Midface Distraction-significance and technical consideration

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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 cranio-facial surgeries are done every year
- 3 surgeons and 4 fellows with full support team
- More than 30,000 documented cleft & craniofacial surgeries have been performed since 1996
- 600 primary new born cleft children are registered every year

Osteotomy of the Maxillary Complex

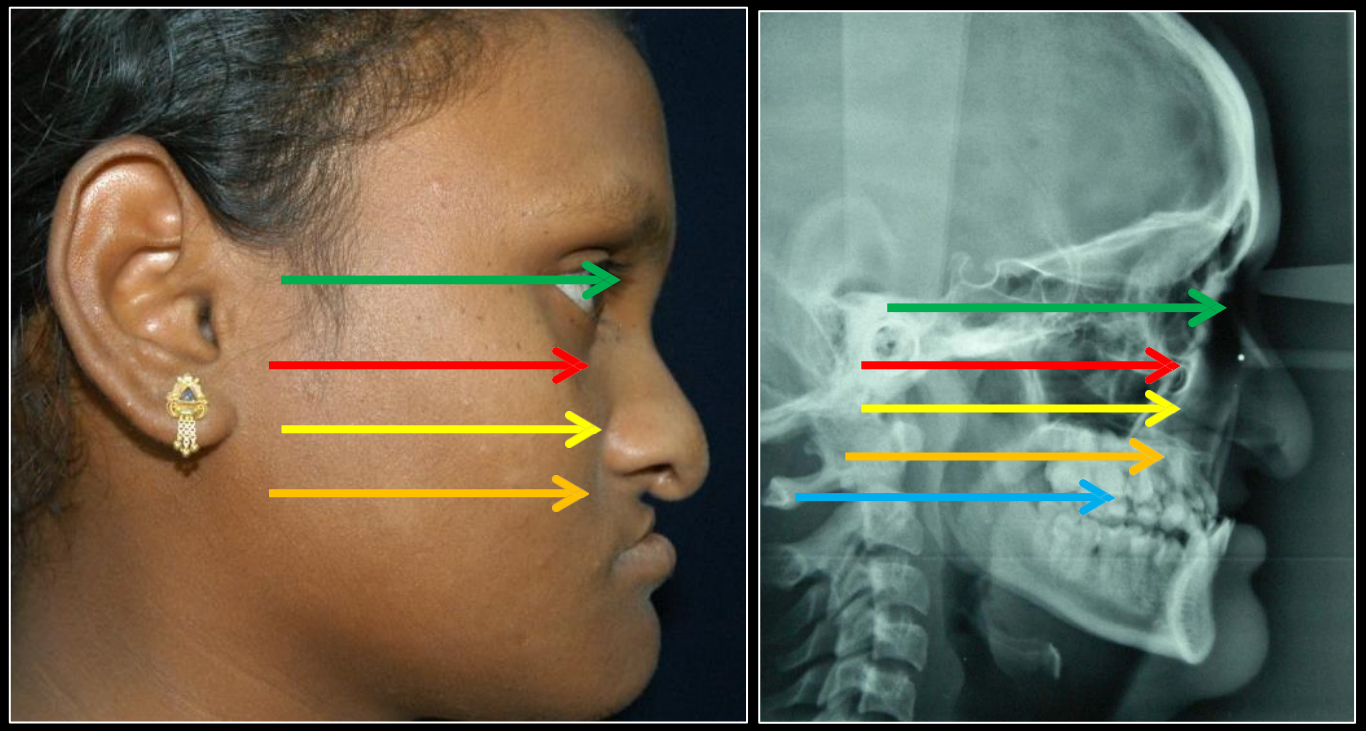
AMD

LeFort I Osteotomy

LeFort II Osteotomy

LeFort III Osteotomy

Fronto monobloc



Skeletal Considerations

- Midfacial Skeletal Hypoplasia

Frontonasal	FRONTOMONO BLOC
Infraorbital	LEFORT III
Nasolabial	HIGH LEFORT I OR LEFORT II
Maxilla	LEFORT I
Dentoalveolar	AMD

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

How to decide the treatment plan

Total maxillary Distraction

vs.

Anterior maxillary distraction??

Total maxillary distraction vs Anterior maxillary distraction????

	Total	Anterior
Need for alveolar bone grafting	Required	Required
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	Does not cause
Damage to the infraorbital nerve	Does not cause	Does not cause
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.
- Tongue flap or any local flap done for Fistula Closure.

INDICATIONS

TOTAL MAXILLARY DISTRACTION

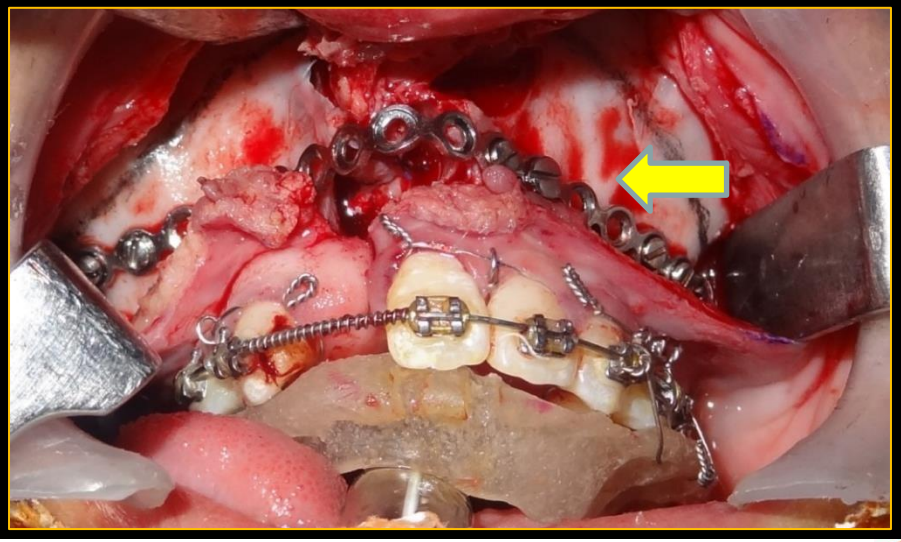
- For MIDFACE SKELETAL DEFORMITY correction
- Scarring of the palate is present
- Amount of movement required more than 6 mm
- When pharyngeal flap is present.
- Tongue flap or any local flap done for Fistula Closure.

ANTERIOR MAXILLARY DISTRACTION

- For DENTAL & MILD DENTOALVEOLAR SKELETAL DEFORMITY correction
- Unilateral or bilateral cleft with normal transverse relation at the molars
- Anterior transverse collapsed arches
- Class I molar relation but anterior reverse overjet.
- In cases where maxillary length are severely compromised to work with in orthodontic perspective

Planning

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 the long rigid plate for arch stability.

Anterior Maxillary Distraction

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Anterior Maxillary Distraction by Tooth-Borne Palatal Distractor

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Rangarajan Krishnaswamy, MDS, MOrth RCS(Edin),‡ and
Muthusubramanian Veerababu, BDS, MDS§

Anterior maxillary osteotomy is mainly indicated for the correction of maxillary dentoalveolar protrusion. It is commonly used to retrude and may also impact the anterior maxilla if the diagnoses include vertical maxillary excess as well. Three techniques are currently practiced to achieve the anterior maxillary osteotomy: Wassmund osteotomy,[1] Wunderer osteotomy,[2] and anterior maxillary downfracture osteotomy.[3,4] The osteotomy cuts are essentially the same but vary from each other only in the incision design, access to the maxillary bone, and the direction of maxillary mobilization. Advancement of the anterior maxilla by osteotomy is technically difficult because of the tight palatal mucosa; this advancement is likely to be complicated by oronasal or oroantral fistula. Only 1 case is reported where the anterior maxilla was advanced by osteotomy, and this was in 1968 by William Bell.[5] Bell essentially used a Wassmund osteotomy to correct anterior maxillary retrusion and Class III malocclusion. The dental alveolar gap created from the advancement of the anterior maxilla had to be bone grafted and was later fitted with a partial removable denture.

The clinical application of distraction osteogenesis to correct hypoplastic maxilla is a relatively recent development, and this procedure is mainly used to correct cleft lip and palate deformities. The gradual advancement of the maxilla is normally achieved via a cranially attached distractor[6] or orthodontic face mask.[7] More recently, internal distractors have also been used.[8] However, this procedure mostly involves movement of the whole maxilla at Le Fort I level rather than the anterior maxilla alone.

Traditionally, tooth-borne palatal distractors have been used for rapid maxillary expansion in children and surgically assisted maxillary expansion in adults.[9] Expansion has always been in the transverse dimension, and aims to correct the collapsed buccal occlusion, particularly in cases of cleft palate.[10] The use of tooth-borne palatal distractor was confirmed feasible in dogs to distract the anterior maxilla forward and generate new bone and palatal mucosa.[11] However, a follow-up radiographic study[12] indicated that tooth-borne distractor tended to produce greater dental movement than skeletal movement. Bone-borne palatal distractors have recently been developed, which ensure that the transverse expansion is derived from the expansion of the palatal bone rather than the buccal tilting of the posterior teeth.[12-14] The use of a palatal distractor in the anteroposterior direction to advance a retruded maxilla after an alveolar osteotomy in a noncleft patient has been reported once.[15] The aim of this article is to describe an alternative technique involving the distraction of the entire segment of the cleft anterior maxilla by a tooth-borne palatal distractor. This technique is illustrated with 2 cases of clinical cleft lip and palate.

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0278-2391/07/6505-0034$32.00/0
doi:10.1016/j.joms.2005.12.049

Materials and Methods

INDICATIONS

This technique is indicated for patients presenting with maxillary hypoplasia in the anteroposterior and transverse planes, particularly in the case of cleft lip and palate deformities. The dental crossbite is preferably restricted to the anterior and premolar teeth, with the molars in the normal buccal occlusion. The technique is particularly suitable for dental crowding in the anterior maxilla. As new bone is generated by the distraction, the displaced teeth can be aligned into occlusion by orthodontics following surgery.

Rajan Gunaseelan et al:

J Oral Maxillofac Surg 65:1044-1049, 2007
American Association of Oral and Maxillofacial Surgeons
0278-2391/07/6505-0034 doi:10.1016/j.joms.2005.12.049

This technique is not expected to be widely used, but would be of particular interest to surgeons on specific indications such as existing crowding of the dental arch in a Class III malocclusion from a retruded maxilla.

As the technique generates more space at the buccal segment, it would enable a crowded dental arch to be properly aligned by orthodontics without a need for dental implants.

The forward movement of the entire anterior maxillary segment also improves upper lip and paranasal prominence in cleft lip and palate patients.

Anterior Maxillary Distraction

Indications

- For Dental & Mild Dentoalveolar skeletal deformity correction
- Unilateral or bilateral cleft with normal transverse relation at the molars
- Anterior transverse collapsed arches
- Class I molar relation but anterior reverse overjet.
- In cases where maxillary length are severely compromised to work with in orthodontic

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-

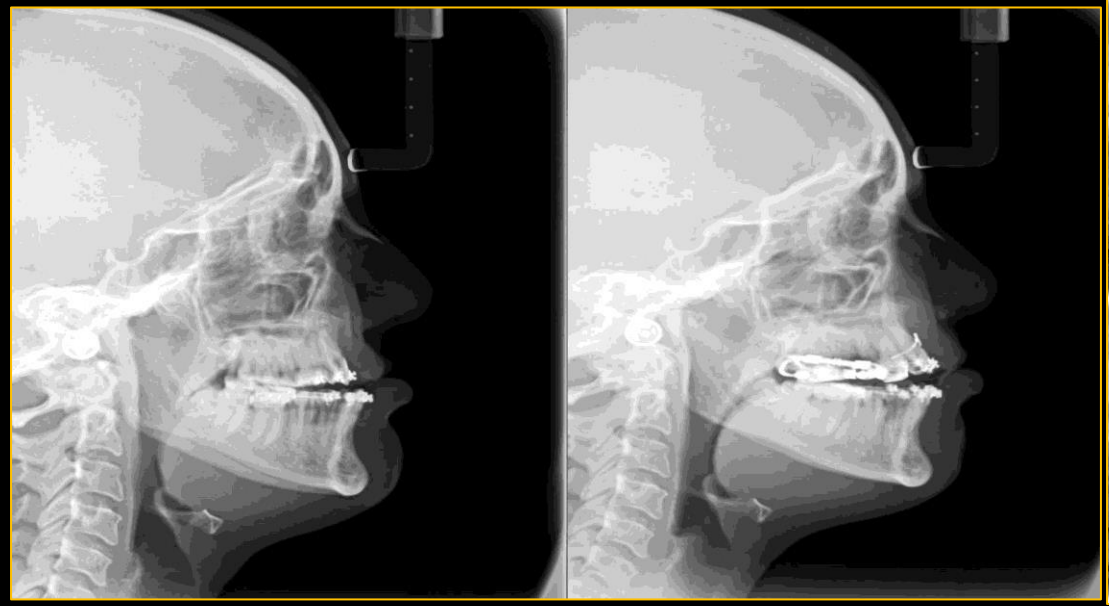
Anterior fistula closure with tongue flap,

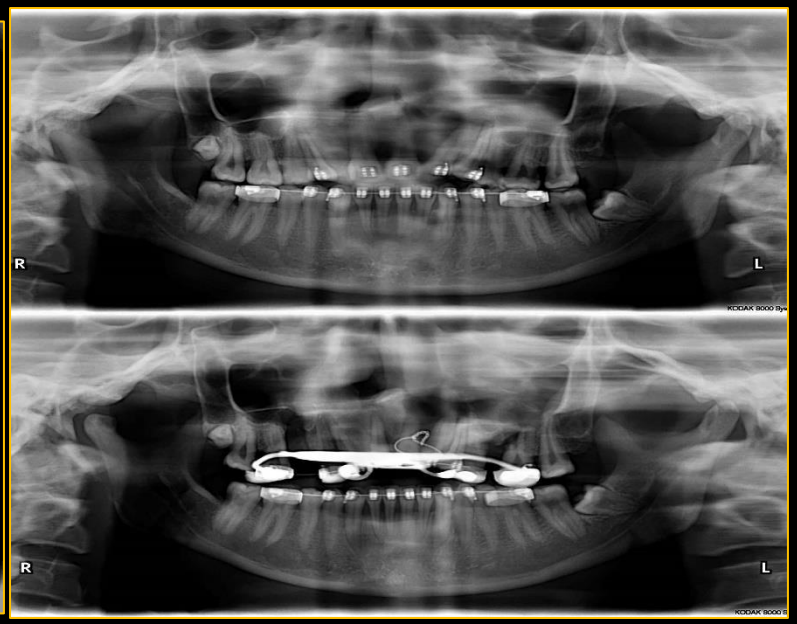
Buccal myomucosal flap.

