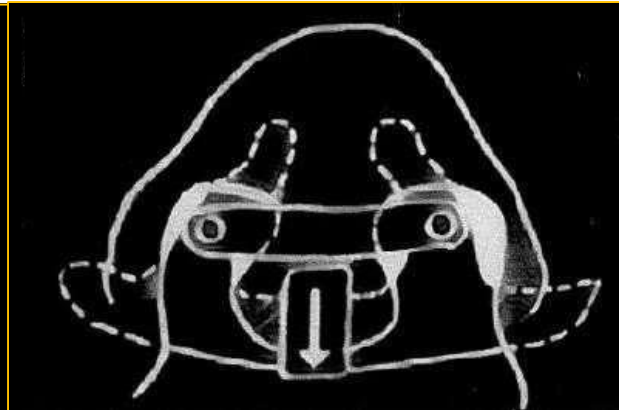
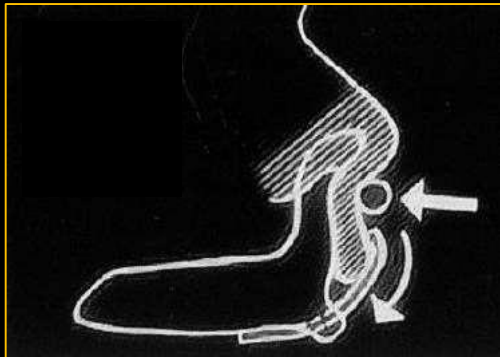
Before primary lip repair (NAM)

Presurgical Nasoalveolar Orthopedic Molding in Primary Correction of the Nose, Lip, and Alveolus of Infants Born With Unilateral and Bilateral Clefts

BARRY H. GRAYSON, DDS
COURT B. CUTTING, M.D.

This addendum to the "State of the Art Dental Treatment of Predental and Infant Patients With Clefts and Craniofacial Anomalies," by Prah-Andersen (*Cleft Palate Craniofac J.* 2000;37:528-532), offers an extended perspective on this controversial subject. This article reviews the role of combined nasal and alveolar (nasoalveolar) molding in the primary correction of the nose, lip, and alveolus of infants born with unilateral and bilateral clefts. The background of presurgical nasoalveolar orthopedic molding, the technique, and the literature are presented. The proposed benefits of treatment from the traditional techniques of presurgical orthopedics have been shown to be unsubstantiated (Kuijpers-Jagtman and Prah, 1996). A close comparison of the proposed benefits of earlier forms of presurgical orthopedics, along with those of the current technique of nasoalveolar molding, is presented.

KEY WORDS: *bilateral unilateral cleft lip and palate, gingivoperiosteoplasty, nasal stent, nasoalveolar molding, nonsurgical columella elongation, presurgical orthopedics*



Presurgical Nasoalveolar Orthopedic Moulding in Primary Correction of the Nose, Lip, and Alveolus of Infants Born with Unilateral and Bilateral Clefts

Dr. Barry H. Grayson, DDS, , Dr. Court B. Cutting, M.D. *The Cleft Palate-Craniofacial Journal* Vol38, Issue 3, pp 193 – 198, May.2001



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Naso-alveolar Moulding (Unilateral)



17Days



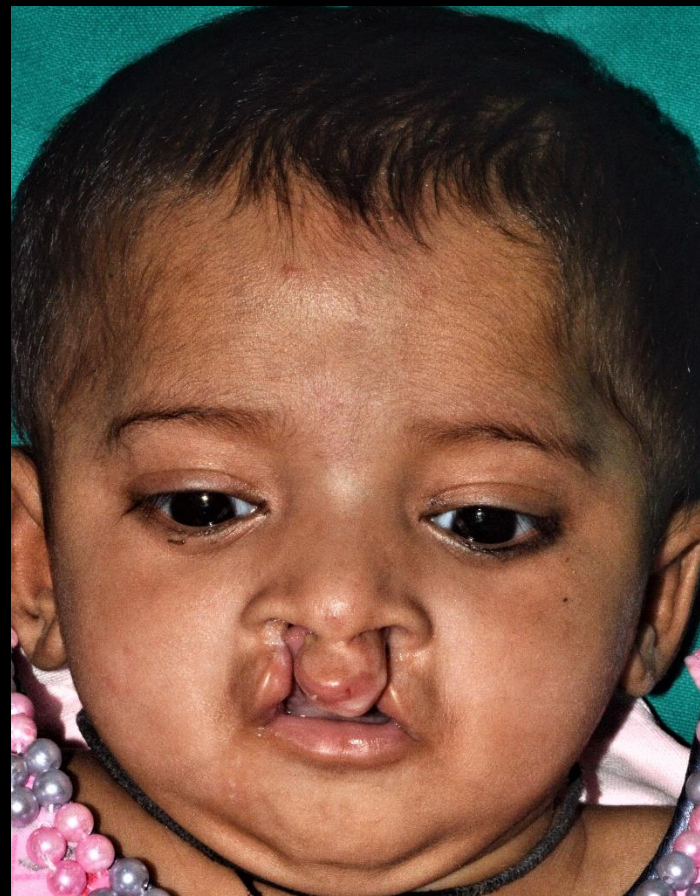
4Months



Naso-alveolar Moulding (Bilateral)



10Days



4Months



AT THE TIME OF PRIMARY LIP REPAIR



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At the time of primary lip repair



Perialveoloplasty



Septoplasty



Ala Nasalis suture Stabilization with
contra lateral side

Source:

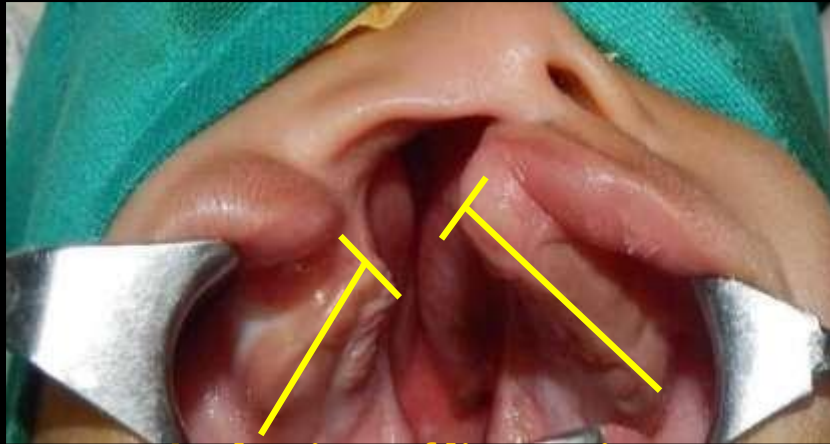
Afroze Incision for Functional Cheiloplasty, Technical Note

Gosla Srinivas Reddy et. al.; J. Craniofac. Surg. 20(8):1733-1736, September 2009.



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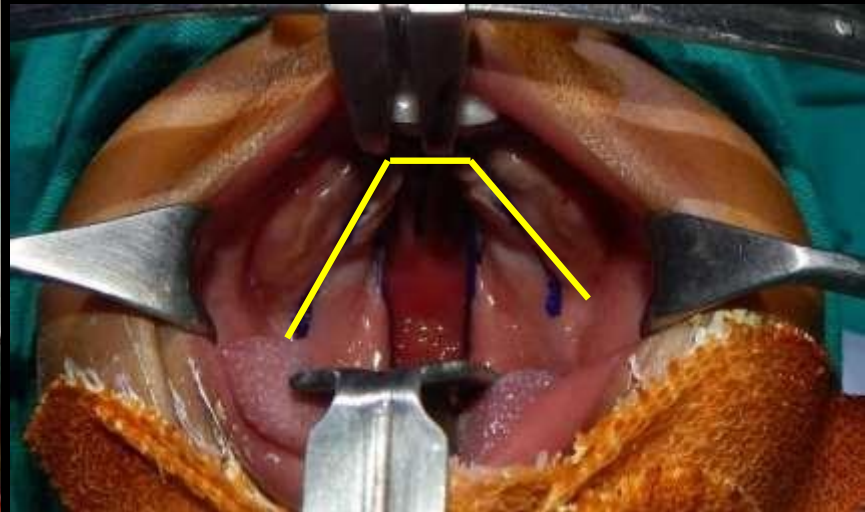
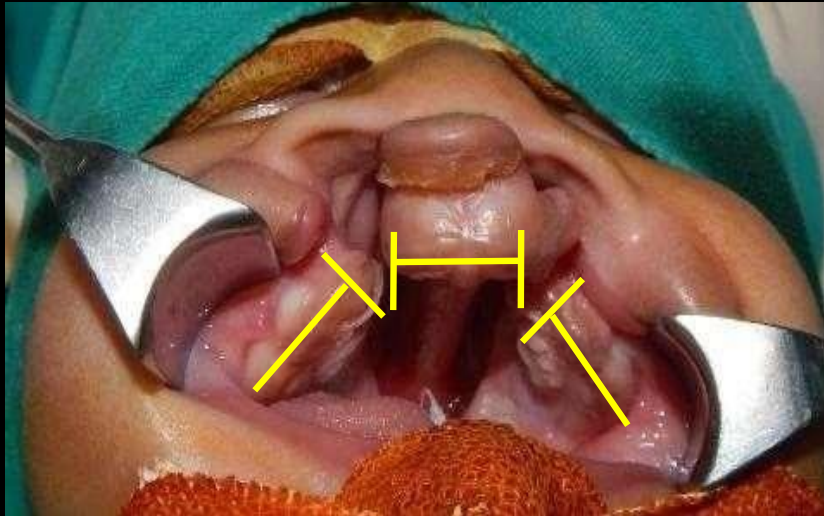
At the time of primary lip repair (Morphofunctional Cleft Lip Repair-**Perialveoplasty**)



At the time of lip repair



At the time of palate repair



Morpho-functional repair of complete unilateral cleft lip to achieve aesthetic balance between the lip and nose: an evidence based study Gosla-Reddy, S. et al. International Journal of Oral and Maxillofacial Surgery, Volume 44 , e13 - e14, 2015.



MIXED DENTITION PHASE ORTHODONTICS



Orthodontic Procedure in Mixed Dentition

Increase transverse dimension by palatal expansion.

11yrs/m 12-06-10

Principles

- Biphase upper arch expansion.
- Flattening of curve of Spee.
- Creating normal arch template for the mandible.
- Decompensation of upper and lower arches.
- Alignment and levelling of upper arch.