Pre and Post-Op

Intraop

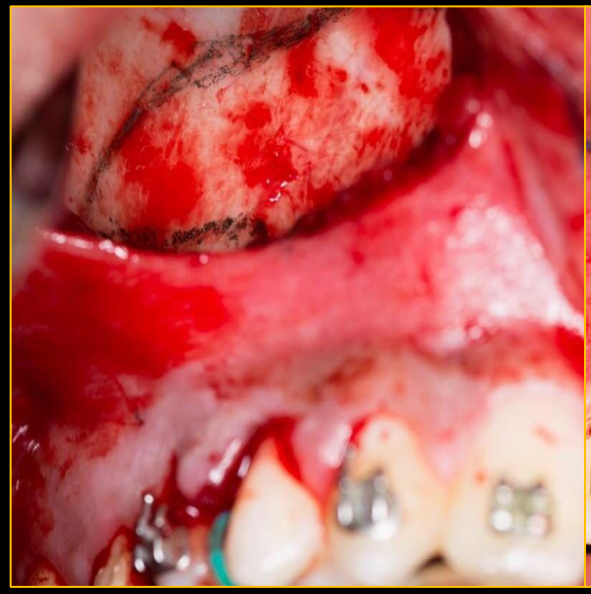
Pre and Post-Op X- rays

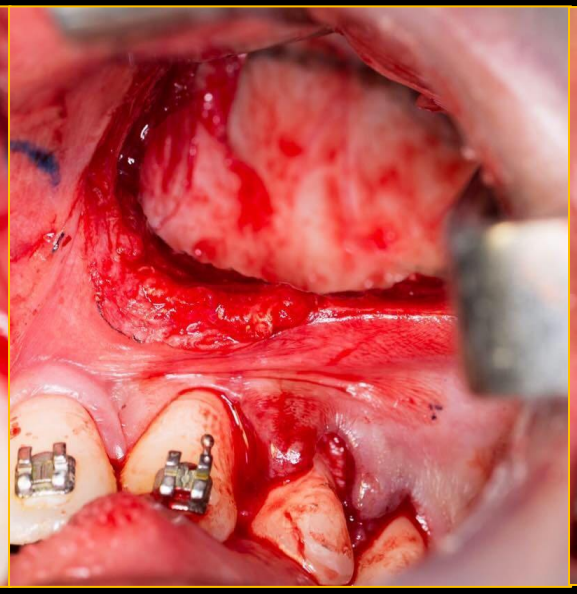




Pre and Post-Op (Modified AMD with winged osteotomy)

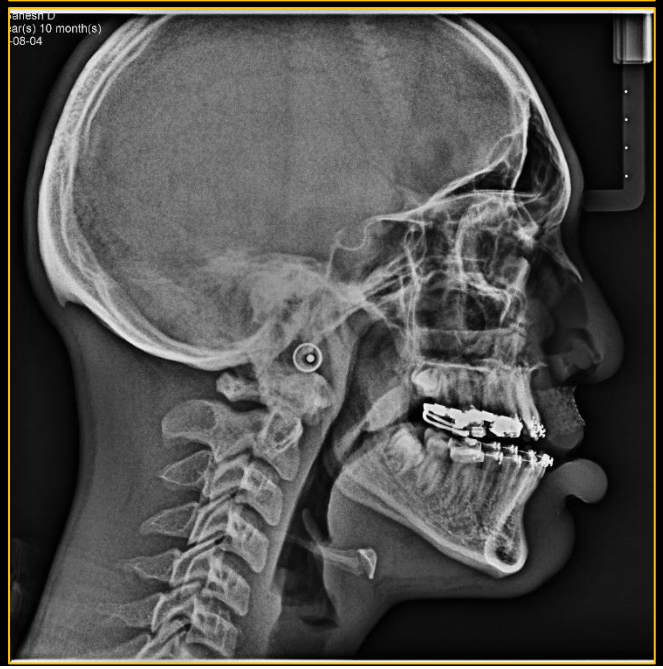
Modified AMD with winged osteotomy

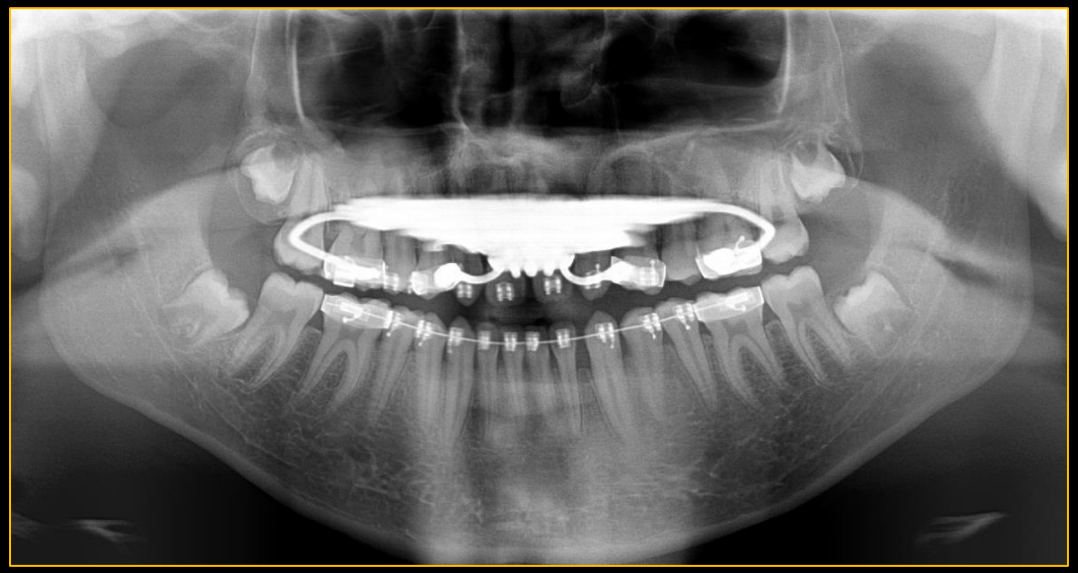




PREOP

POSTOP





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Modified anterior maxillary distraction using "Winged Osteotomy": A technical note

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ABSTRACT

Hypoplasia of the maxilla is common in cleft lip and palate (CLP) deformities. Orthognathic surgery has been the traditional method of correction in such developmental anomalies since 1970's, with Le-Fort I advancement as its long-established management modality, which results in significant speech alteration and relapse rate. In contrast, anterior maxillary distraction (AMD) has the advantage of lesser chances of relapse, velopharyngeal insufficiency, and alteration of speech. This modified AMD technique carries a handful of its advantages as it is an easier procedure compared to the Le-Fort I osteotomy as it gives positive soft tissue changes by improving the projection of the nose and the upper lip, normalizes naso-labial angle, and changes the facial prominence from concave to convex simultaneously as it gives nasolabial and sub-malar prominence post-operatively due to the extension of horizontal cuts up to to the zygomatic region, leading to lesser complications. Also, the hollowing caused by the conventional AMD osteotomy cuts is eliminated by the extension of the winged osteotomy.

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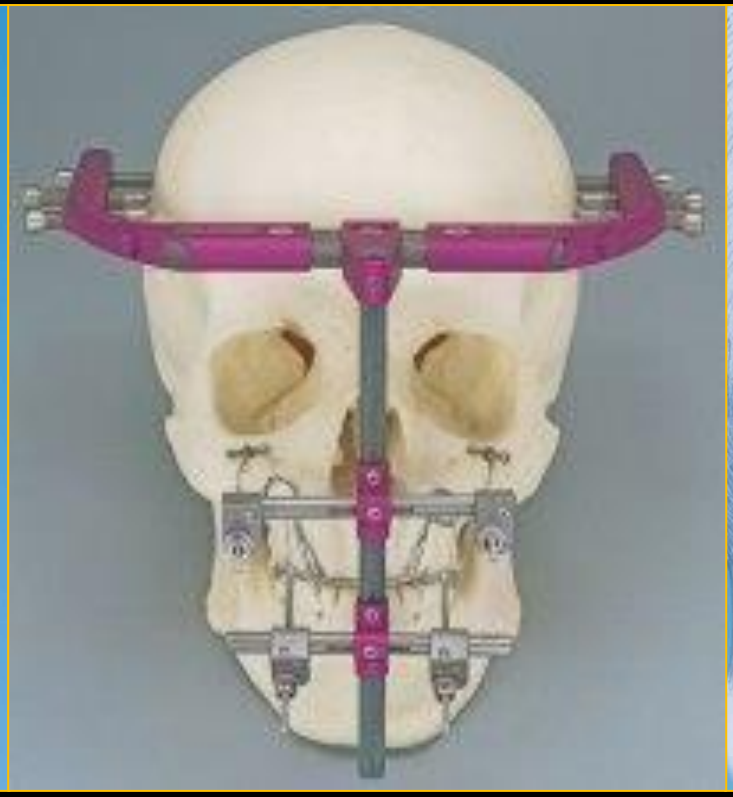
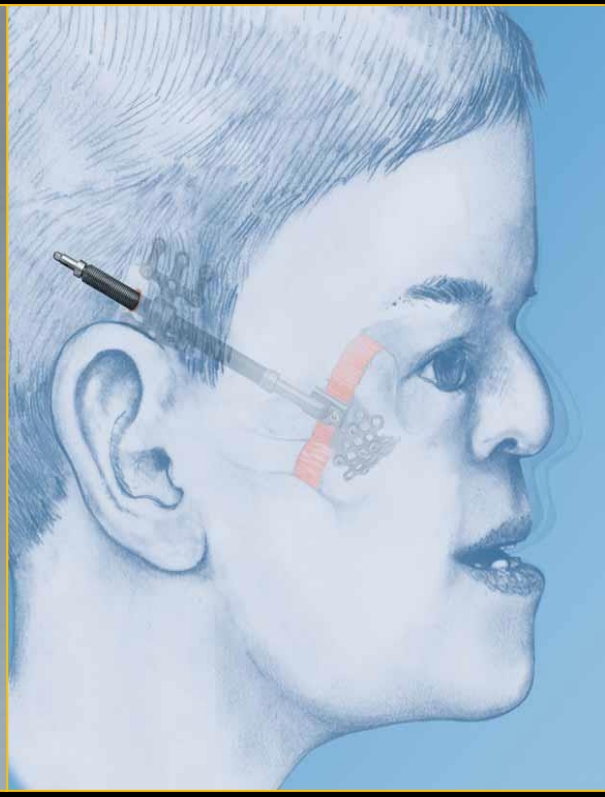
Midface Distraction for Maxilla

Internal Pull Distraction



External Pull Distraction



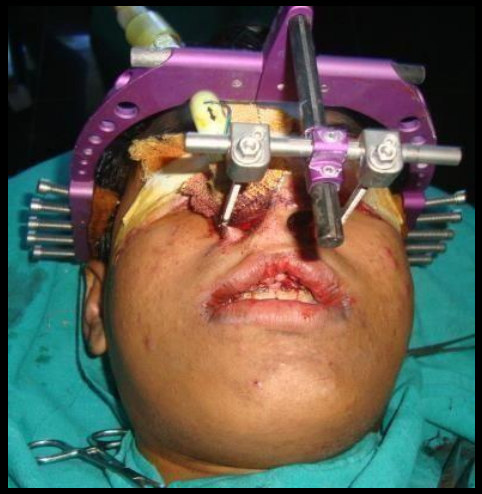
Internal Push Distraction

	Advantages	Disadvantages
External device	Multidirectional lengthening with angular adjustment possible during distraction	Patient apprehension to wear bulky external devices
	Relatively simple to apply intraoperatively	Potential permanent facial scarring
	Easy for patient to activate	
	Can be removed without the need for second operative procedure	
Internal device	Absence of facial scars	Design limitations due to limited size of device and restricted access to oral cavity
	Inconspicuous nature of device	
	Better stability of device to bone	

Distraction Osteogenesis in Oral and Craniomaxillofacial Reconstructive Surgery DOI: http://dx.doi.org/10.5772/intechopen.81055