2012



2014



2017





2010



2011



2013



2017





2010



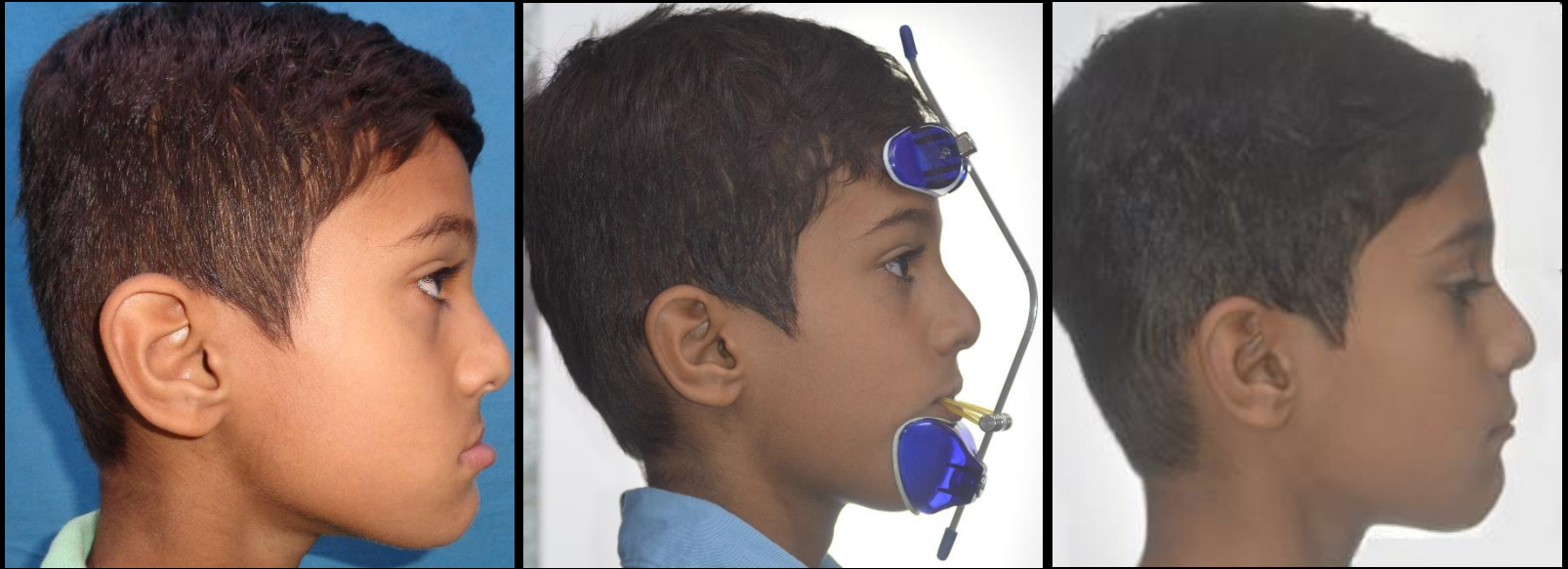
2013



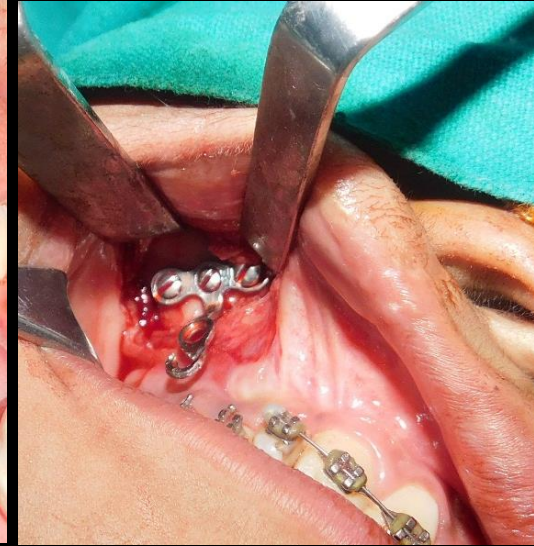
2017



TOOTH ANCHORED MAXILLARY PROTRACTION DEVICES (FACE MASK)



BONE ANCHORED MAXILLARY PROTRACTION DEVICES (BAMP)



AFTER COMPLETION OF GROWTH - SECONDARY CLEFT MAXILLARY SURGERY



Secondary Cleft Maxilla



Scar

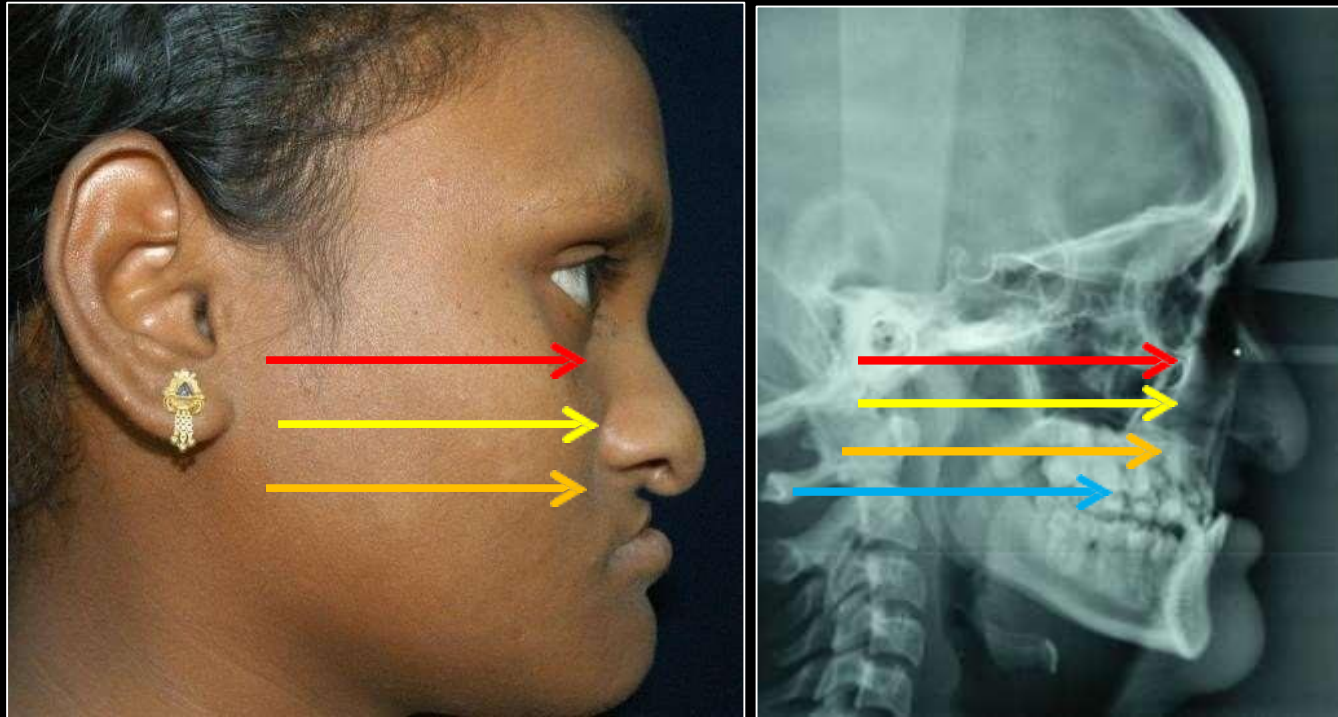
- Scar in the midline of the palate extends not only antero-posteriorly but also superiorly

Skeletal Considerations

- Loss of the bony support anteriorly in the cleft alveolus and medially in the cleft maxilla.



Secondary Cleft Maxilla



Skeletal Considerations

- Midfacial Skeletal Hypoplasia **Infraorbital**
 Nasolabial
 Maxilla
 Dentoalveolar



Principles of Correcting Secondary Cleft Maxilla

Surgical:

1. Restore horizontal and vertical dimension of lip
2. Bone grafting and palatal fistula closure
3. Midfacial Advancement (Orthognathic surgery or Distraction)
4. Rhinoplasty (Balanced rotation & Projection)



How to decide the treatment
plan

Distraction

vs.

Orthognathic surgery??



Distraction vs Osteotomy????

	Distraction	Osteotomy
Need for bone grafting	Not necessary even for defects > 20 mm	Necessary for defects >10 mm
Control over movement	3 Dimensional	2 Dimensional
On infants and children	Can be done	Think about permanent teeth and sufficiency of bone
Distortion and loading of the TMJ	Does not cause	Risk of causing
Damage to the inferior alveolar nerve	Does not cause	Risk of causing
Increasing ramus height	Possible	Not Possible
Cost	Expensive (distractors and equipment)	Relatively inexpensive
Time	Takes time	Quick Fix Method



Indications of Lefort Osteotomy

- Scarring of the palate is minimal.
- Amount of movement required less than 6 mm
- When pharyngeal flap is not present.

Indications of Distraction

- Scarring of the palate is present
- Amount of movement required more than 6 mm
- When pharyngeal flap is present.



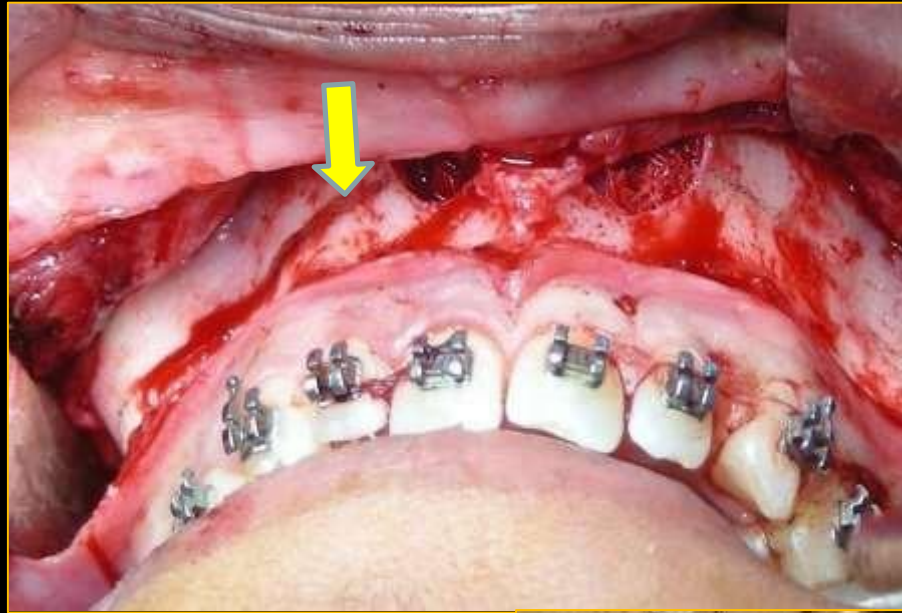
High Lefort I Osteotomy

Deficiency at the levels of

- Piriform
- Infra orbital
- Malar
- Subzygomatic



LeFort I



High LeFort I



High LeFort I

LeFort I



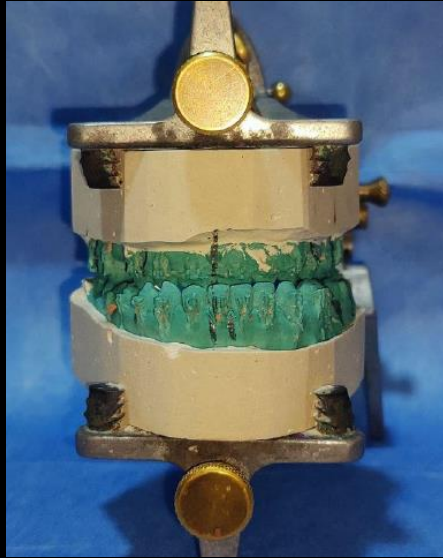
Pre surgical work up

- Complete orthodontics
- Oral prophylaxis and Restorative dentistry
- 3Rd Molar Disimpactions
- Pre op – Vitamin B12, Vitamin D, Iron Supplements, Zinc Supplements
- 2 sets of dental cast
- Pre op OPG & Lateral cephalogram
- Extra oral, intra oral & occlusion photos
- Mock surgery / VSP
- Splint fabrication

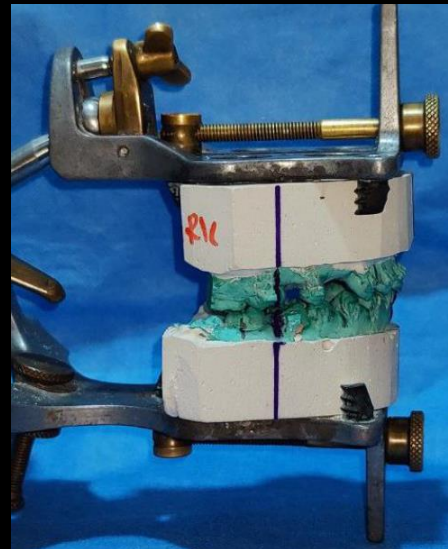


Mock Surgery

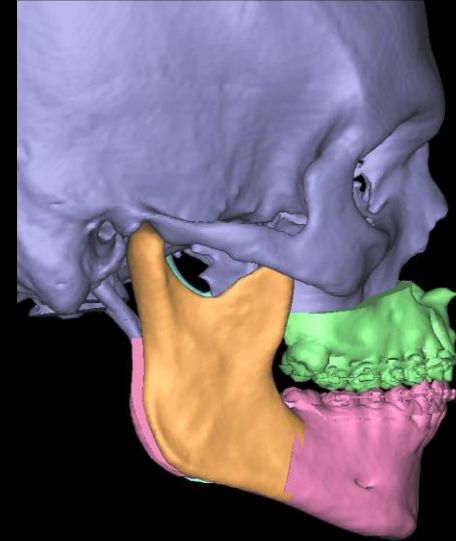
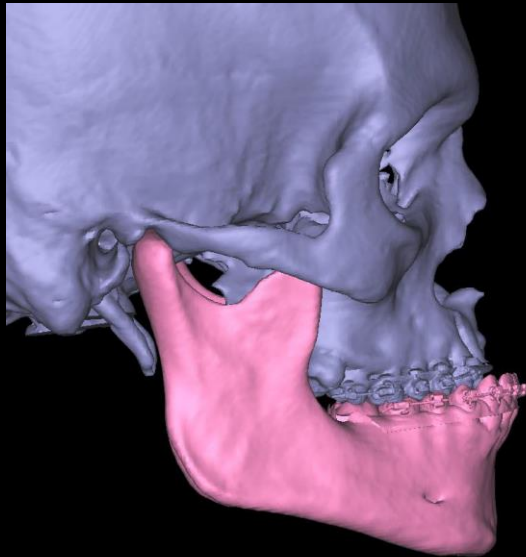
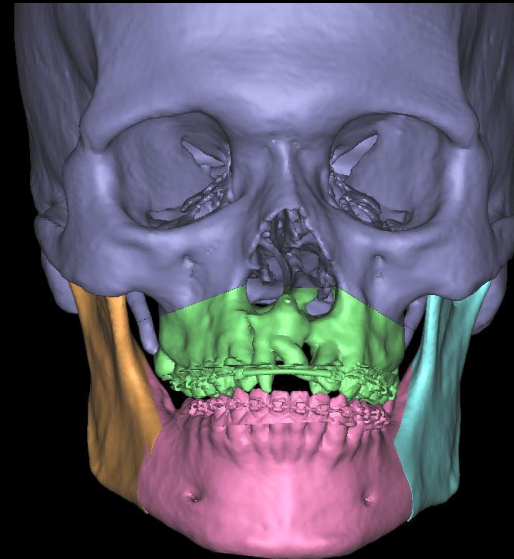
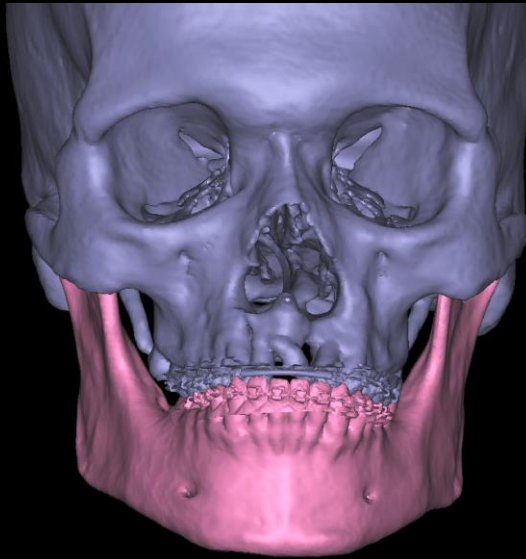
Pre op



Post op



Virtual Surgical Planning



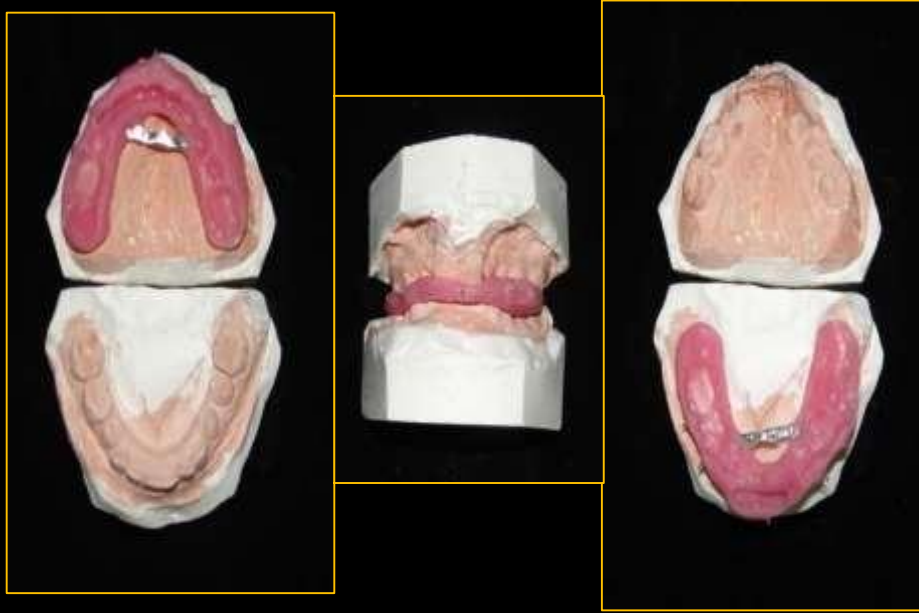
Pre op

Post op



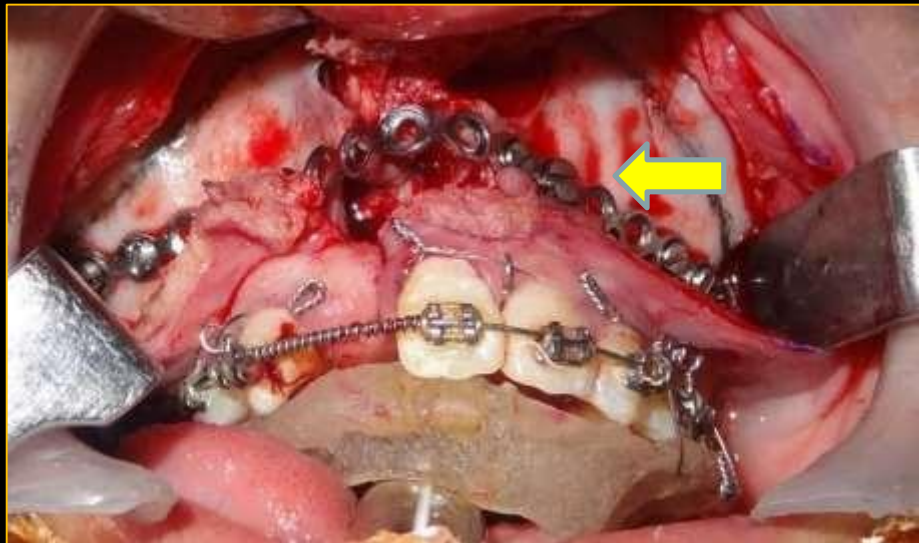
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It remains **same** for either Distraction or Orthognathic surgery.

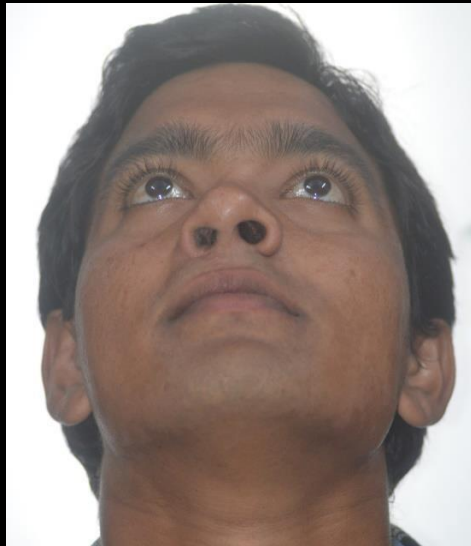


Splint

- To guide the maxilla into the desired occlusion.
- To counter the unfavorable movements due scar formation.
- Cross bar prevents posterior collapse of the arch.
- Fixation of a long rigid plate for arch stability.



LEFORT I ADVANCEMENT

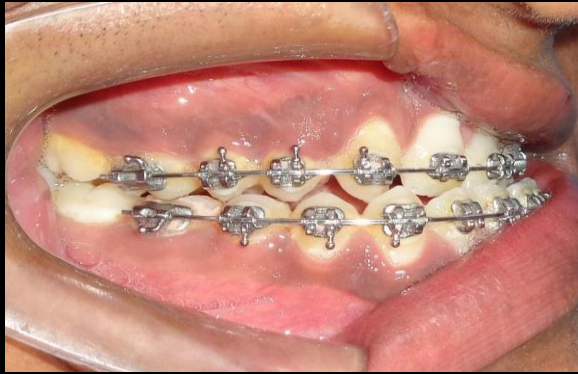


Pre op

Post op



Pre op



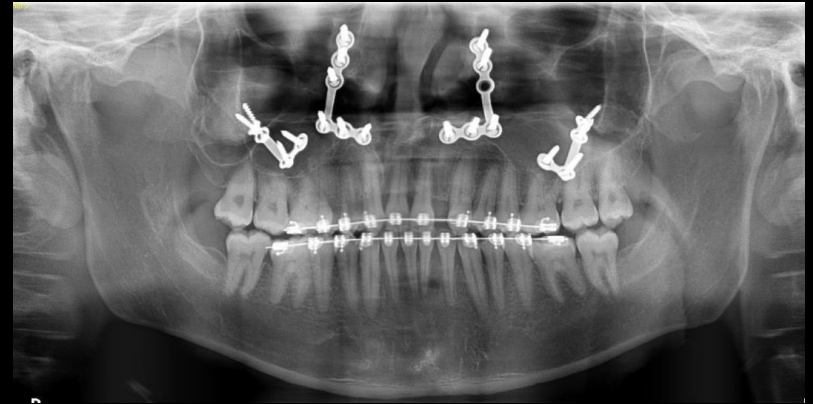
Post op



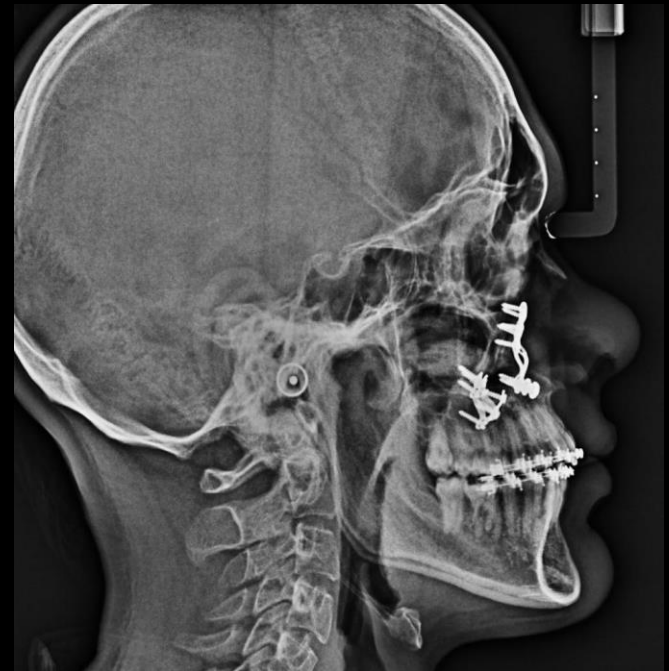
Pre op



Post op



1st of
a) 6 month(s)