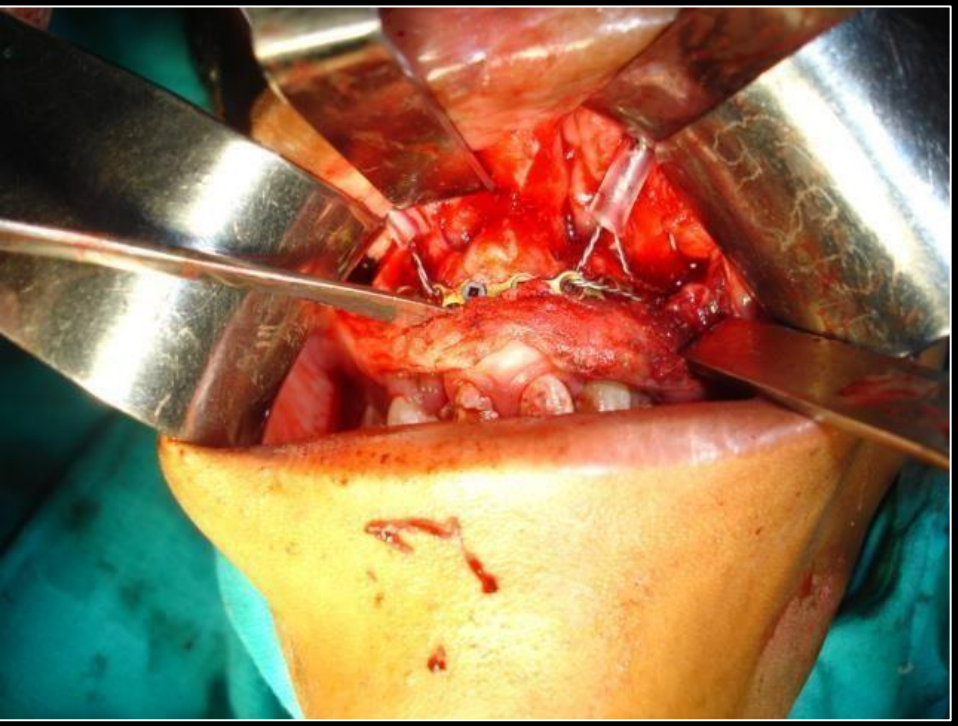
Pre-op

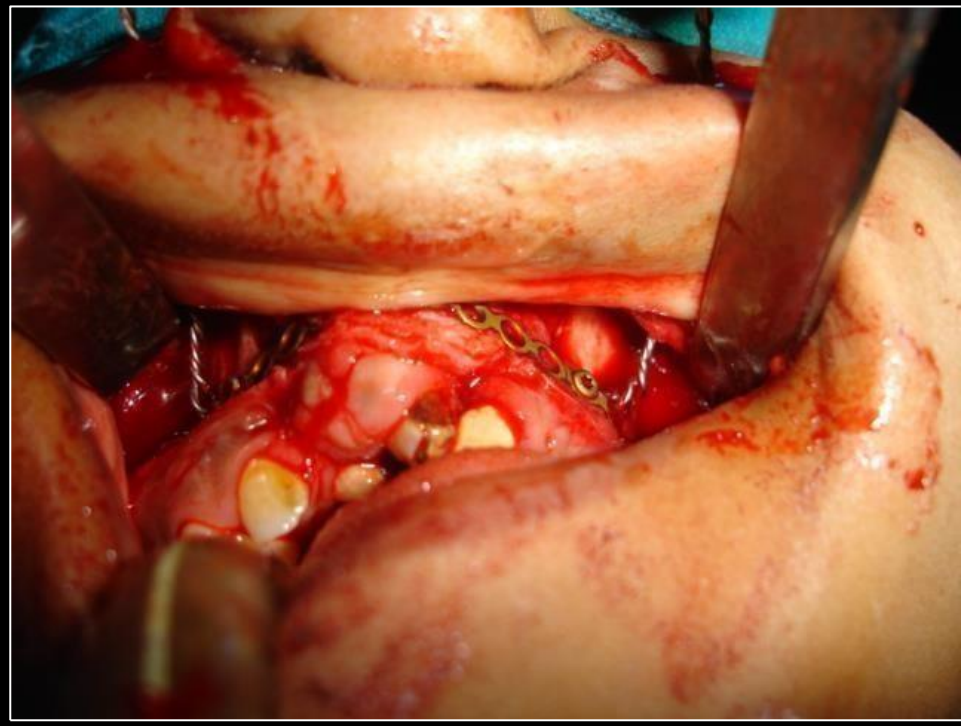
Intra-op



With Frame

Surgical Procedure Distraction

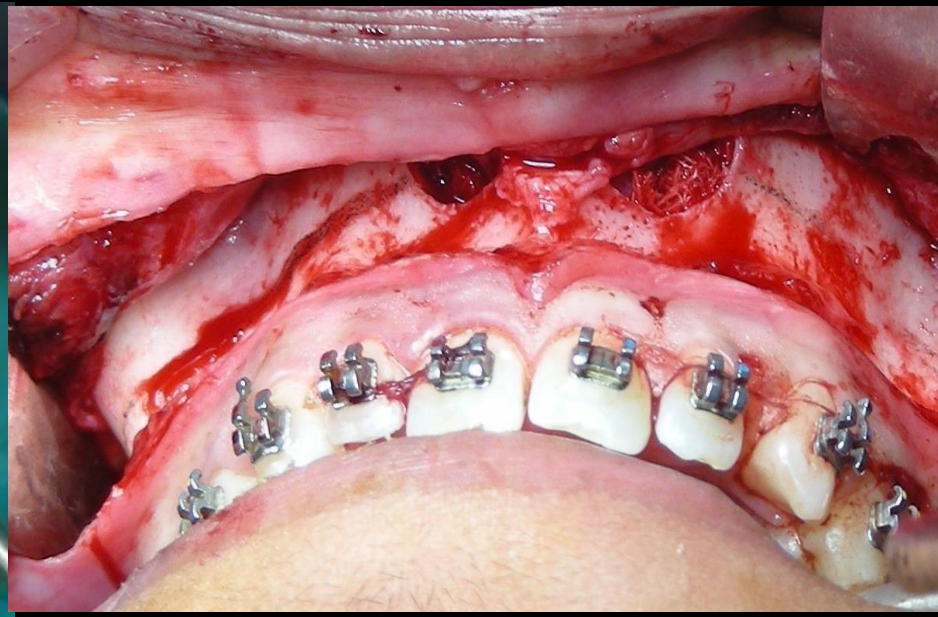




NEED FOR ANTERIOR BONE PLATE

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

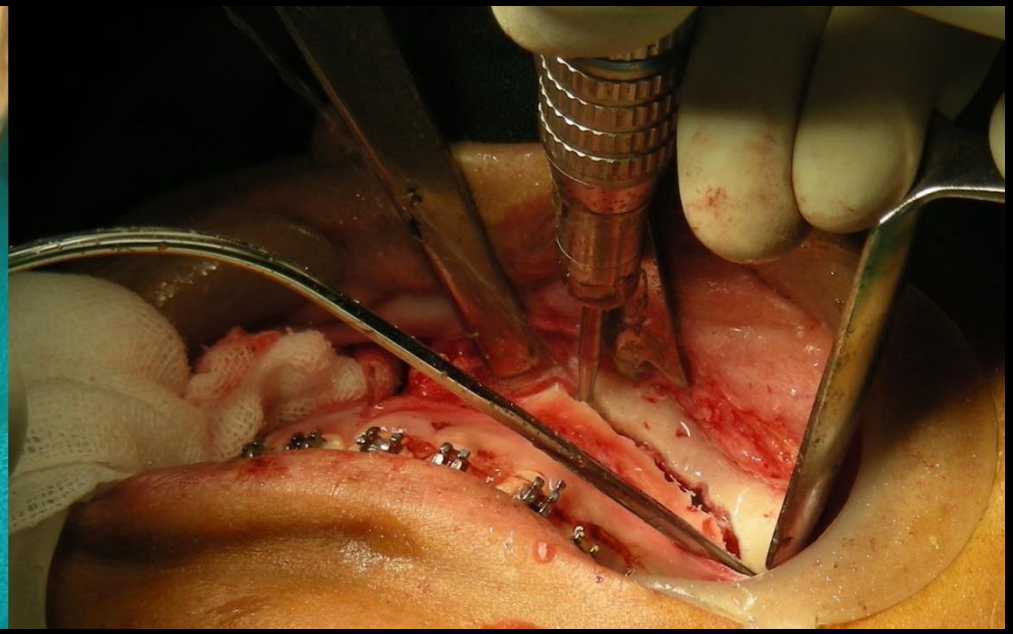
Performing a LeFort I Osteotomy



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.

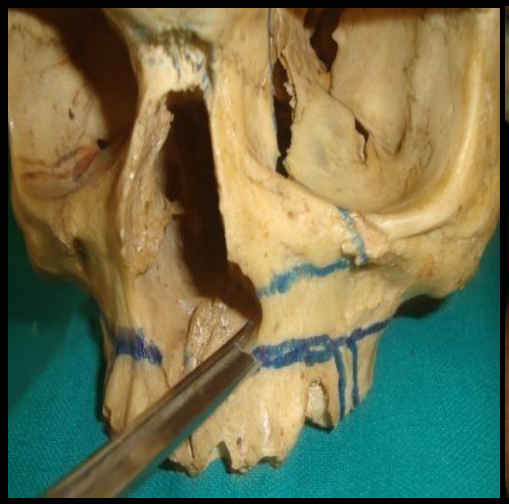
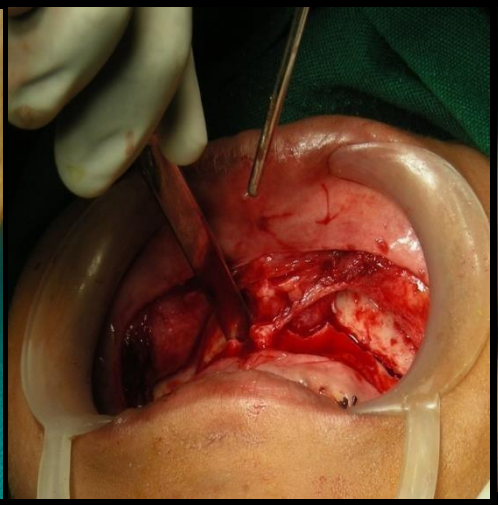
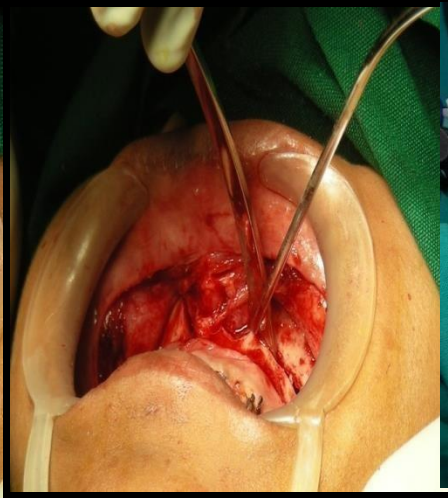
Performing a LeFort I Osteotomy



Anterior buccal osteotomy

- Done with reciprocating Saw with copious irrigation.

Performing a LeFort I Osteotomy

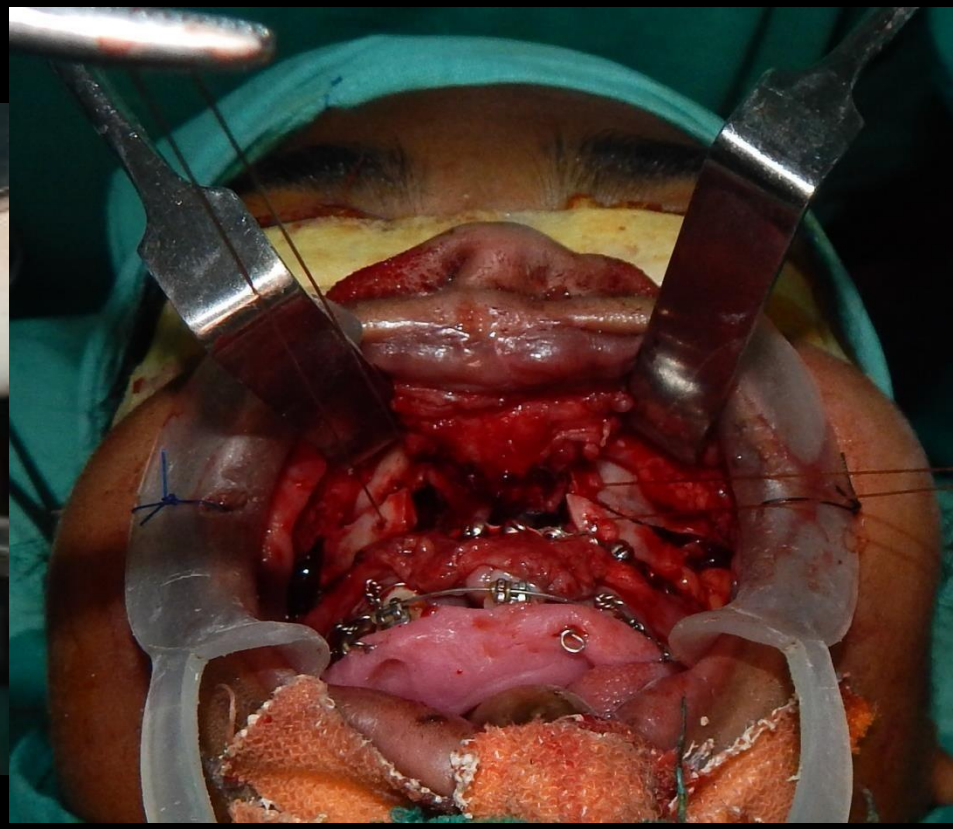





Medial and posterior wall osteotomy

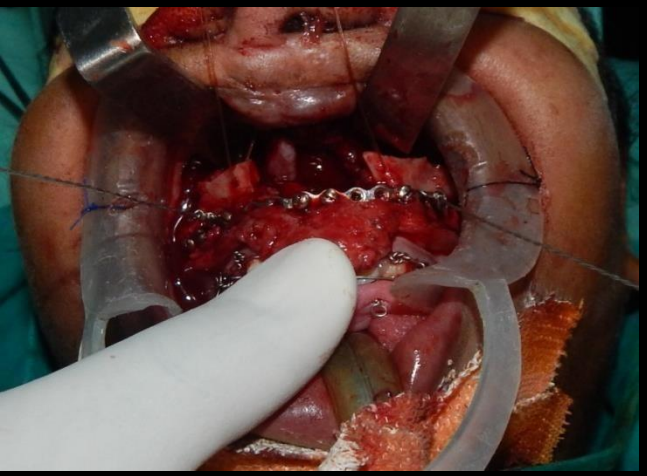
•A thin guarded osteotomeis used to and tap gently and carefully to fracture the medial (lateral nasal wall) and posterior wall of maxilla.

Lefort I maxillary osteotomy with pterygoid disjunction & down fractureof 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

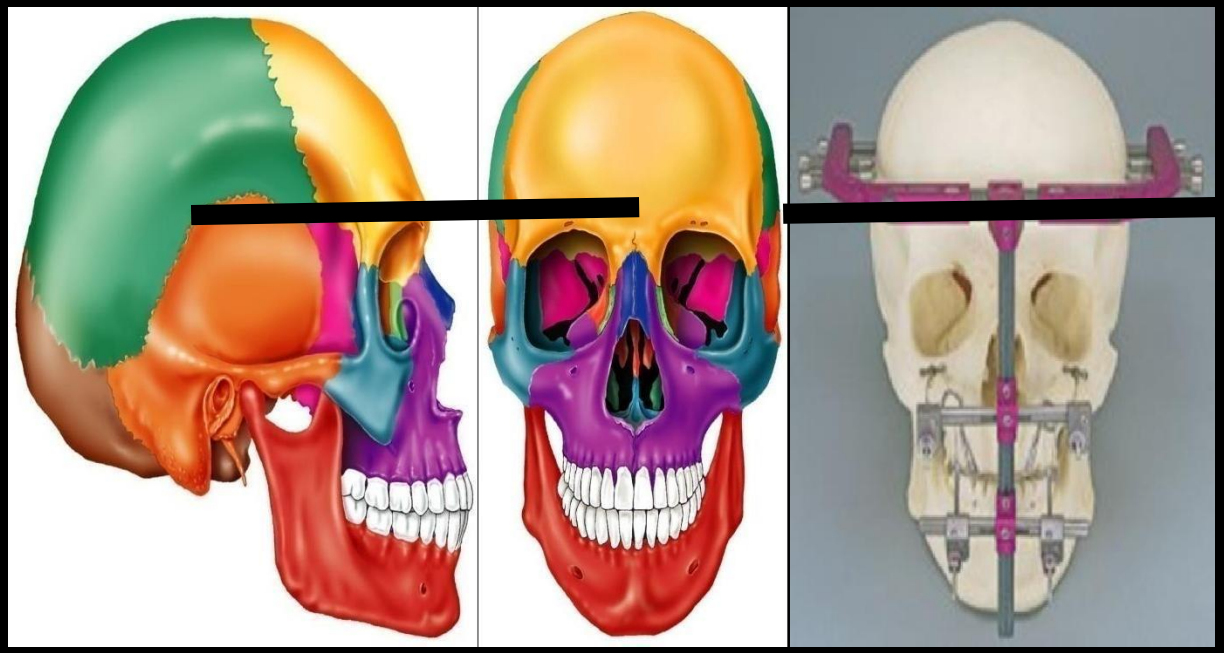
- Removal of head drape

- Painting with betadine in b/l temporal region.

- Marking on the face onforehead.

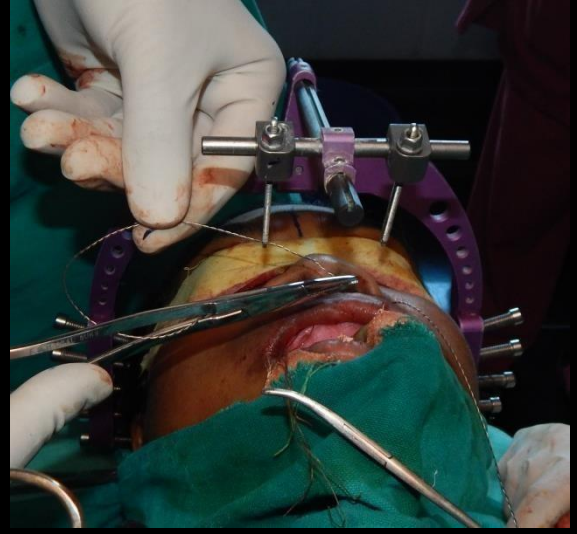
Vertical :- Midline

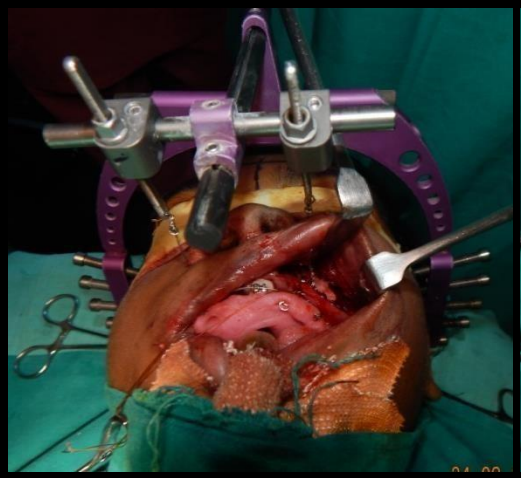
Horizontal:- 1 inch above & parallel to Supra orbital ridge

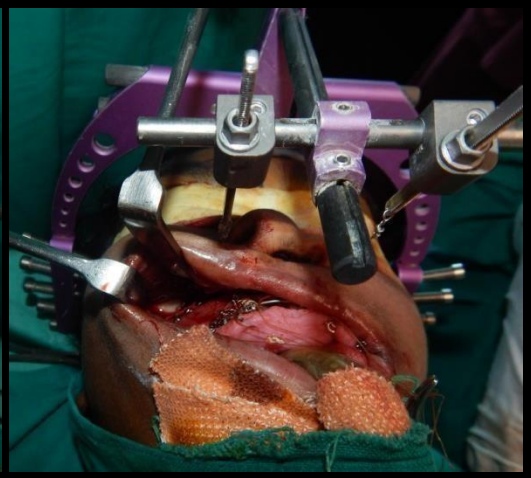


- PLACEMENT OF DISTRACTOR
- Anteriorly ensure it placed about 1 inch superiorly to the superior orbital rims
- Laterally ensure it is placed superior to the lateral temporal fossa

Fix Double wire to Frame

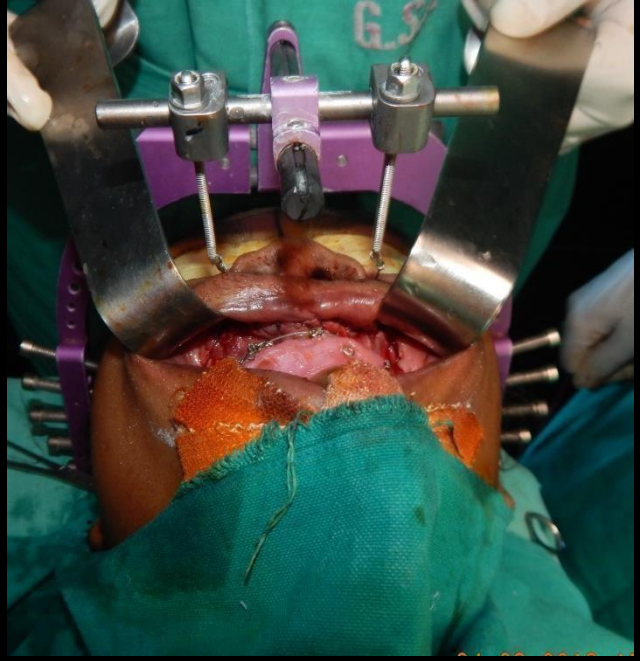






Check for complete movement of maxilla with distraction keys & Tie the catgut Suture

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



Placement of B/L Temporal Betadine Dressing.