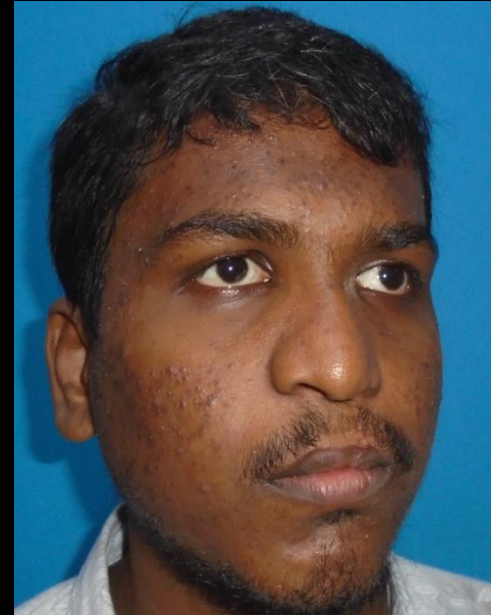


LEFORT I ADVANCEMENT + GENIOPLASTY

Pre op



Post op



Pre op

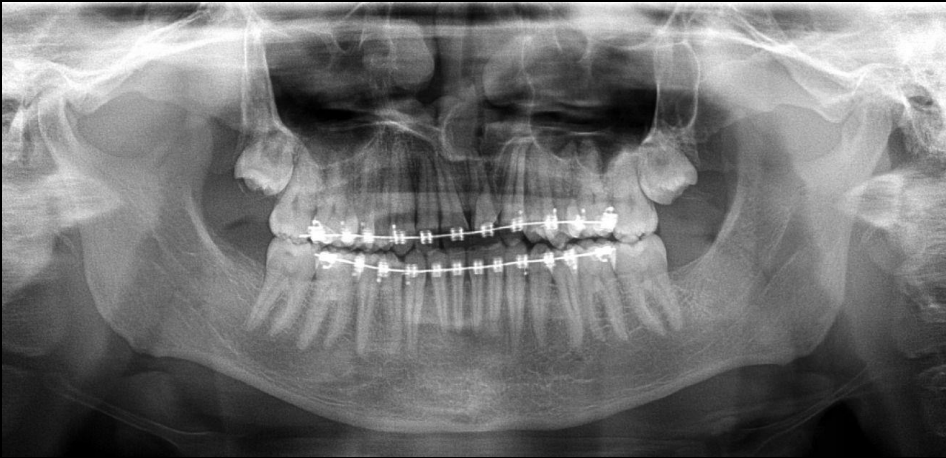


Post op



Pre op

Post op



LEFORT I ADVANCEMENT + BSSO SETBACK

Pre op



Post op



Pre op



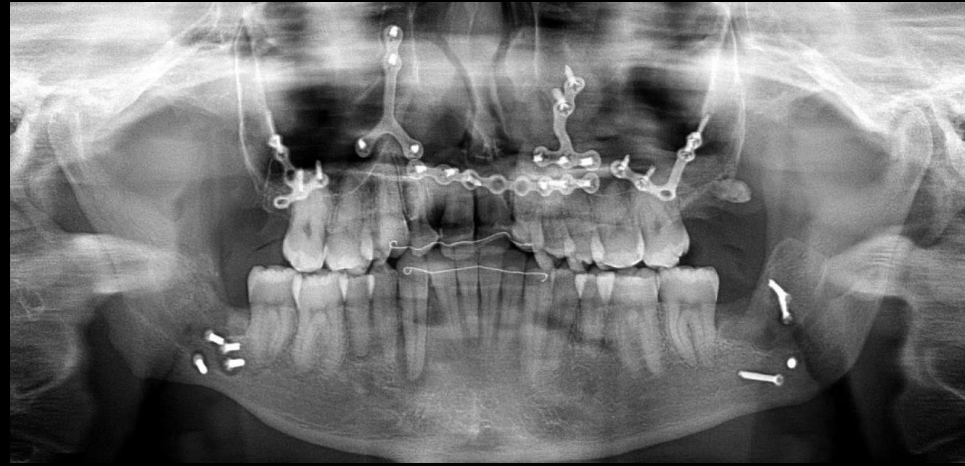
Post op



Pre op



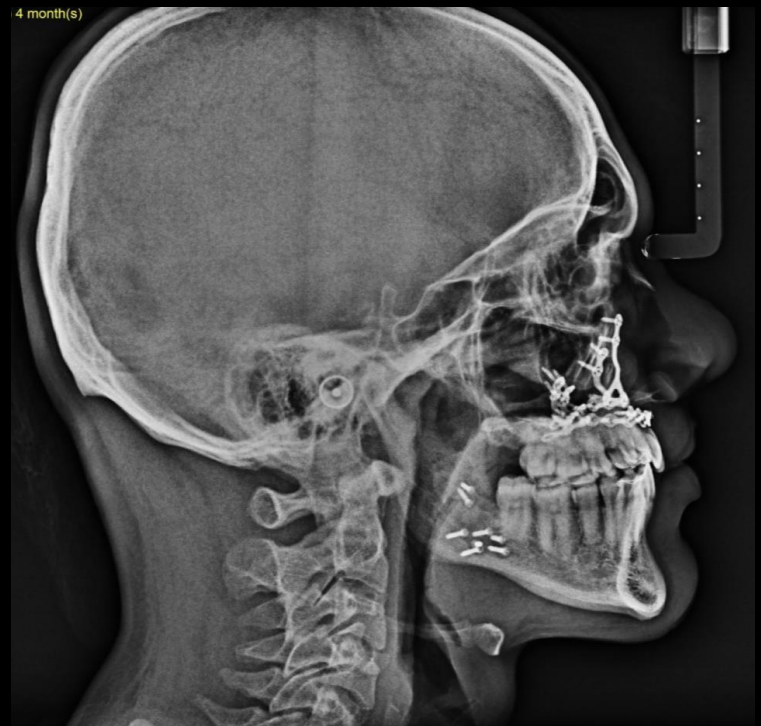
Post op



9 month(s)

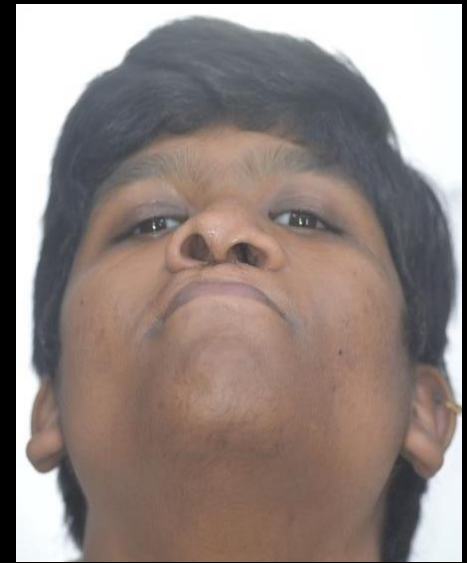
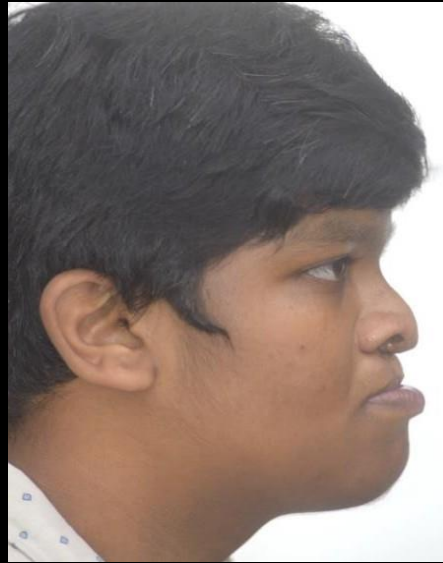


4 month(s)

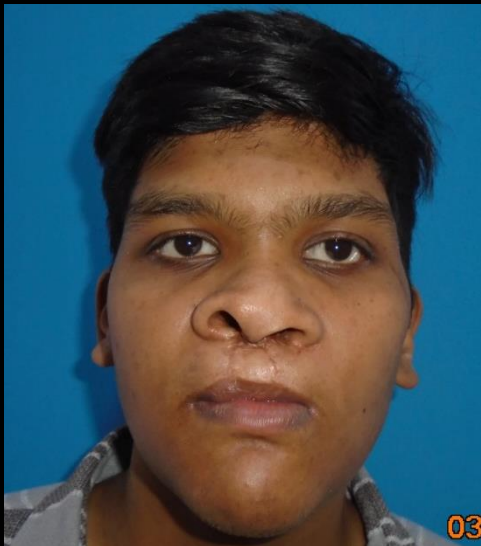


LEFORT I ADVANCEMENT + BSSO SETBACK + GENIOPLASTY\

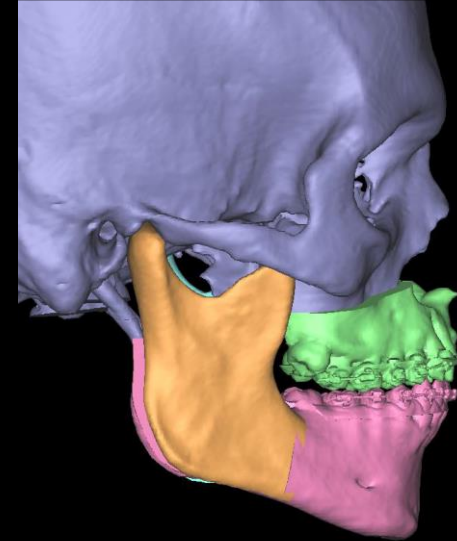
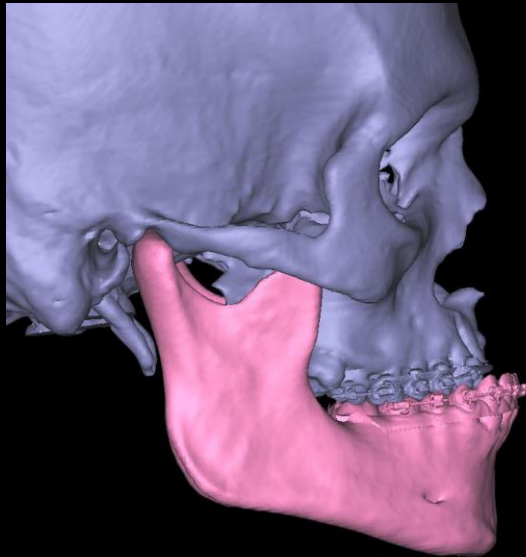
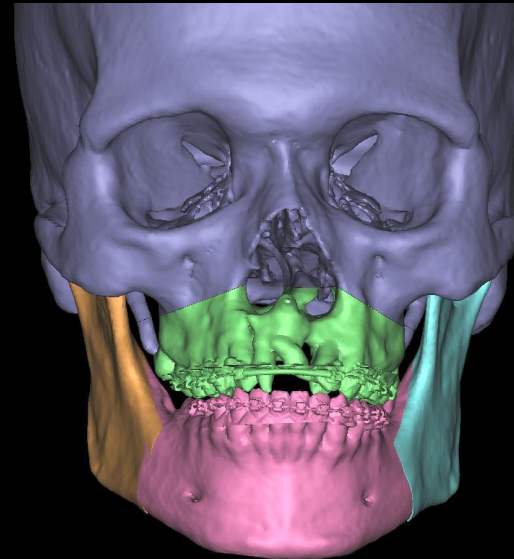
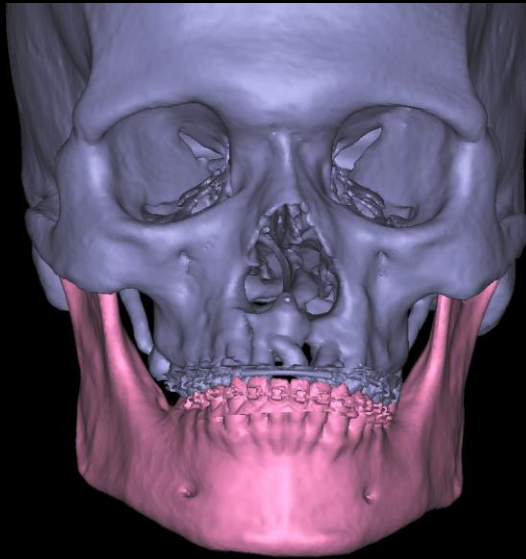
Pre op



Post op



Virtual Surgical Planning



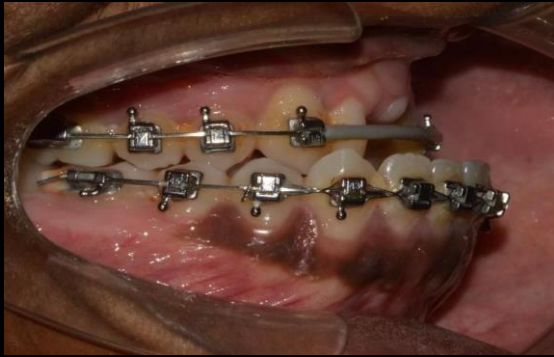
Pre op

Post op



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Pre op



Post op



Pre op



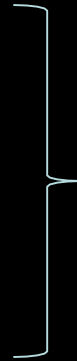
Post op



Indications of Lefort III Osteotomy

➤ Deficiency affecting

- Maxilla
- Malar
- Infraorbital area
- Naso-frontal area



Total Midface Hypoplasia

➤ VonBinders syndrome (Maxillo-nasal dysplasia)



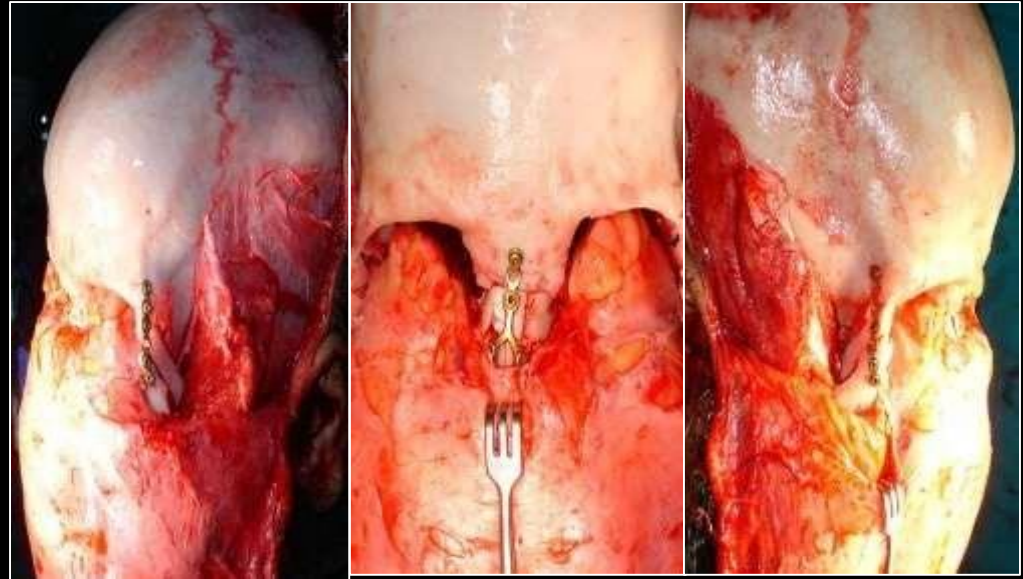
LeFort III Osteotomy + BSSO

Osteotomy at LeFort III level with calvarial bone graft for inter positioning and BSSO



Pre op

1year post op



Osteotomy cuts at LeFort III level with calvarial bone graft for inter positioning



LeFort I+III Osteotomy (Binders Syndrome)



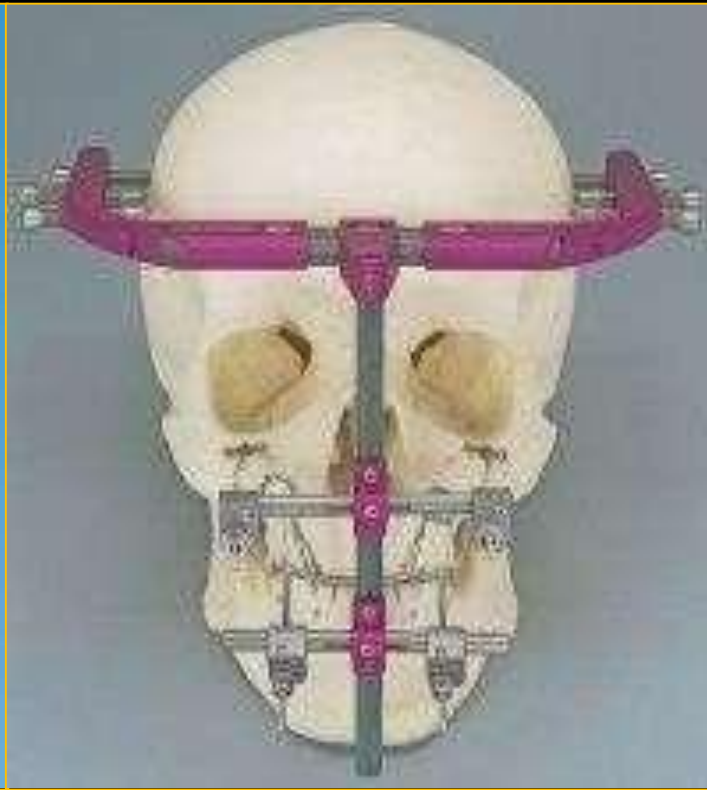
Midface Distraction for Secondary Cleft Maxilla



Different methods of distraction



Internal Pull
Distraction



External Pull
Distraction



Internal Push
Distraction



Pre-op



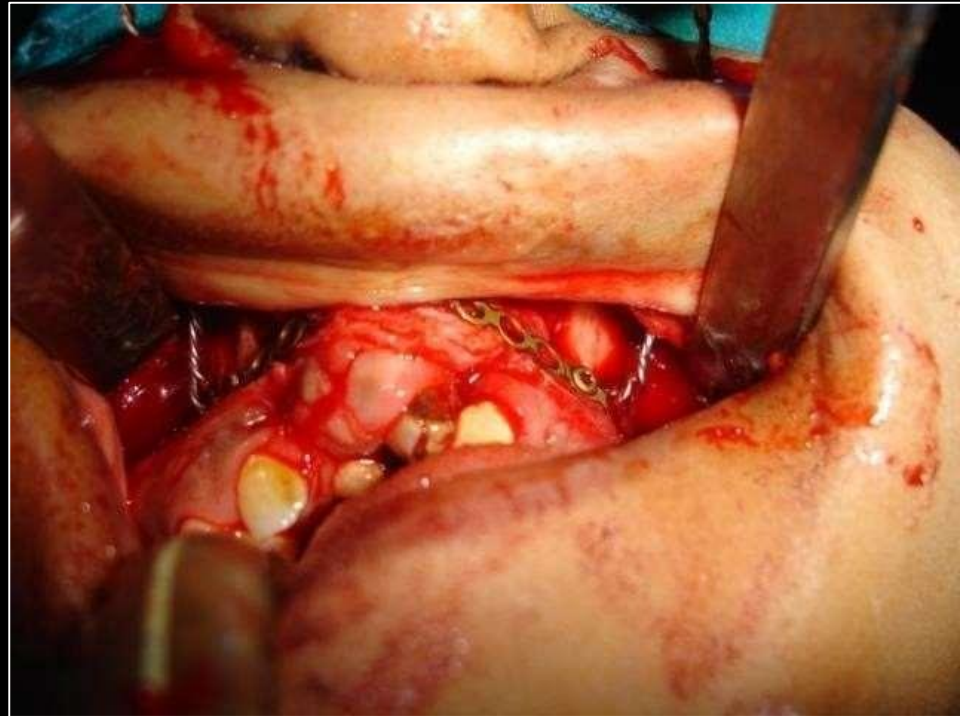
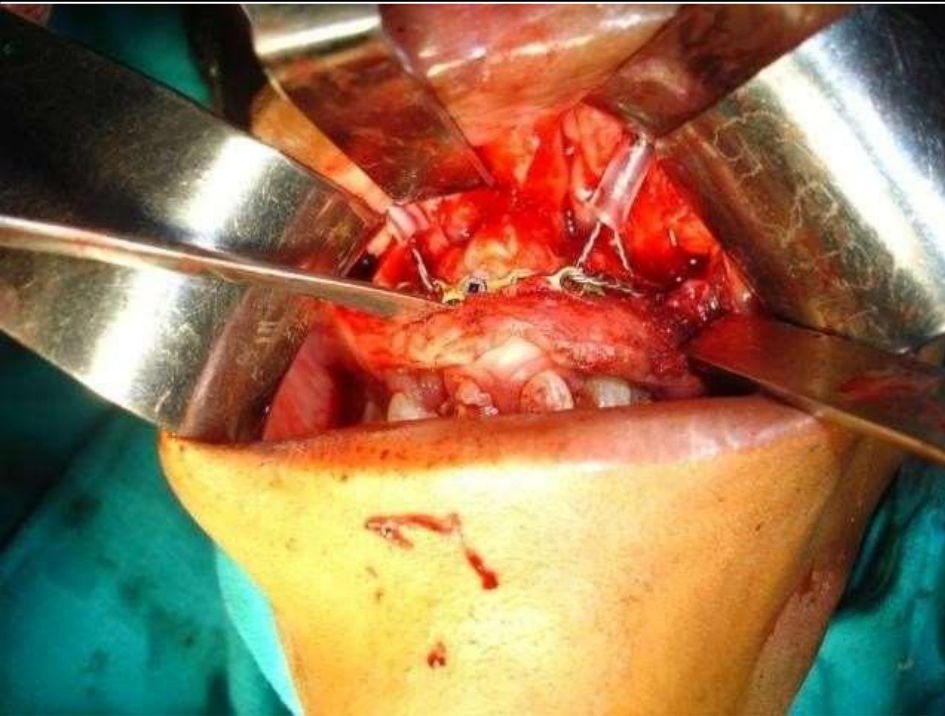
Intra-op



With Frame



Surgical Procedure Distraction



NEED FOR ANTERIOR BONE PLATE

- The anterior bone plate holds all cleft segments together thereby ensuring equal forward movement for all segments.
- It also provides an ideal anchorage for the distraction wires.