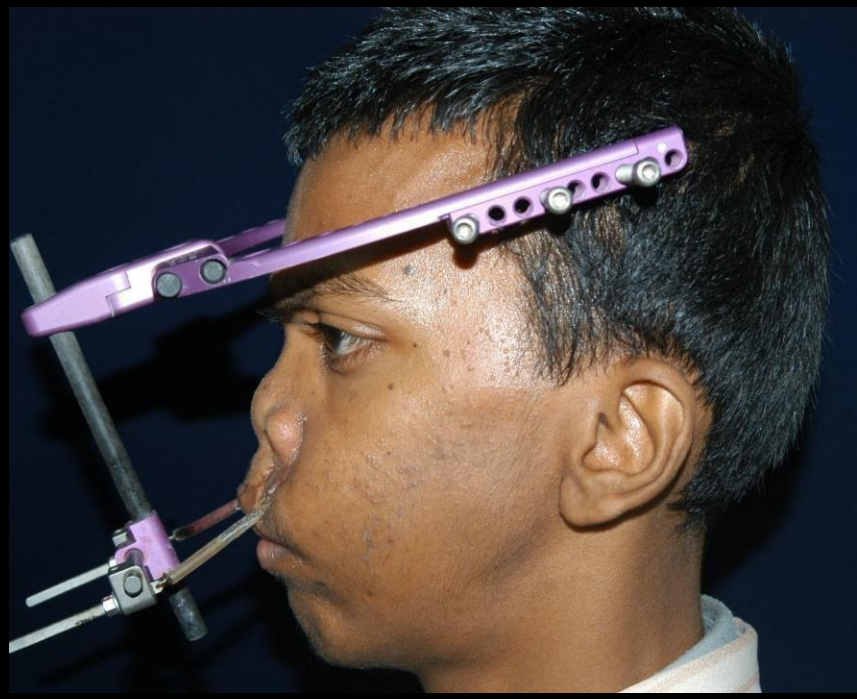
Distraction Protocol

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

Complications

- **Intra operative Complications**

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



Postoperative Complications

-Intradistraction

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

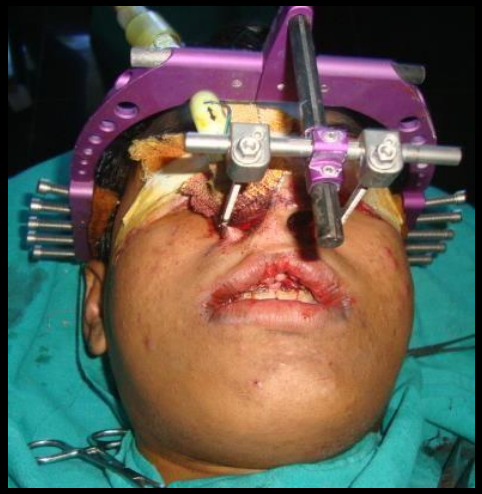
Postdistraction

- Delayed Consolidation
- Premature Consolidation
- Malocclusion
- Growth Disturbances
- Malunion
- Nonunion

DISTRACTION -RED

Pre-op

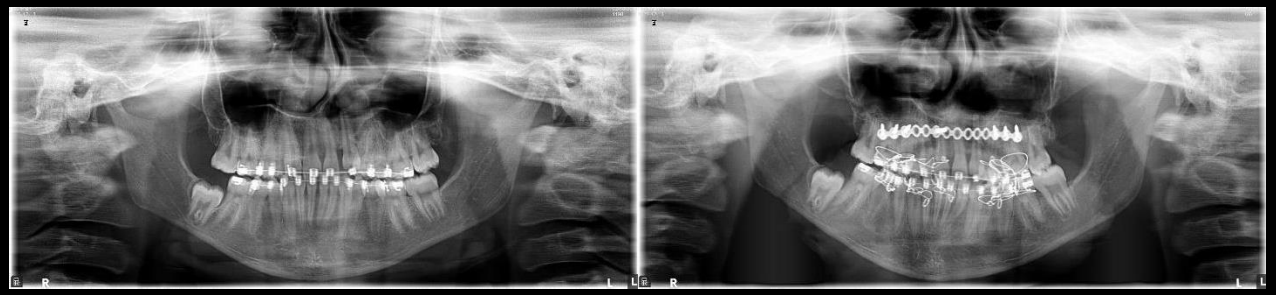
Intra-op



With Frame

Long term outcomes..

DISTRACTION -RED



LEFORT II OSTEOTOMY

Indications

- To move the naso-maxillary complex anteriorly

LeFort II Osteotomy

- Does not provide a stable movement due to a 3 point movement
- Does not provide a predictable movement.
- Preference can be given to do a LeFort I advancement with Nasal reconstruction

Performing a LeFort II Osteotomy

Skin Incision

Bicoronal incision as far forward and anterior as possible
+
Labial sulcus incision

OR

Incision on the naso frontal area
+
Labial sulcus incision

LEFORT II OSTEOTOMY

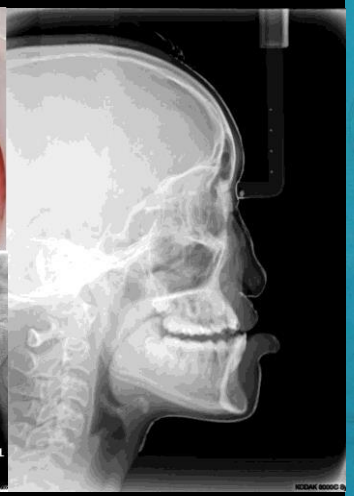
- A pyramidal maxillary osteotomy.
- The osteotomy line extends from
  - pterygoid region on one side,
  - underneath the zygomaticomaxillary buttress
  - up over the medial portion of the infraorbital rim,
  - behind the lacrimal bone
  - along the medial wall of the orbit
  - to the dorsum of the nose

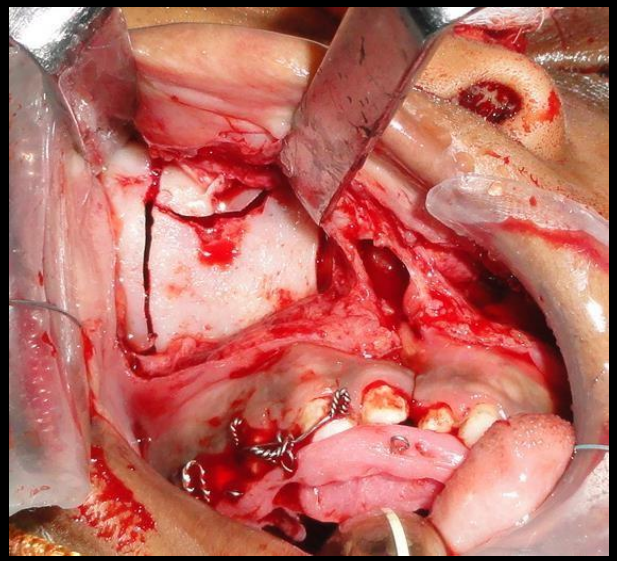
PREOP

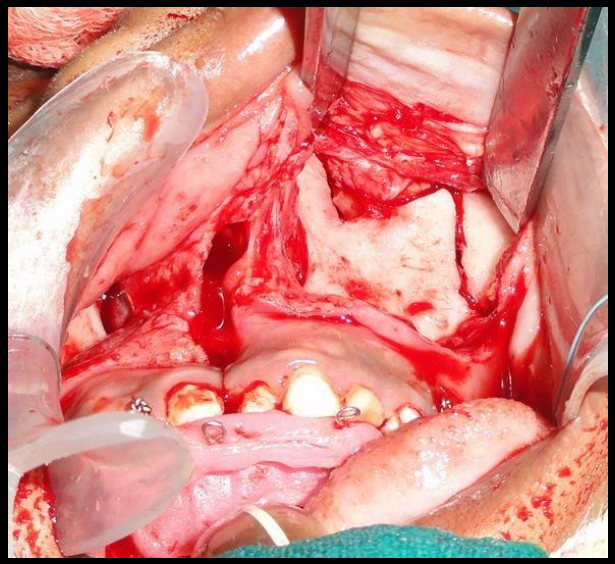


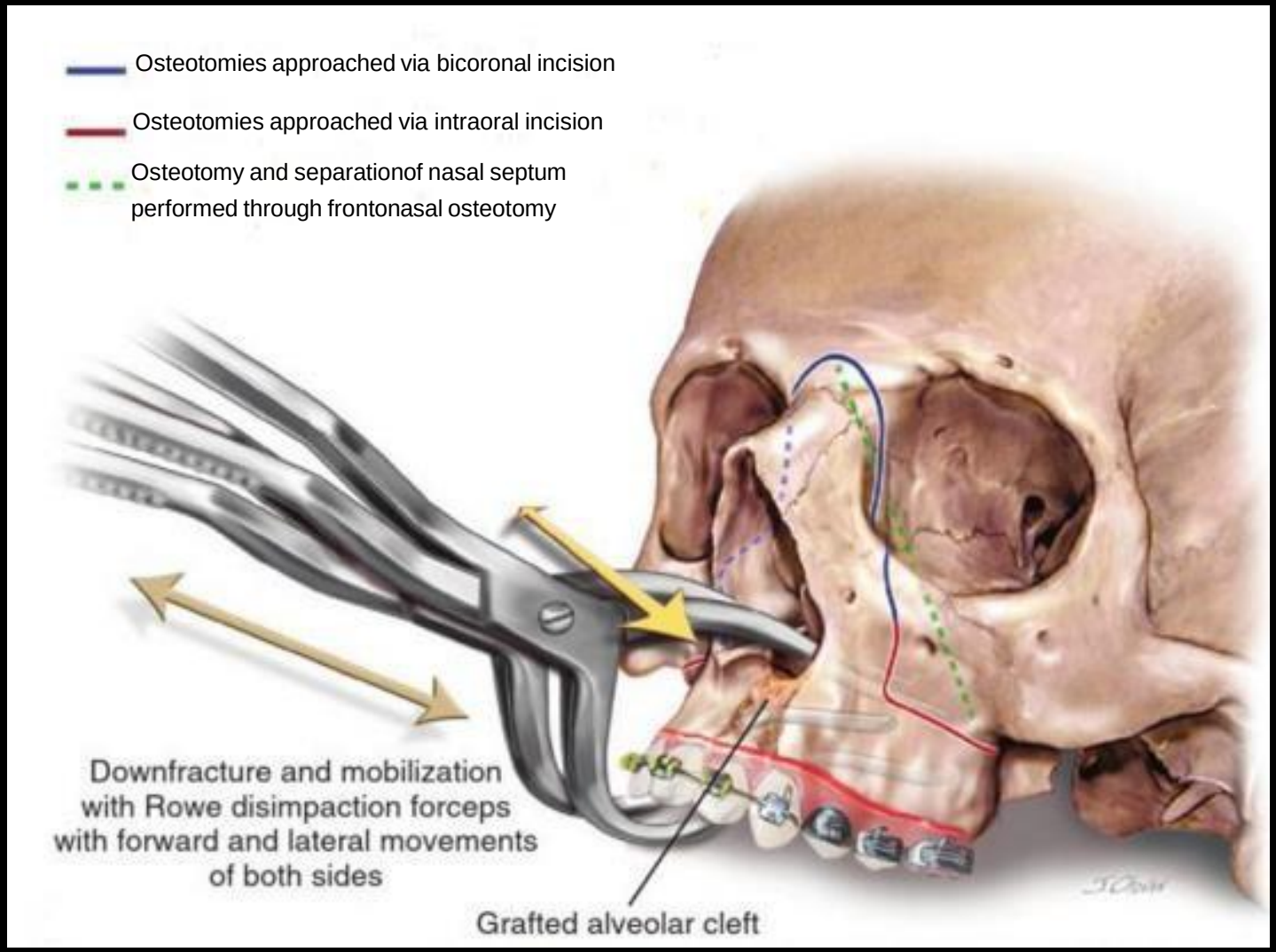






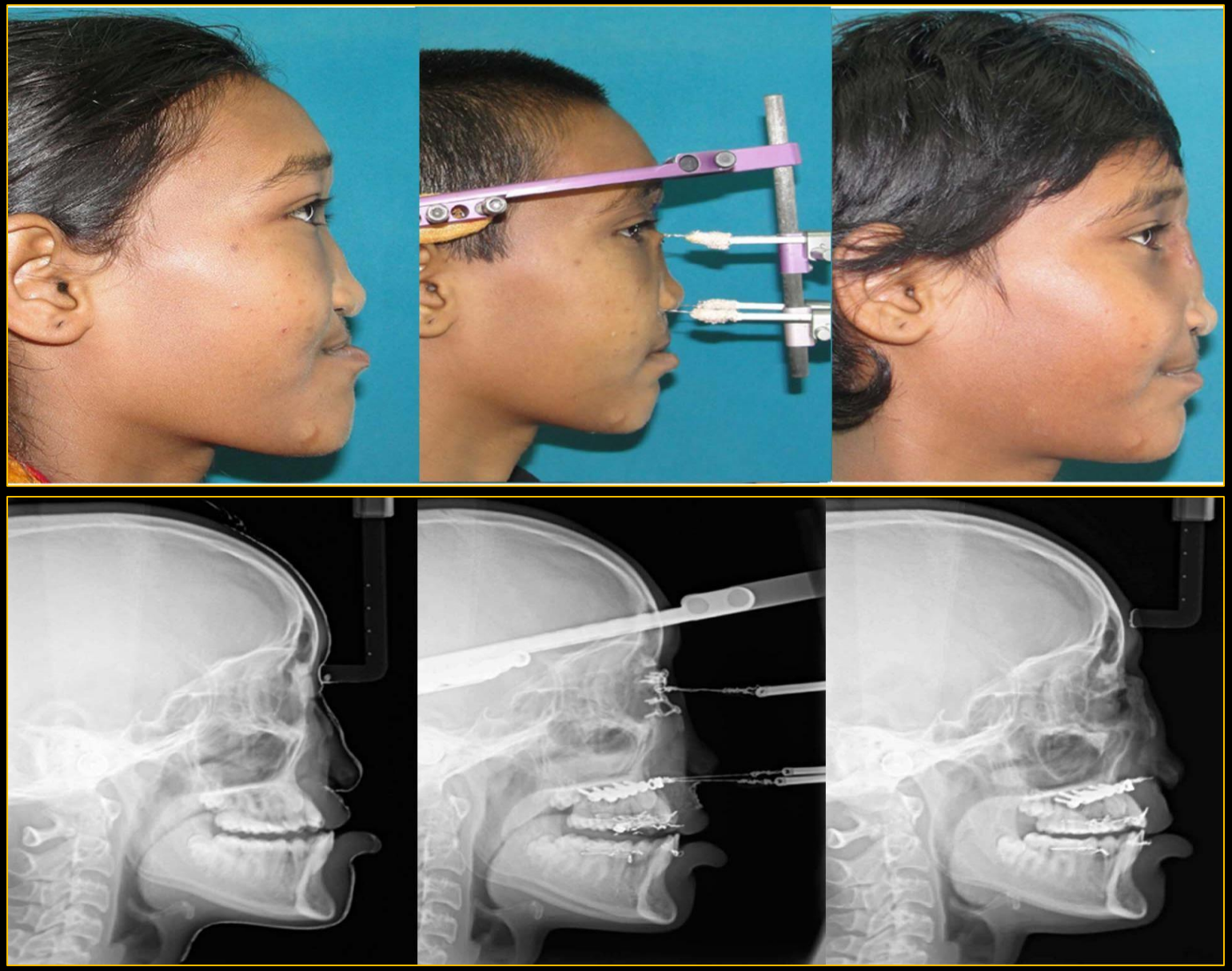




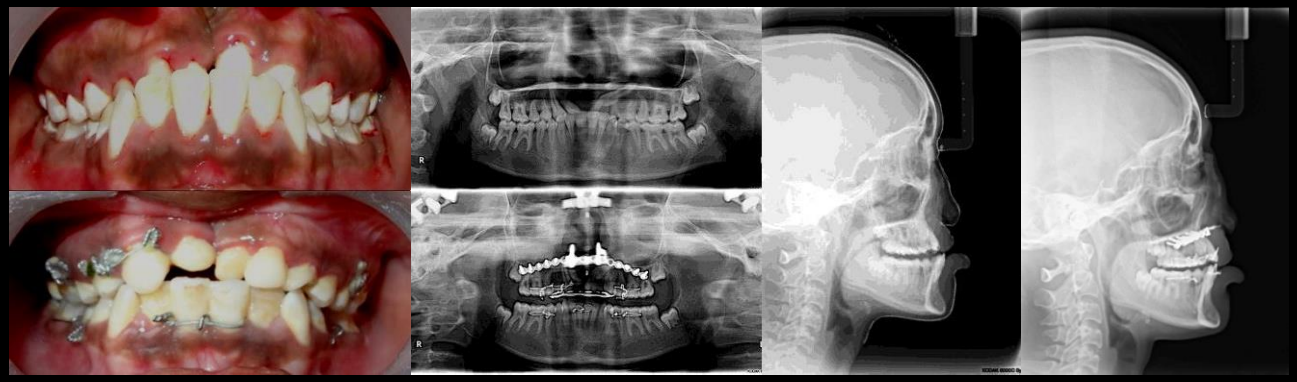
Courtesy :

Kademani D, Tiwana P. Atlas of Oral and Maxillofacial Surgery , Elsevier Health Sciences - US; 1 edition. 2015

LeFort II Distraction



PREOP VS POST OP



LEFORT III OSTEOTOMY

INDICATION

- Deficiency affecting

  - Maxilla
  - Malar
  - Infraorbital area
  - Nasofrontal area

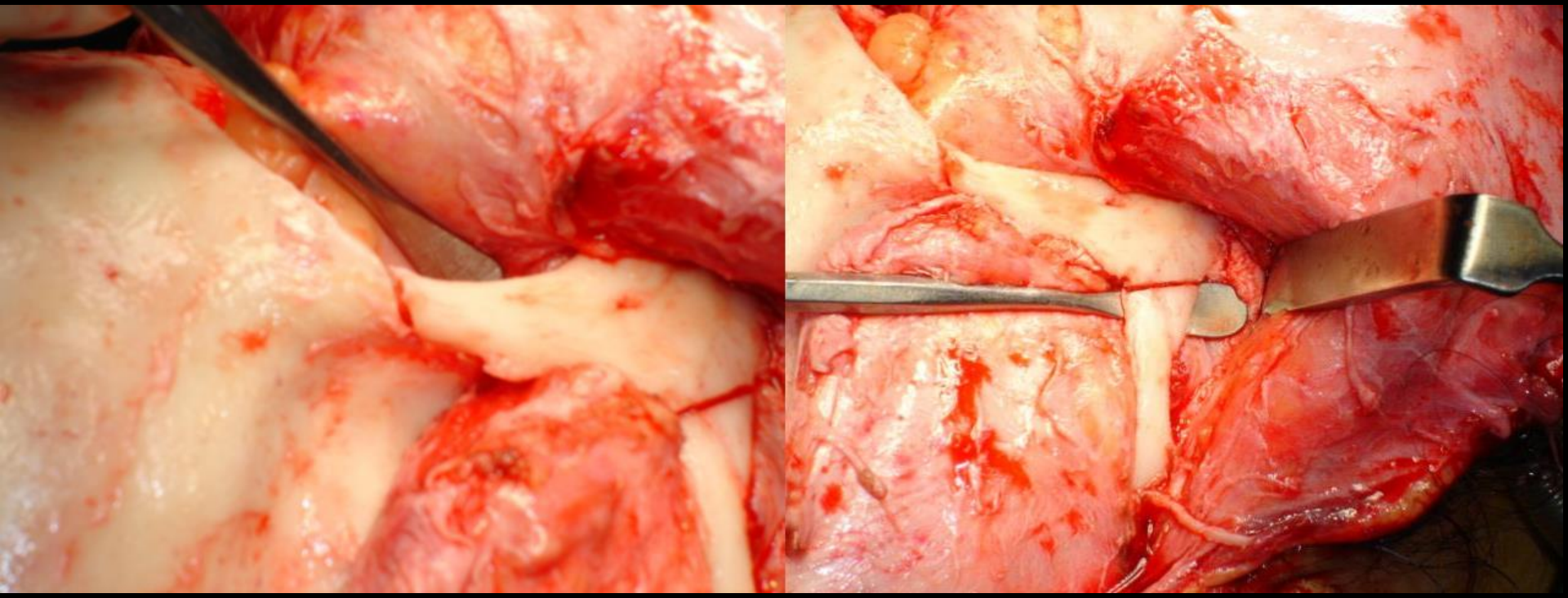
  } **Total Midface Hypoplasia**

- Von Binders syndrome (Maxillo-nasal dysplasia)

Performing a LeFort III Osteotomy

Frontozygomatic suture osteotomy and dysjunction of zygomatic arch is done

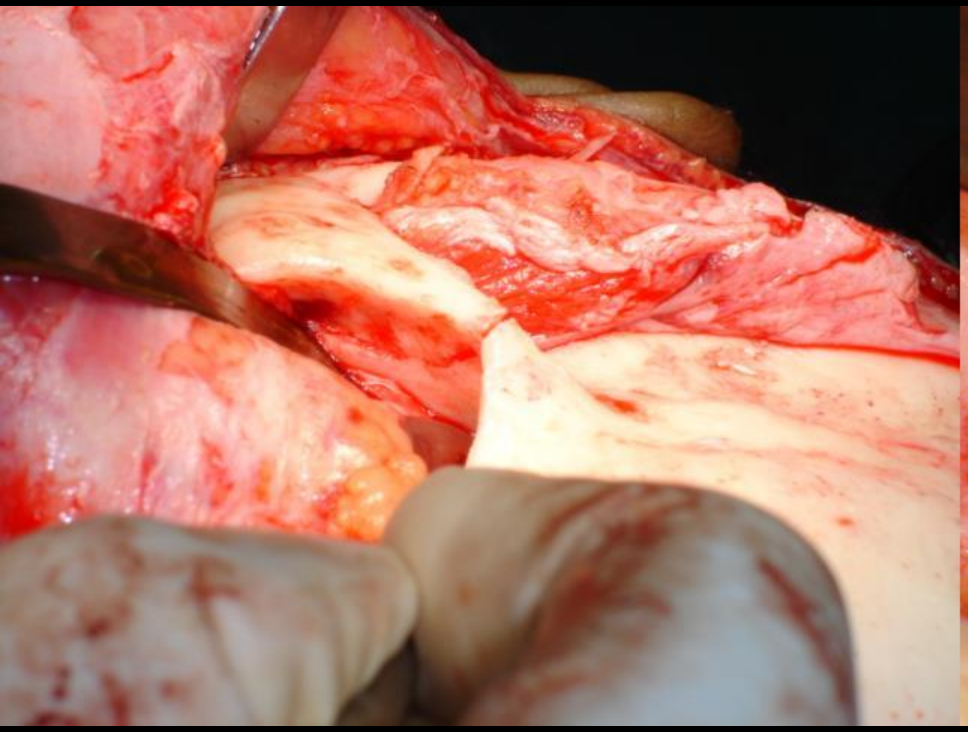
Orbital osteotomy along the lateral aspect of the internal orbit is done

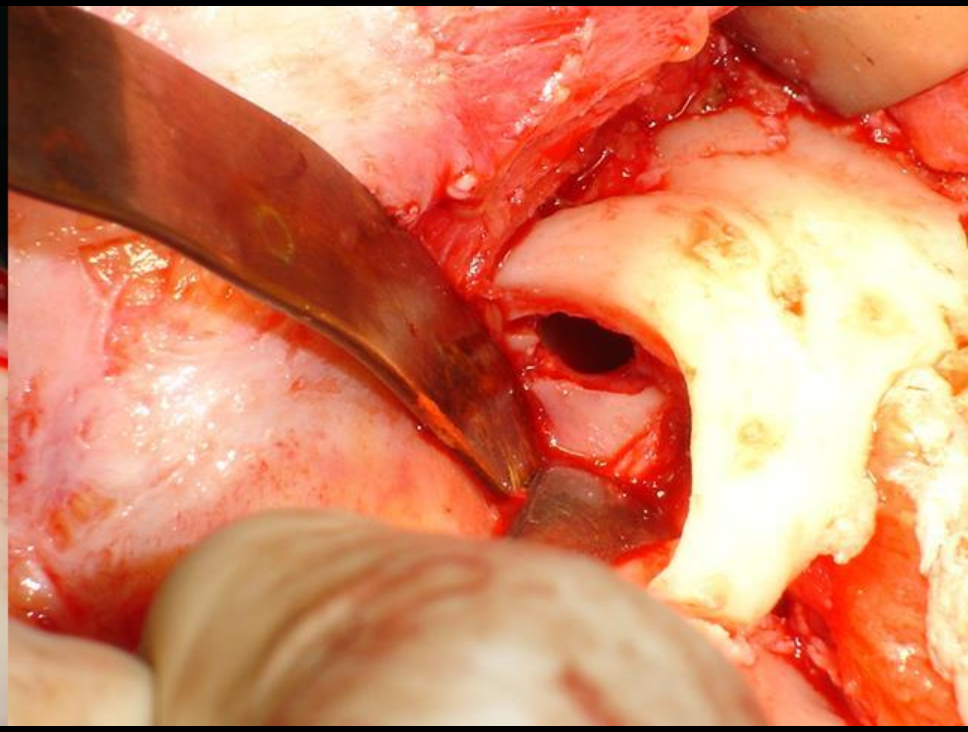


Performing a LeFort III Osteotomy

The osteotomy is continued along the sphenozygomatic suture line to the inferior orbital fissure.

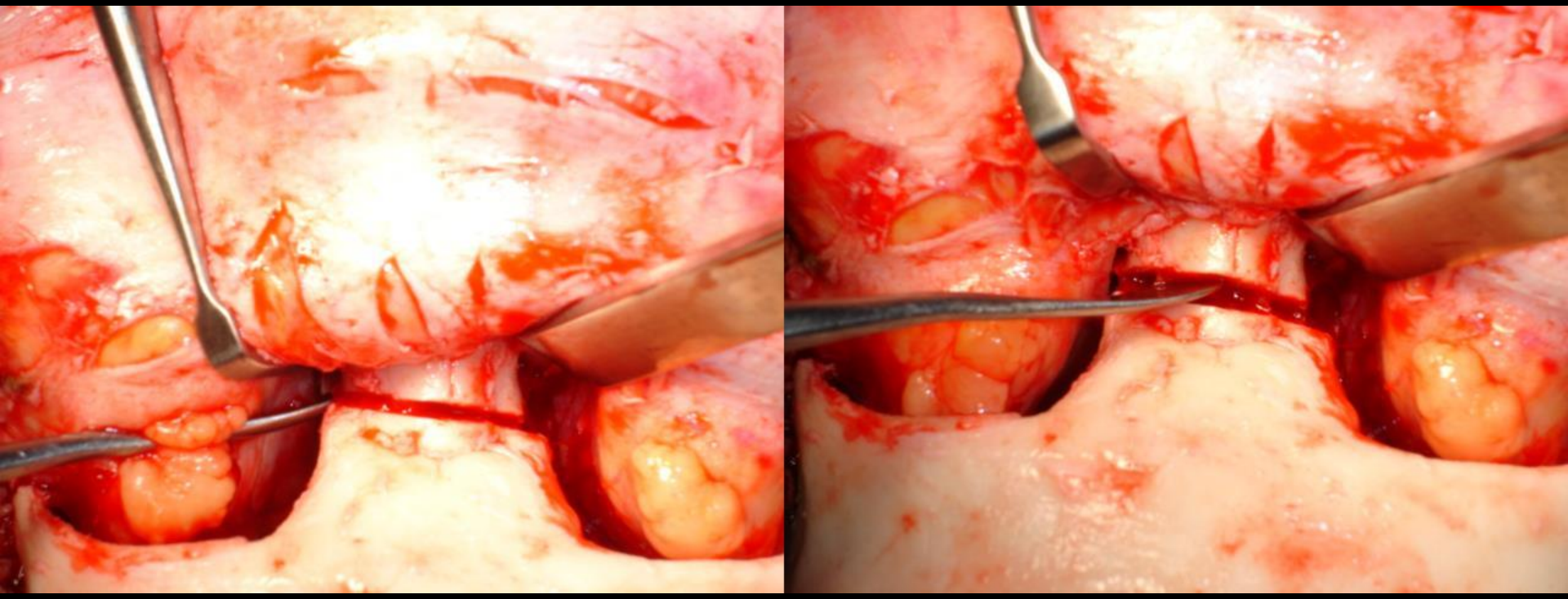
The osteotomy then extends medially across the floor of the orbit up the medial wall of the orbit





Performing a LeFort III Osteotomy

The osteotomy ends on the dorsum of the nose

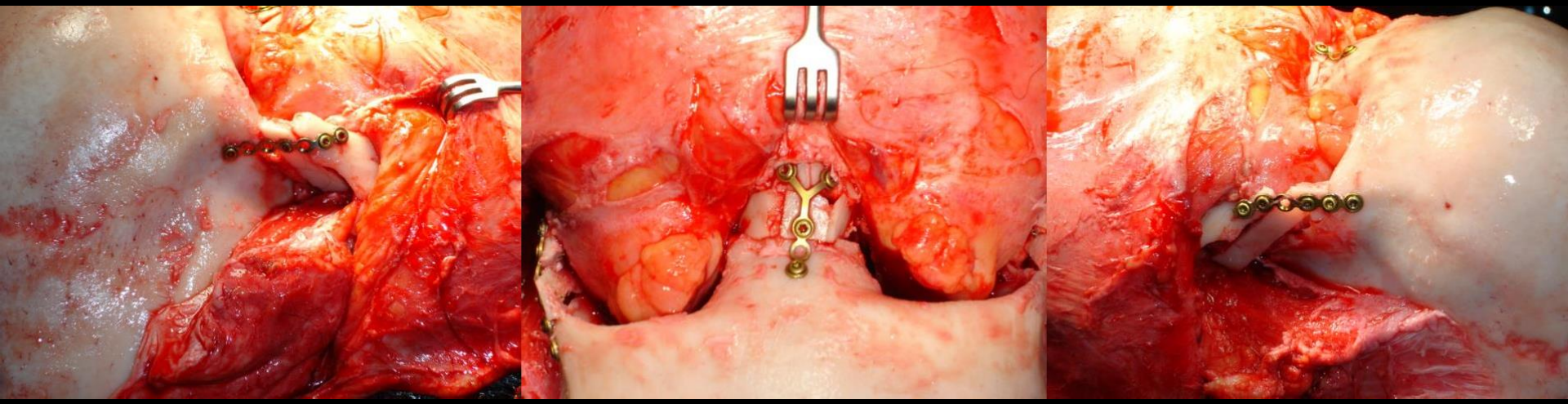


Performing a LeFort III Osteotomy

Calvarial bone graft is harveted

Fixation after performing a LeFort III Osteotomy

Fixation is done with 1.5 mm low profile plates at the nasal and frontozygomatic areas with interposition of bone grafts