Performing a LeFort I Osteotomy

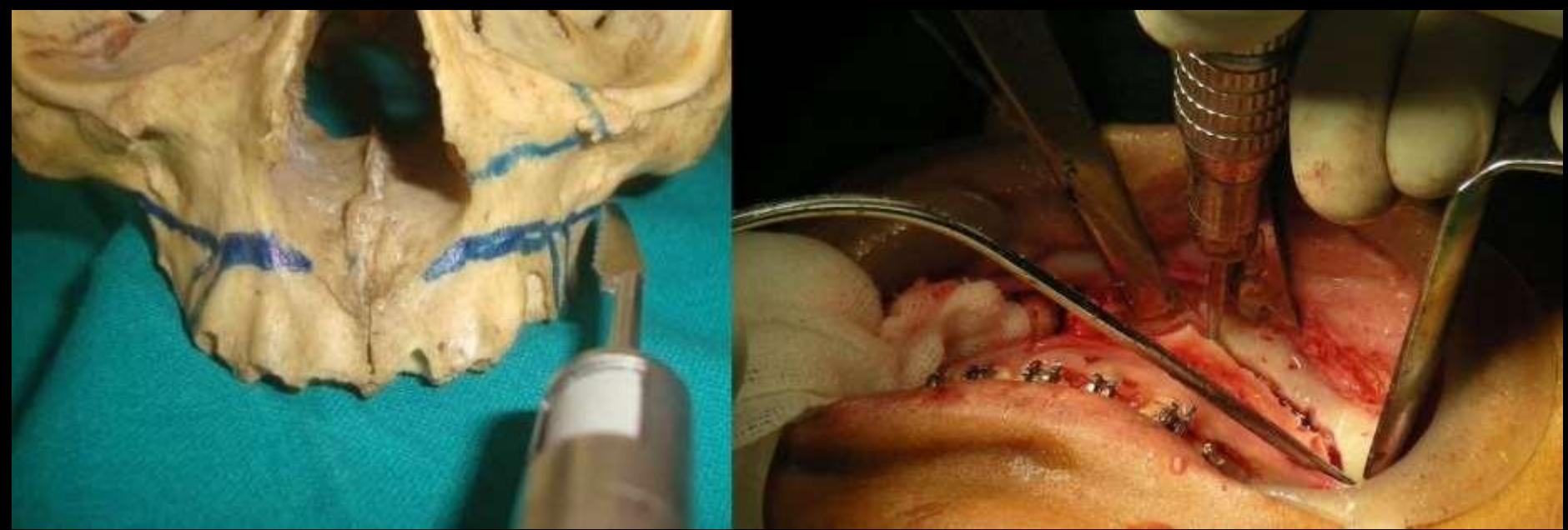


Osteotomy Cut

- The osteotomy cuts are placed 2-3mm higher than the conventional Lefort I ostetomy, to provide a cuff to place the plate and stability to the distracting segment.



Performing a LeFort I Osteotomy

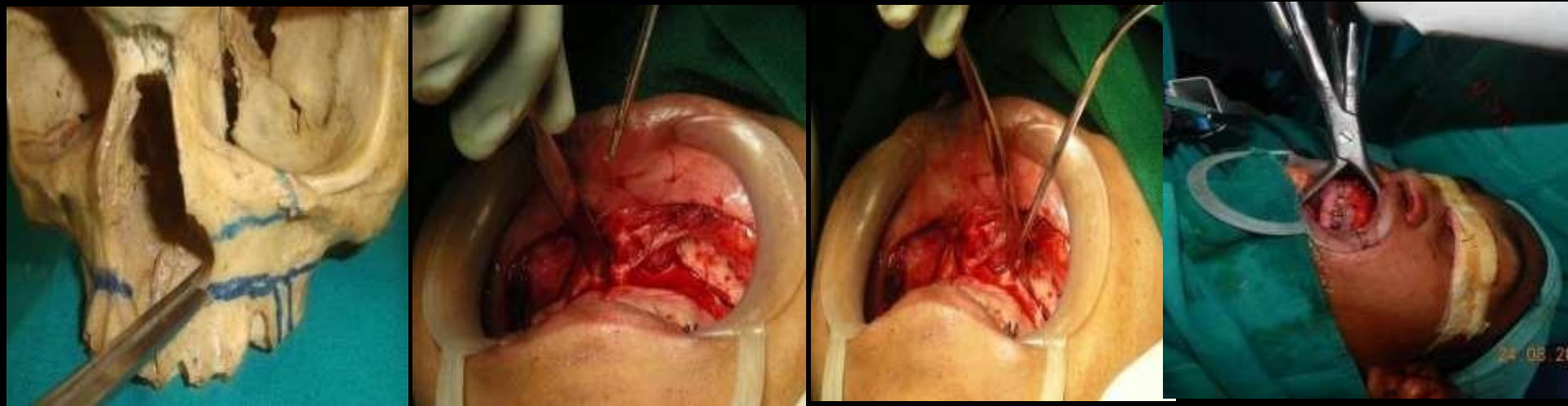


Anterior buccal osteotomy

- Done with reciprocating Saw with copious irrigation.



Performing a LeFort I Osteotomy



Medial and posterior wall osteotomy

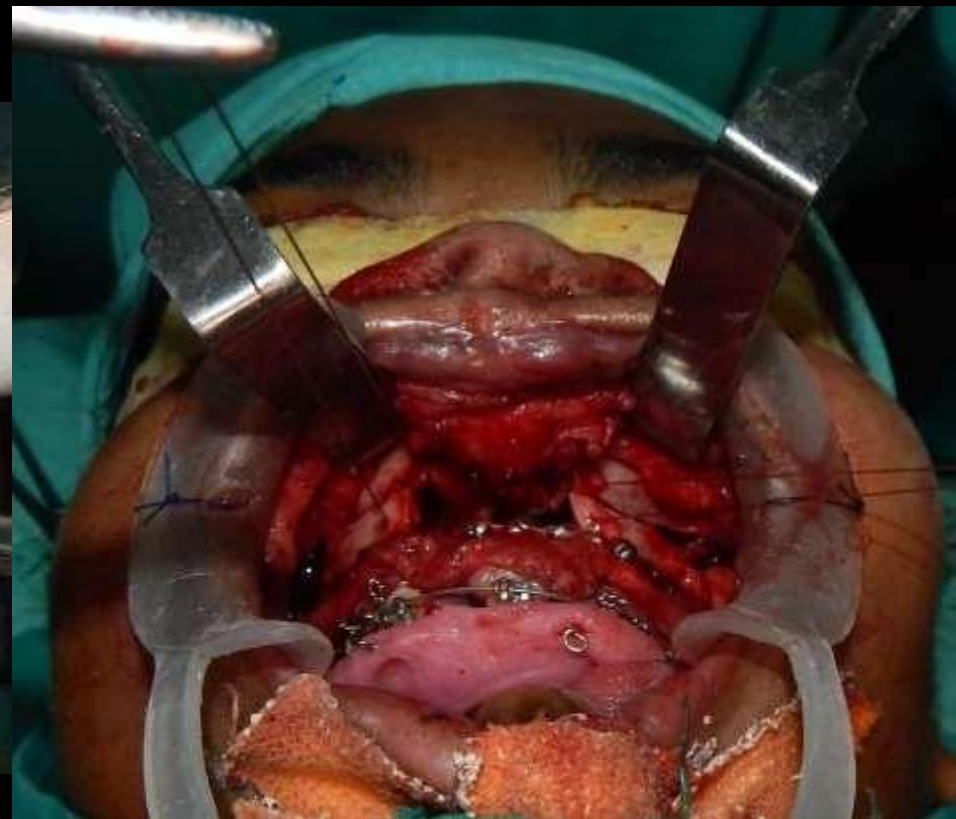
- A thin guarded osteotome is used to tap gently and carefully to fracture the medial (lateral nasal wall) and posterior wall of maxilla.

Lefort I maxillary osteotomy with pterygoid disjunction & down fracture of maxilla is done. (radical mobilization in case of orthognathic surgery & minimal mobilization in distraction)



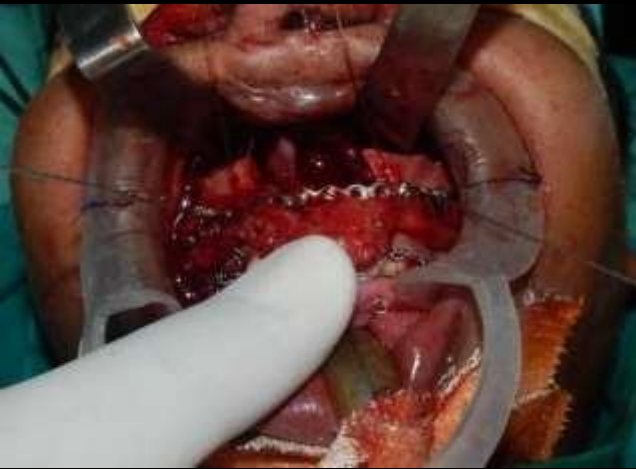


Holes are made on upper & lower segments
with #703 fissure bur



3- 0 Catgut Stay suture is used for
stabilization of segment





Attach double wire to
plates in empty holes.

Pierce 18 gauge cannula at alar base.

Bring out the double wires through alar base



- Removal of head drape
- Painting with betadine in b/l temporal region.
- Marking on the face on forehead.

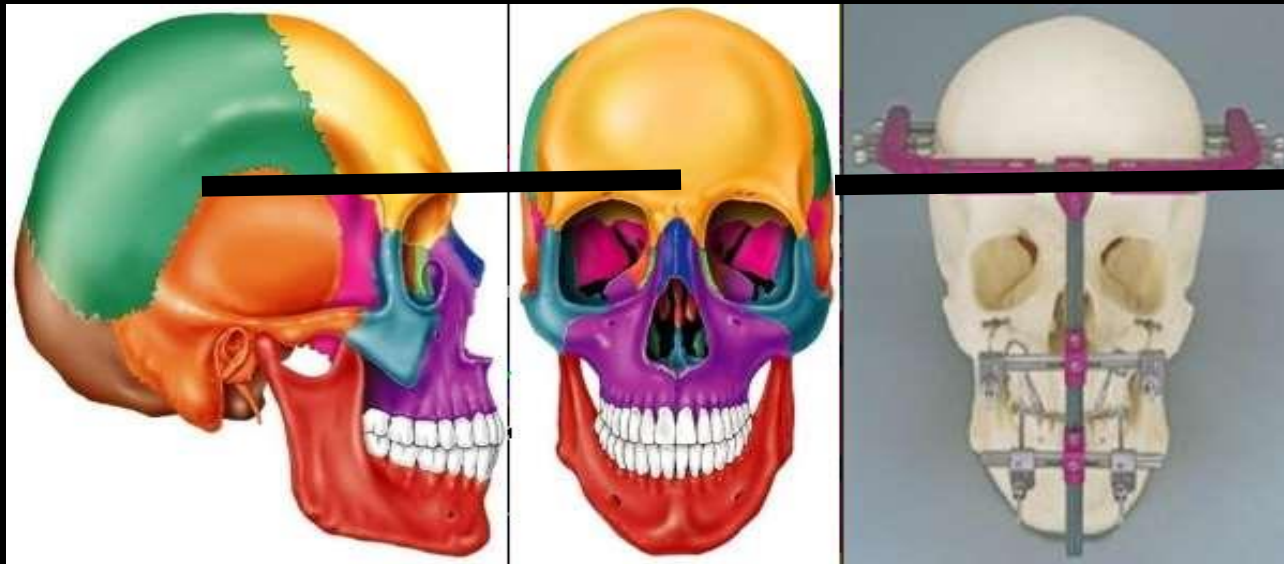
Vertical :-

Horizontal:-

Midline

1 inch above & parallel to
Supra orbital ridge



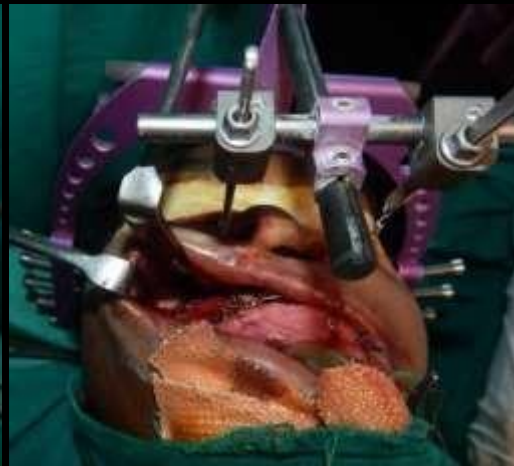
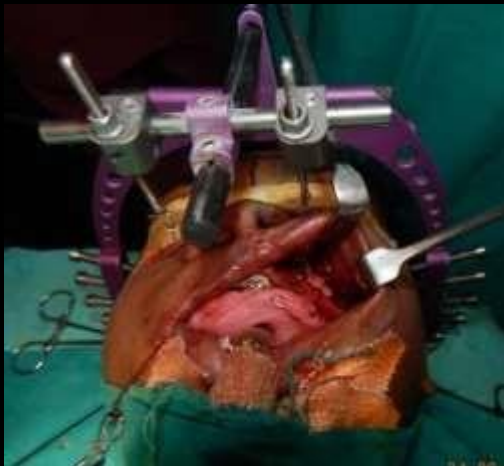