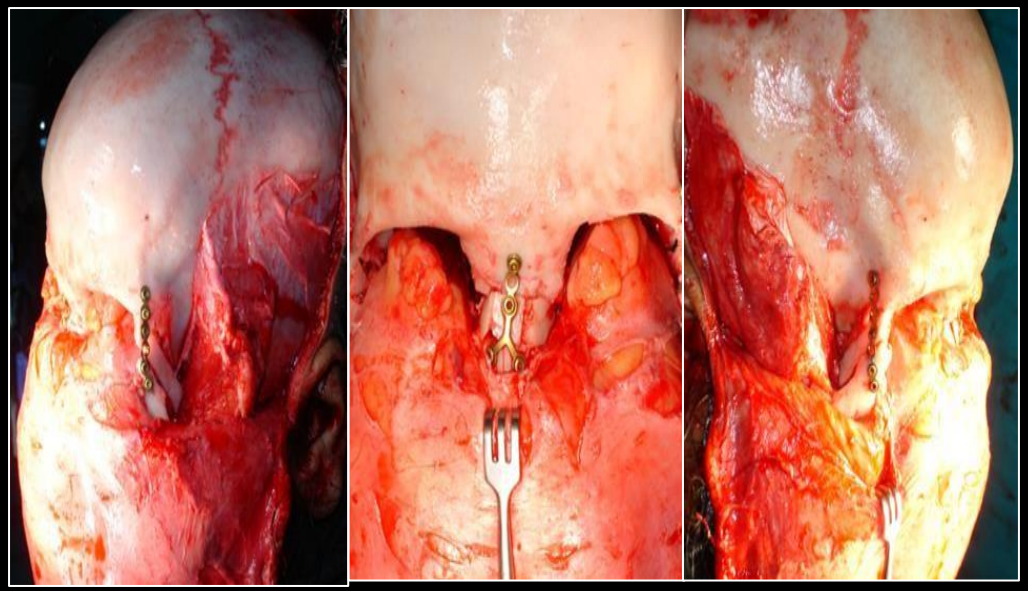


Lefort III Osteotomy + BSSO

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

Pre op

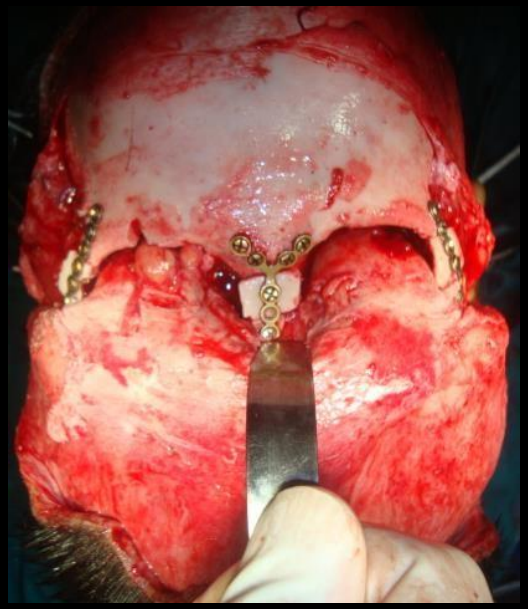
1year post op

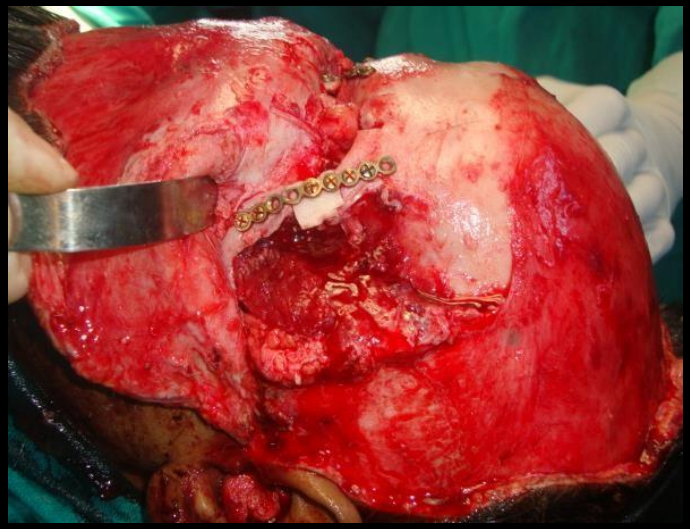


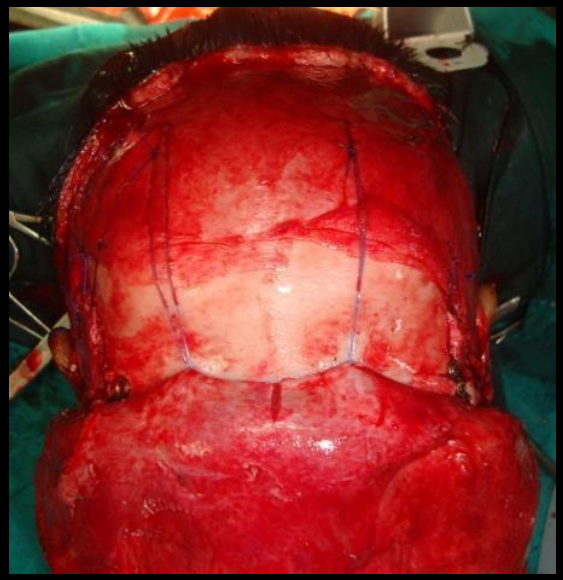
Osteotomy cuts at LeFort III level with calvarial bone graft for inter positioning

LeFort I+III Osteotomy (Binders Syndrome)

LeFort I+III Osteotomy (Binders Syndrome)







LEFORT III DISTRACTION

Facial Bipartition and Monobloc Osteotomy

Why?

- To correct midface deformities caused by
  - craniosynostosis syndromes
  - frontonasal dysplasias
  - cranioorbital clefting

What?

Monobloc

- advancing orbit and midface as one unit
- Fernando Oritz-Monasterio

Facial Bi-partition

- splitting the monobloc osteotomy in the midline to remove nasal and ethmoid bones and medializing the naso-orbital complex.
- Van der Muelen

Courtesy :

Kademani D, Tiwana P. Atlas of Oral and Maxillofacial Surgery , Elsevier Health Sciences - US; 1 edition. 2015

Facial Bipartition and Monobloc Osteotomy

How?

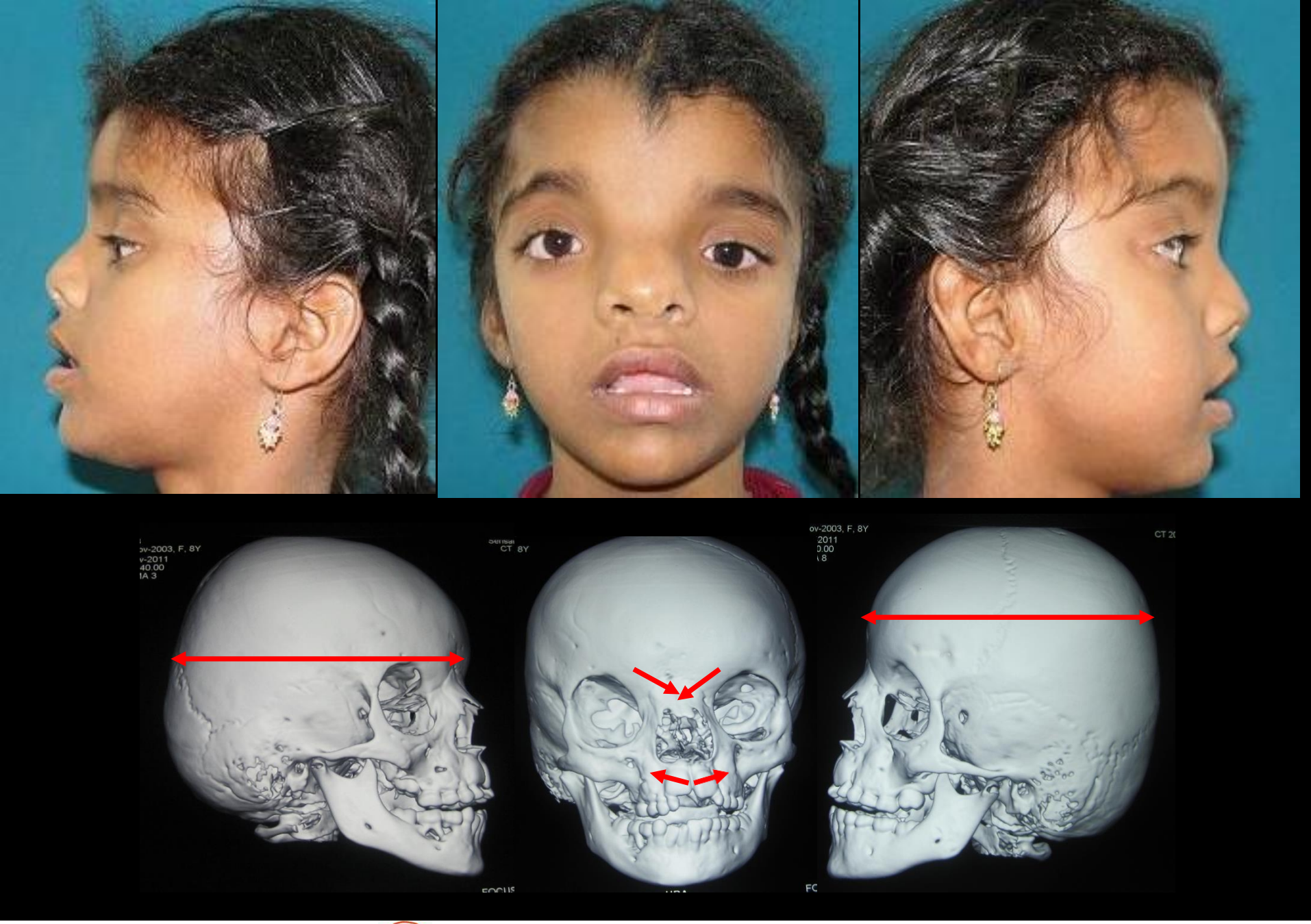
Facial Bipartition

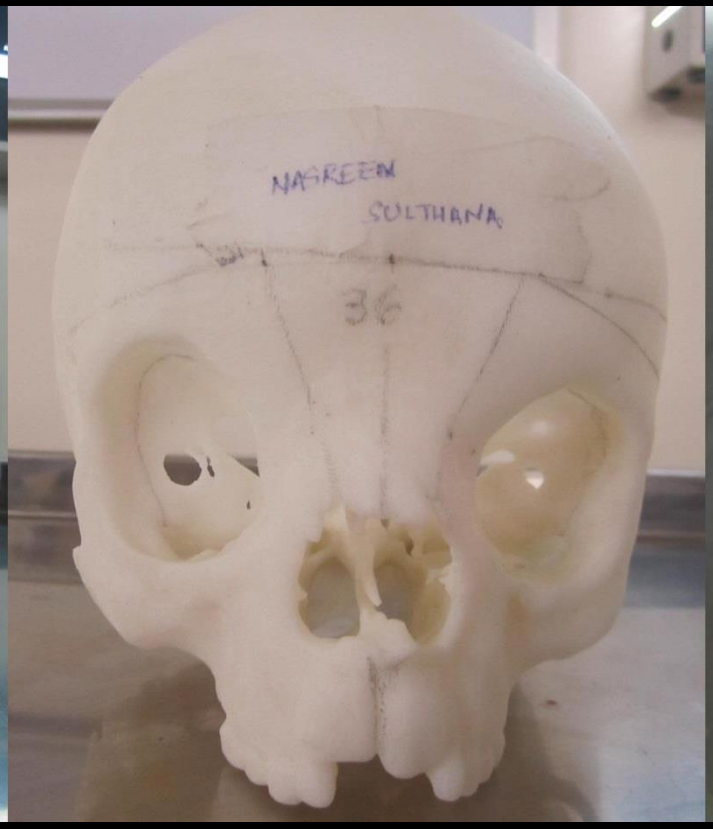
Indications

- To increase antero-posterior dimension of the cranial complex

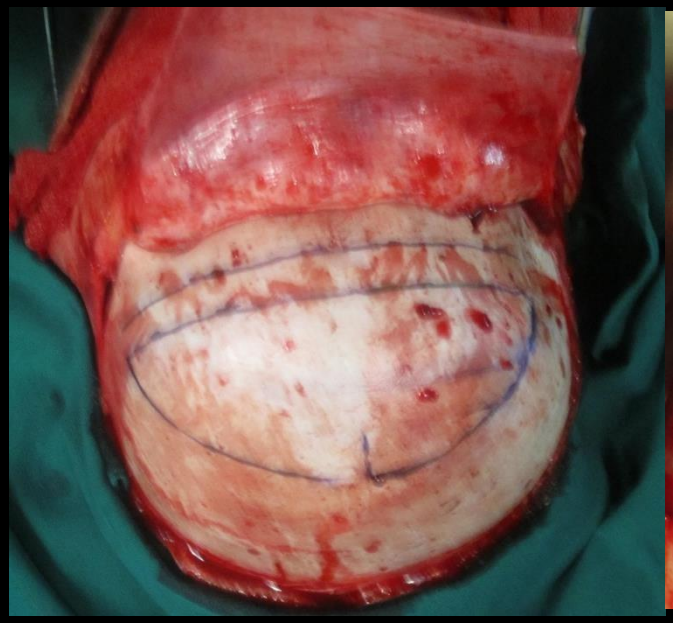
While also

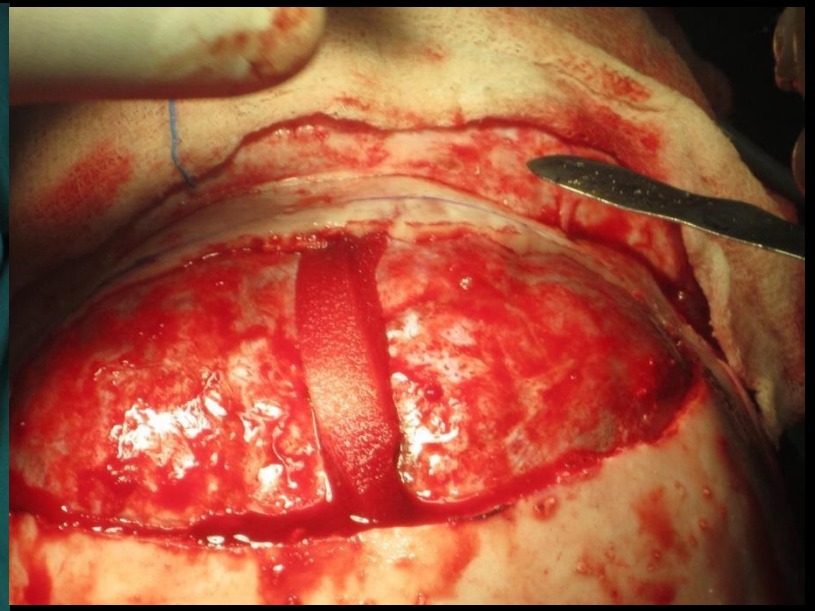
- Correcting hypertelorism and
- Flattening the maxilla

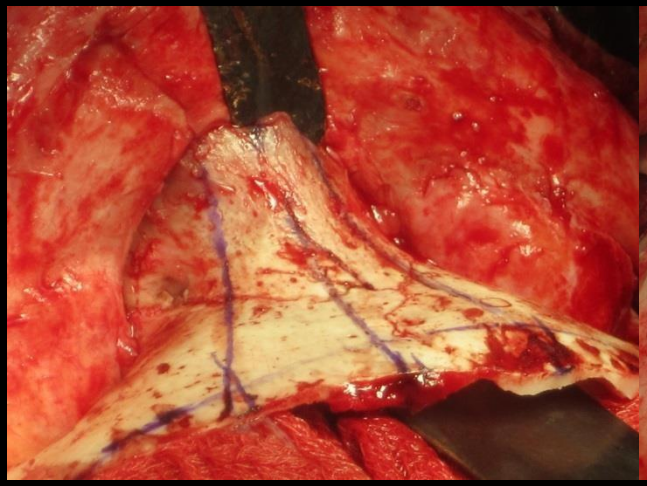


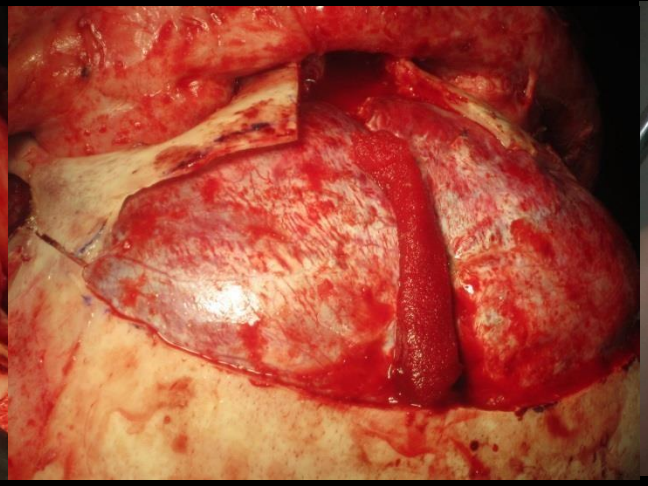


NASREEN
SULTHANA
36


Frontal and medial craniotomy

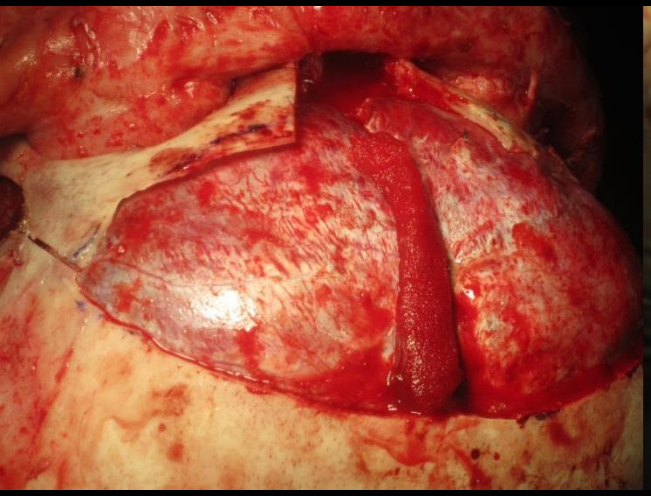
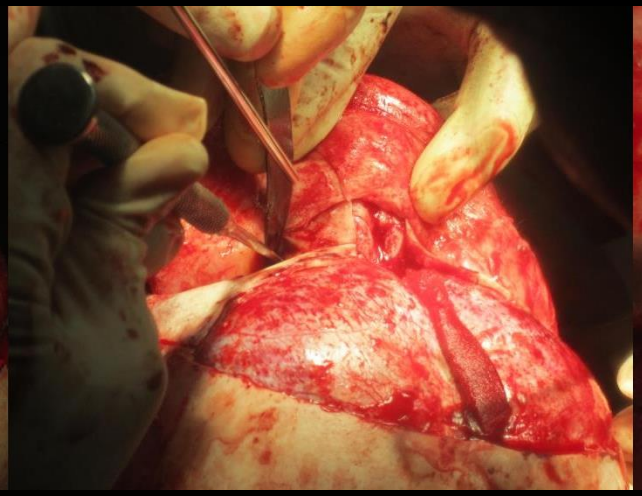
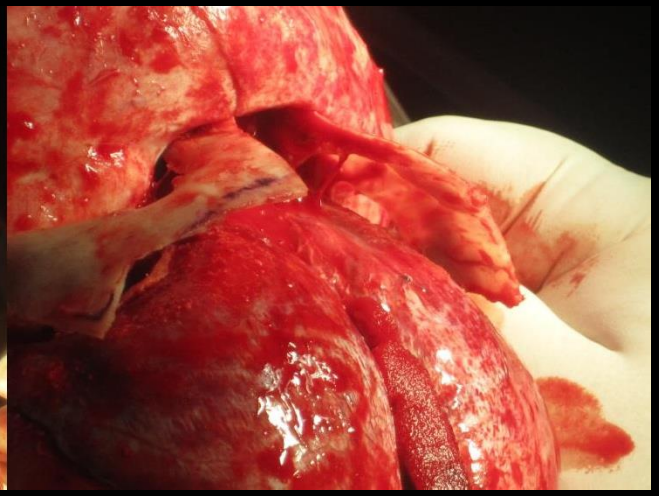






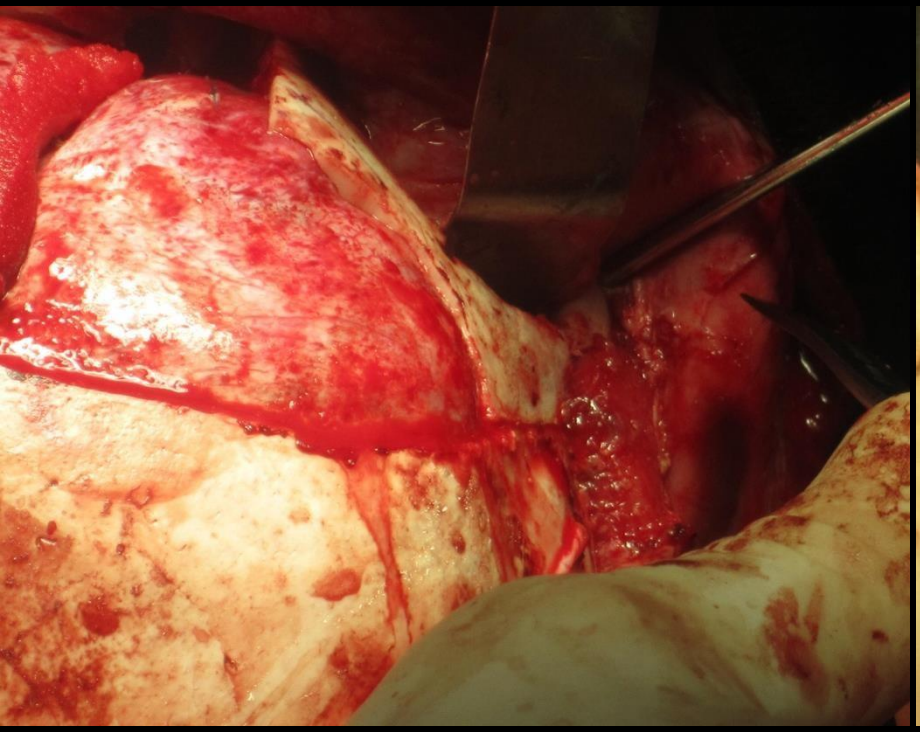


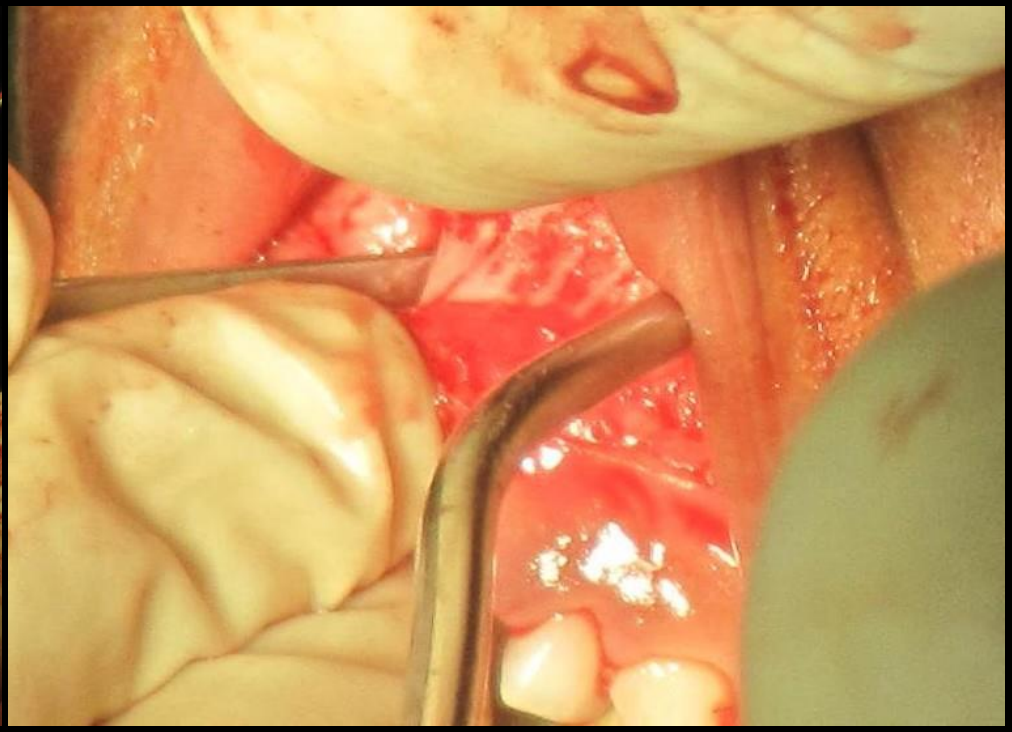
Lateral, Medial and Superior orbital osteotomies

- These osteotomies are done to separate the naso-orbital complex from the temporal and sphenoid bones and also the skull base
- Osteotomy is also done at the zygomatic bone.

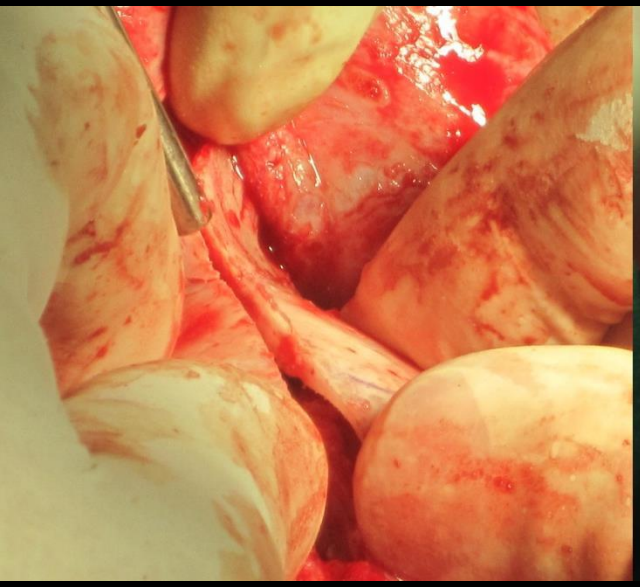
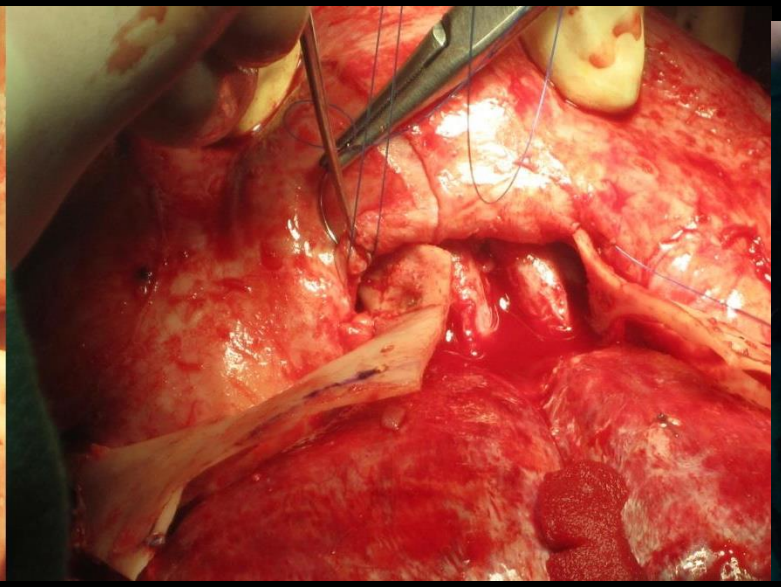
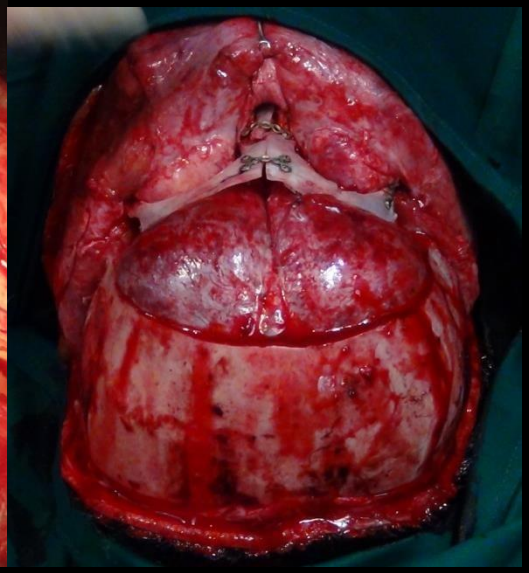
Pterygo-maxillary and mid palatine osteotomies



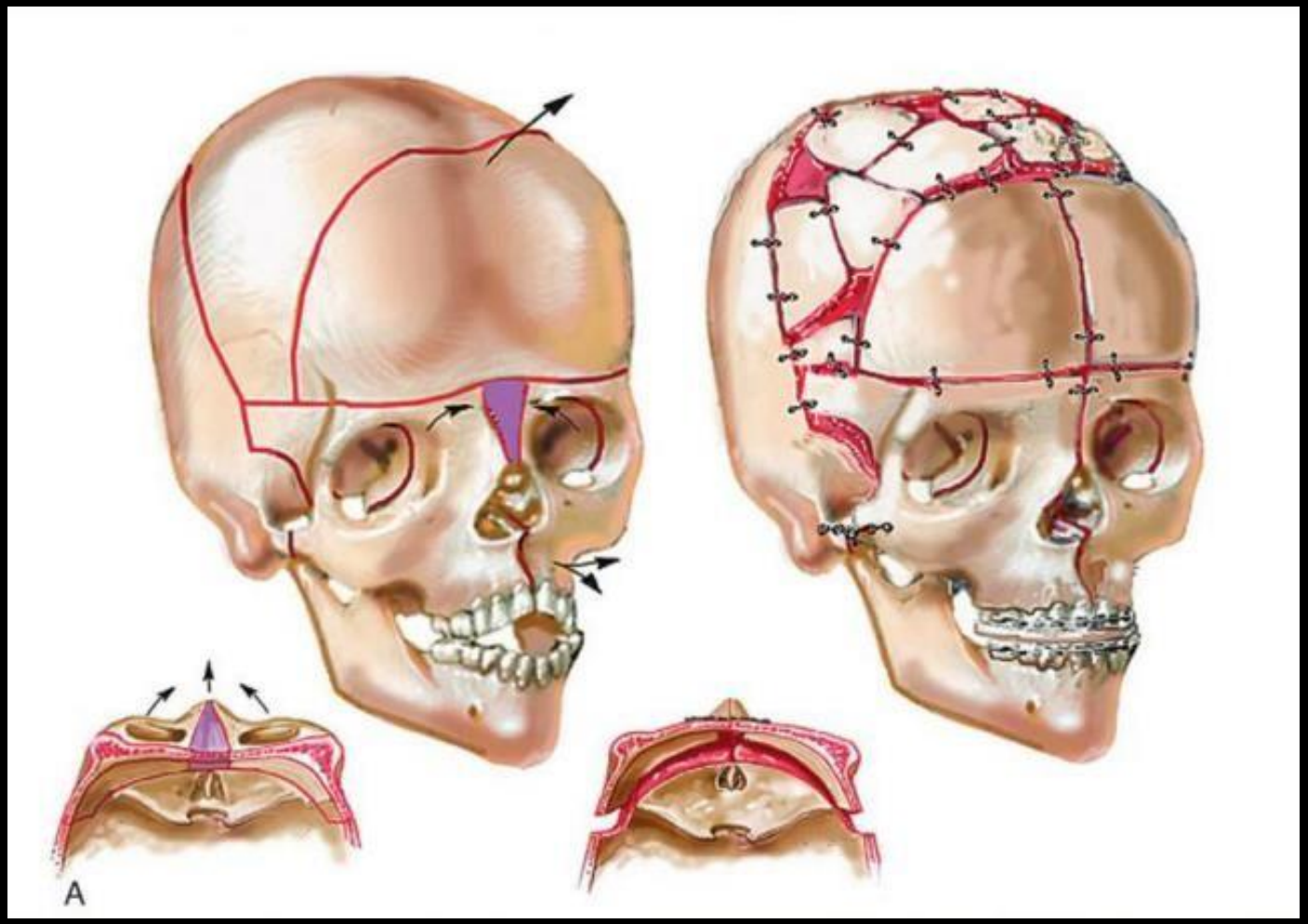


- Pterygo-maxillary osteotomy done to separate the zygomatico-maxillary complex from the pterygoid bone.
- Mid-palatine osetotomy is done to flatten the maxilla.