- PLACEMENT OF DISTRACTOR

- Anteriorly ensure it placed about 1 inch superiorly to the superior orbital rims
- Laterally ensure it is placed superior to the lateral temporal fossa



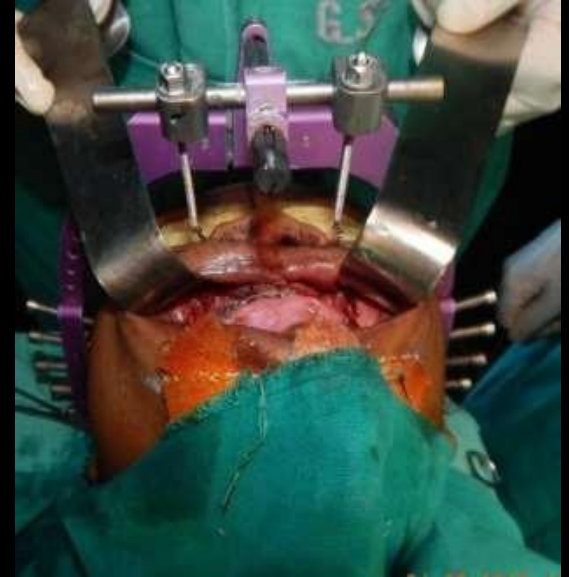
Fix Double wire to Frame



Check for complete movement of maxilla with distraction keys & Tie the catgut Suture



V – Y Closure of surgical site with 3-0 vicryl.



Placement of B/L Temporal Betadine Dressing.



Distraction Protocol

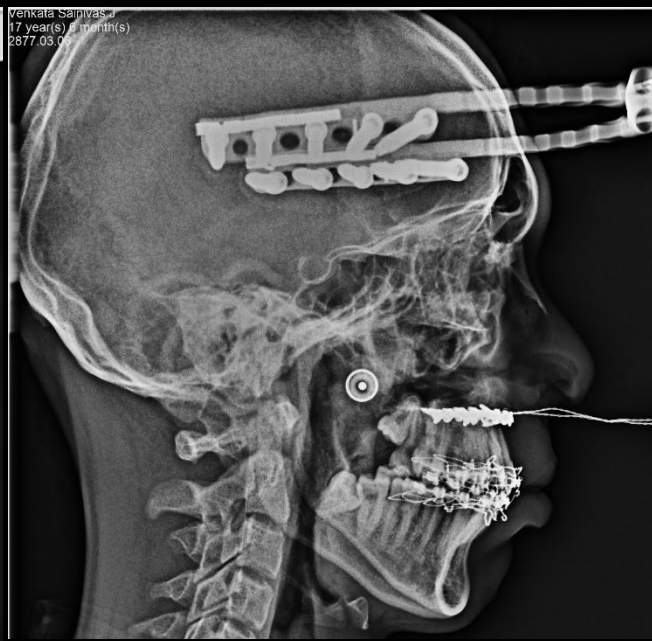
- Latency period: 5 days following osteotomy and application of the device
- Active distraction: 1 mm per day(Morning,evening)
After 1 month of IMF
- Frame removal(under LA): After complete distraction for 2 months
- Rigid retention(Wire IMF):
- Elastic retention (2 oz elastics): 8 weeks -24Hrs (box type)
2 in posterior & 2 in anterior region 8 weeks –night use only
- Radiographs (Post op) : Lateral Cephalogram
Immediate post op, 3M, 6M,1year



Long term outcomes..



LEFORT I DISTRACTION(RED)



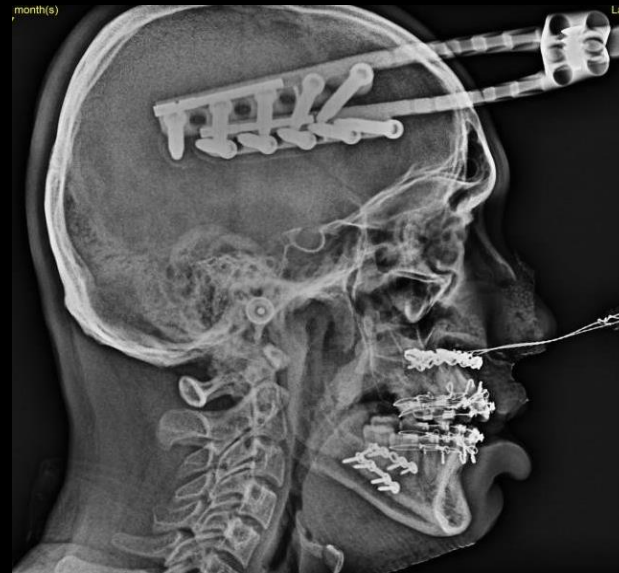
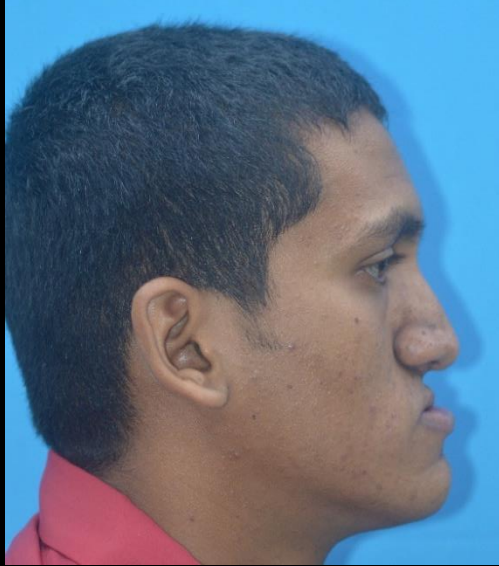
Pre op



Post op



LEFORT I DISTRACTION(RED) WITH BSSO SETBACK



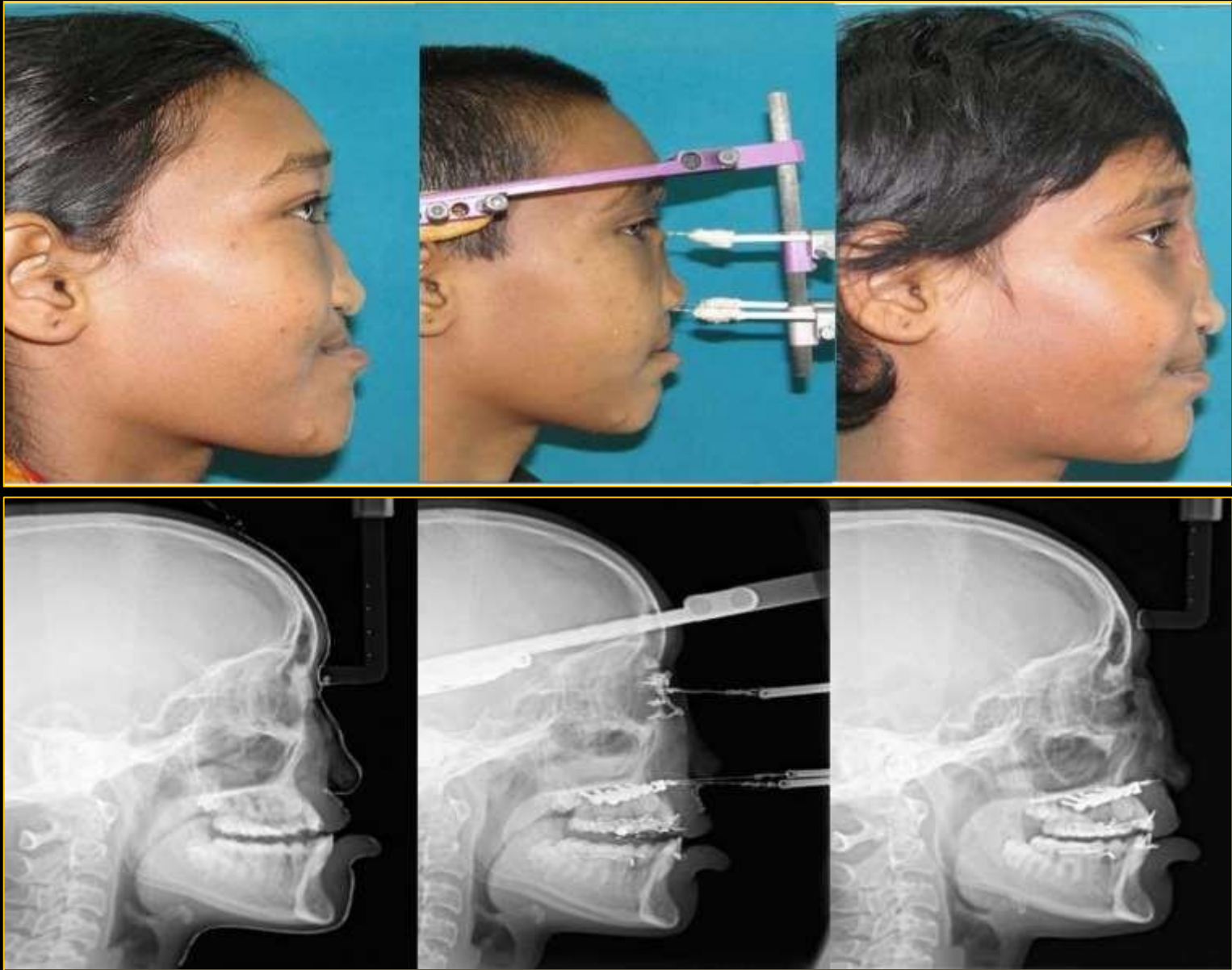
Pre op



Post op



LEFORT II DISTRACTION



LEFORT III DISTRACTION



COMPLICATIONS

- **Intra operative Complications**

- Hemorrhage
- Bad Split/ Fracture
- Nerve injury
- Damage to the tooth buds

- **Postoperative Complications**

- **Intradistractor**

- Pin infections, Pin and device loosening
 - Device failure
 - Inappropriate distraction vector/Frame migration
 - Premature consolidation
 - Coronoid process interference
 - Fibrous Pseudoarthrosis
 - Trismus



- **Postdistractor**

- Delayed Consolidation
 - Premature Consolidation
 - Malocclusion
 - Growth Disturbances



ANTERIOR MAXILLARY DISTRACTION



ANTERIOR MAXILLARY DISTRACTION

Indications

- Unilateral or bilateral cleft with normal transverse relation at the molars
- Arch length
- Class I molar relation but anterior reverse overjet.
- In cases where maxillary length are severely compromised to work with in orthodontic perspective

Contraindications

- Unilateral or bilateral cleft with posterior cross bite
 - With missing anchor teeth
 - Clefts with anterior open bite
 - Severe maxillary deficiency
 - Cases with adequate arch length
 - Cases with severe scarring.
- Eg-
- Anterior fistula closure with tongue flap,
Buccal myomucosal flap.



Anterior Maxillary Distraction

(Advantages over High LeFort I Distraction)

Benefits

- Less morbidity
- Less cumbersome for the patient comparative to RED
- Easy activation
- Easy retention
- Gives chance for alignment of premolars which are most often sacrificed due to arch length discrepancies
- Minimal or no post operative change in speech adaptation

Drawbacks

- Vector control
- Precise surgical cuts between the roots of anchor teeth
- Selective cases
- Limitation if length of expansion and may require second appliance to be fabricated to achieve the desired length of distraction.
- Appliance failure



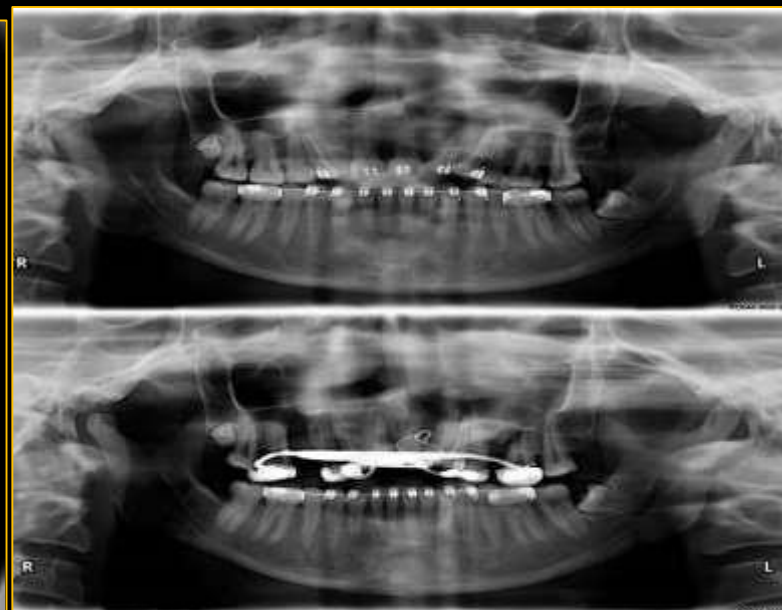
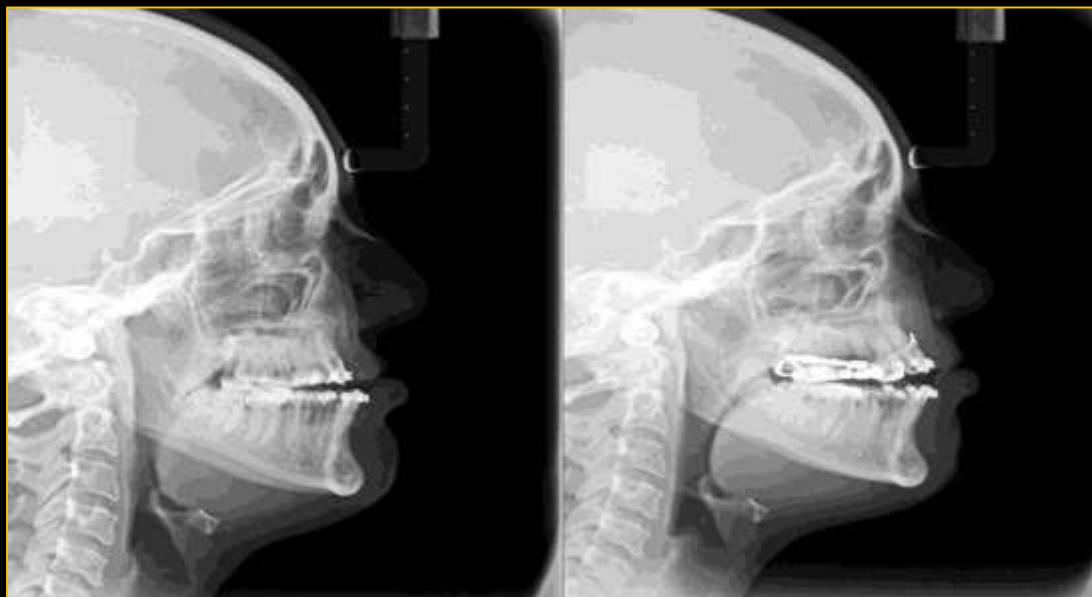
Pre and Post-Op (AMD with Internal Distractor)



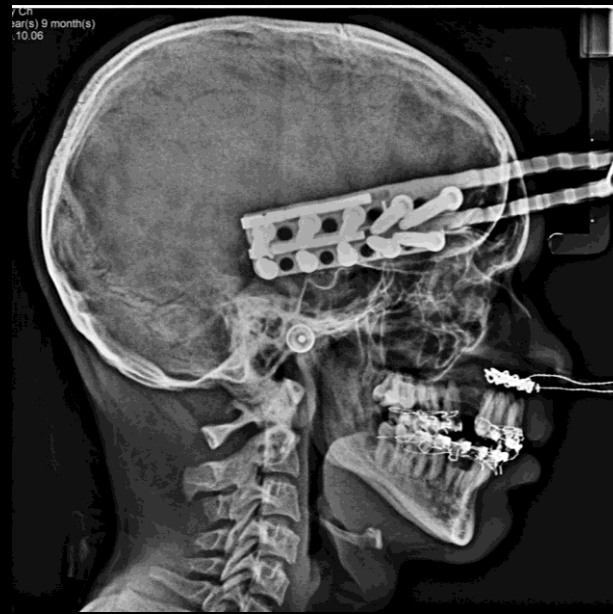
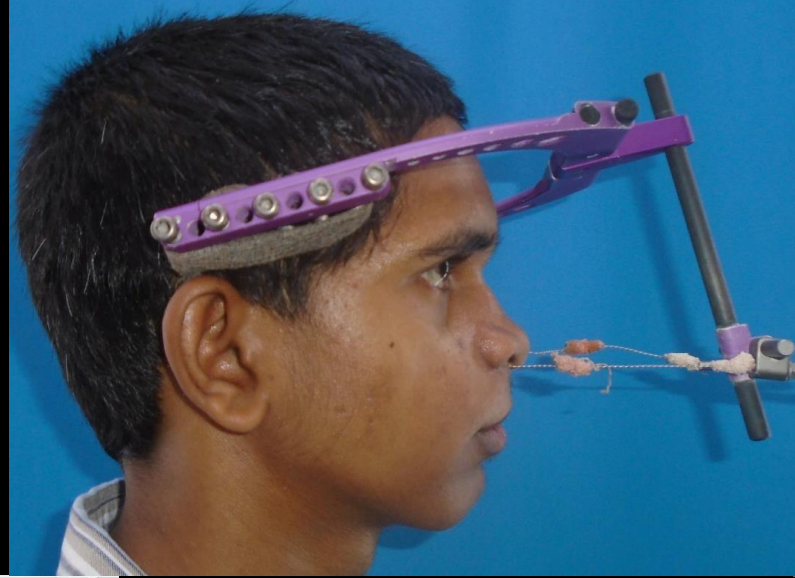
Intraop



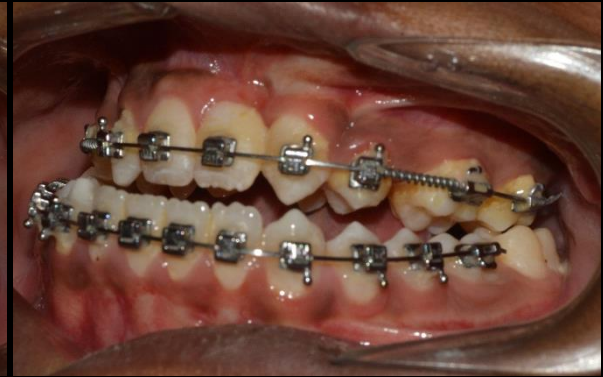
Pre and Post-Op X- rays



Pre and Post-Op (AMD with RED)



Pre op



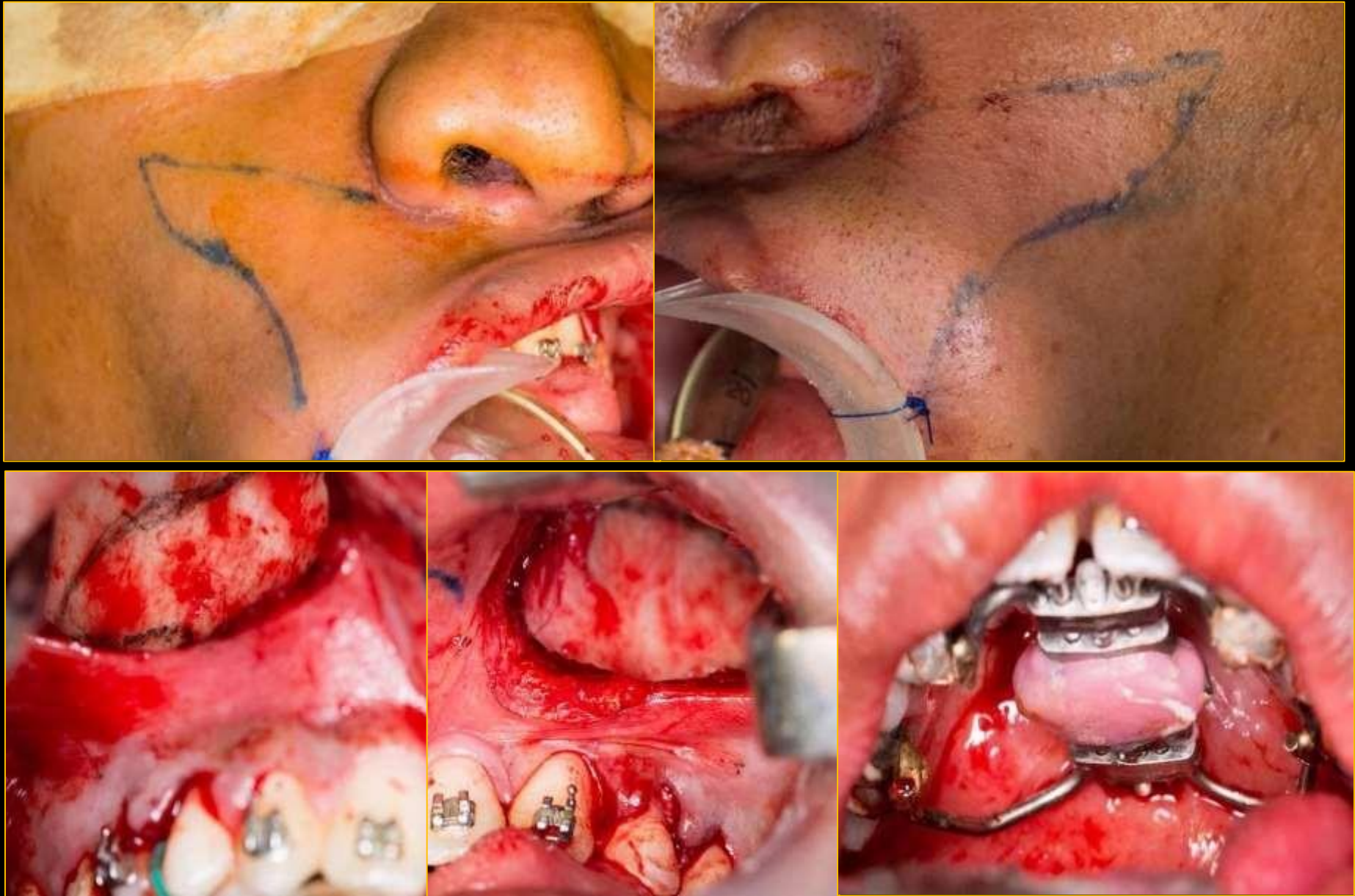
Post op



Pre and Post-Op (Modified AMD with winged osteotomy)



Modified AMD with winged osteotomy



P
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P



P
O
S
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P





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