Approximation and fixation

- If the osteotomies are complete the segments will medialise with finger pressure
- Medial and lateral canthal ligaments are resuspended
- Fixation is done

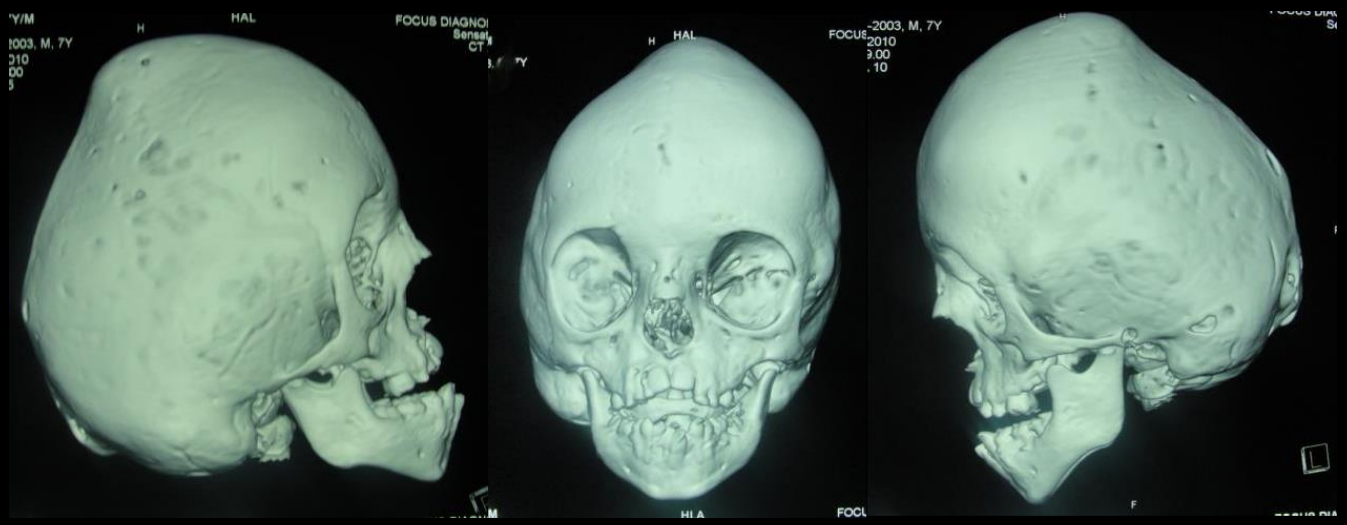


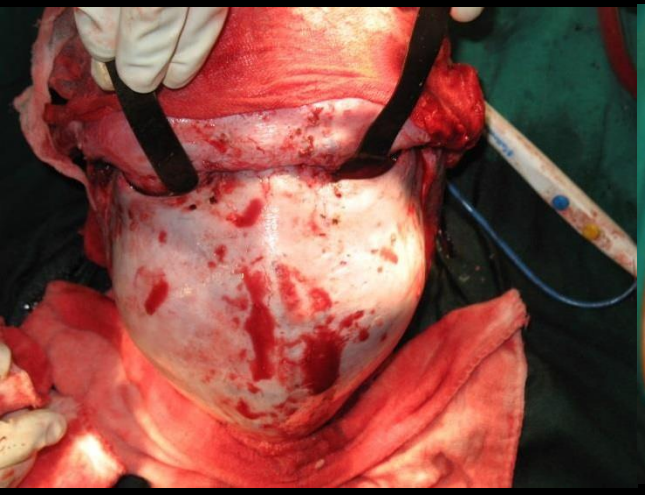
Courtesy :
Kademani D, Tiwana P. Atlas of Oral and Maxillofacial Surgery , Elsevier Health Sciences - US; 1 edition. 2015

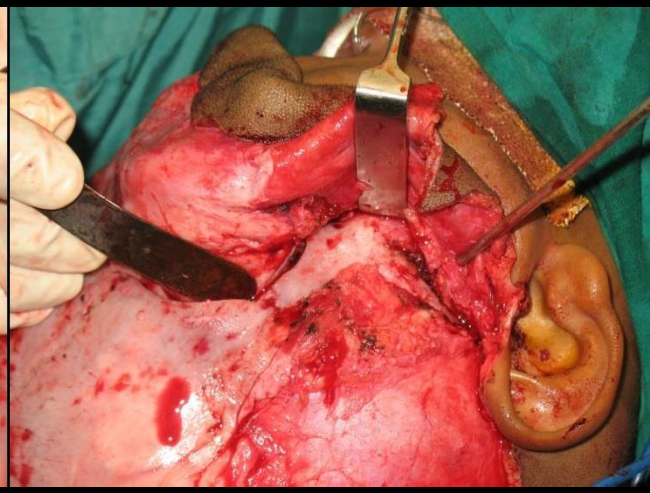
Monobloc

Indications

- To increase antero-posterior dimension of the cranio-maxillary complex



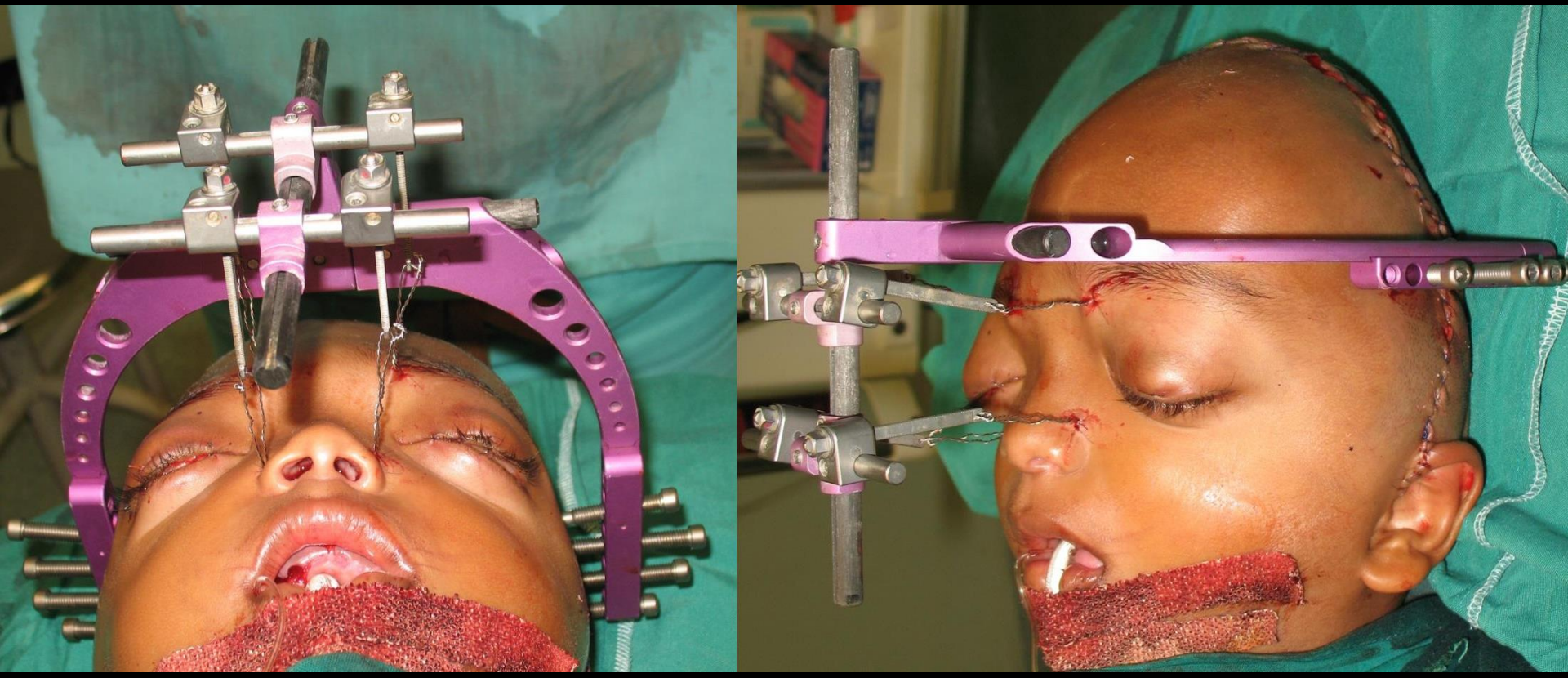




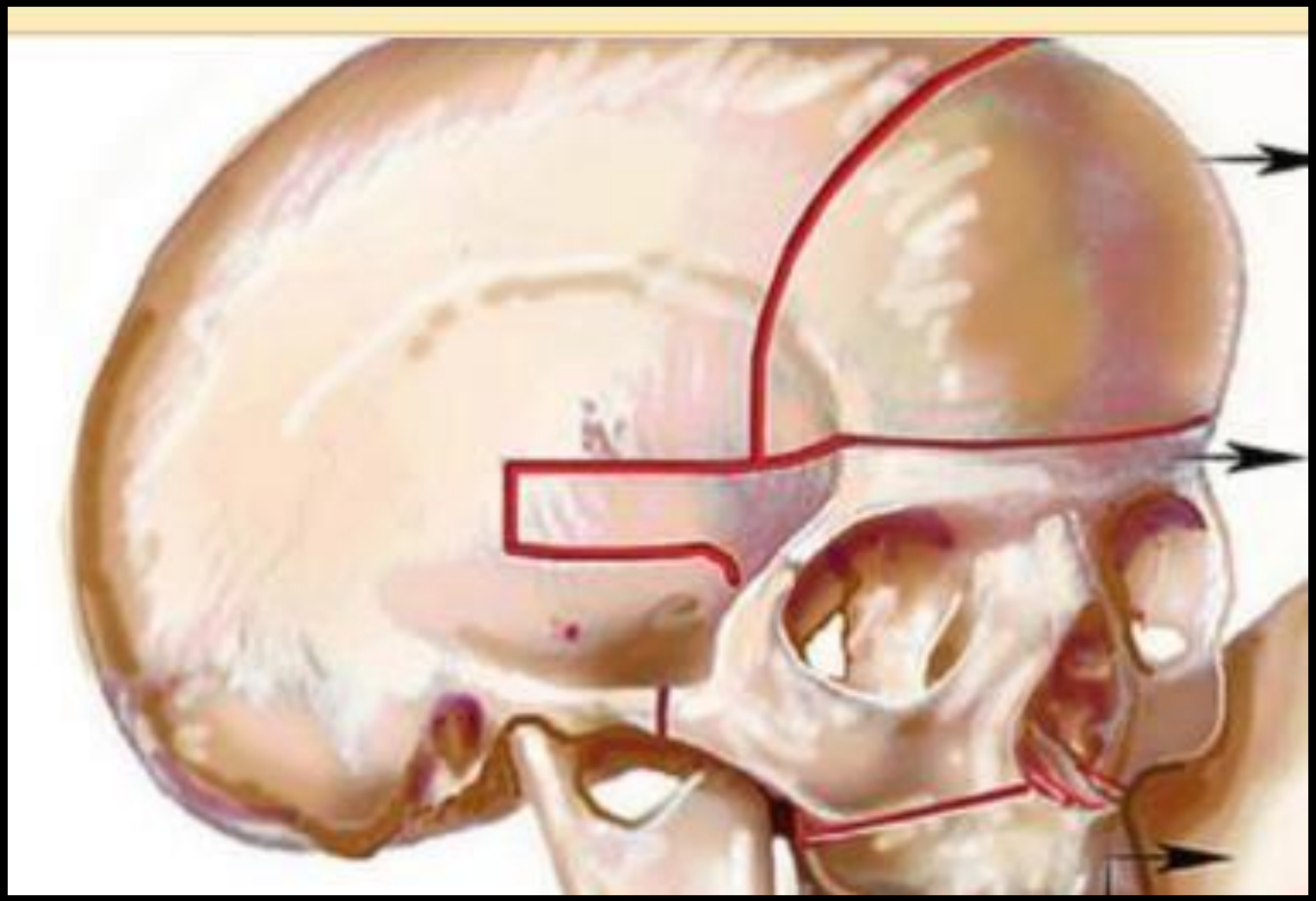
- The exposure the same as that is done for facial bipartition

- The lateral osteotomies are same as those done for facial bipartition.

- No medial cuts are given ensuring that the osteotomised complex is moved antero-posteriorly as a single block



- Distractor in place
- Distraction was preferred because of the amount of movement required, the dead space the movement would have resulted in and poor quality of bone already present.



Courtesy :
Kademani D, Tiwana P. Atlas of Oral and Maxillofacial Surgery , Elsevier Health Sciences - US; 1 edition. 2015

Review Article

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Quick Response Code:

Comparison of conventional Le-fort I advancement, anterior maxillary segmental distraction, and distraction osteogenesis of maxilla for surgical management of cleft maxillary hypoplasia: A systematic review

Taher Abbas Mistry, Abbas Mistry[1]

ABSTRACT

This systematic review compares conventional Le-fort I advancement (CLO), anterior maxillary segmental distraction (AMD) and distraction osteogenesis of maxilla (DOM) for the treatment of cleft maxillary hypoplasia in terms of the amount of maxillary advancement achievable, relapse, residual velopharyngeal incompetence and soft tissue changes. All patients with maxillary hypoplasia secondary to cleft palate repair were taken into consideration irrespective of their gender, age and ethnic background. Literature research was done in databases PubMed, Ovid and Google scholar beta. From the original 429 articles identified, 17 articles were finally included, which passed the critical appraisal checklist and met the inclusion criteria. The mean advancement ranged from 6.59 mm to 16.5 mm for DOM, 6–14.28 mm for AMD and 5.17–7.2 mm for CLO. Relapse was 8.24%–45% for DOM, 4.6%–7% for AMD and 21.63%–63% for CLO. Velopharyngeal insufficiency increased significantly following Le-fort I advancement, while there was no significant change after anterior maxillary distraction and DOM. The ratio of soft tissue to hard tissue changes was greatest with AMD, followed by DOM and then CLO. Distraction osteogenesis of the maxilla and AMD are plausible treatment options for cleft maxillary advancement. Due to less stability and restricted amount of possible advancement, Le-fort I osteotomy should be reserved for minor skeletal discrepancies in cleft patients.

Key words: Anterior maxillary distraction, cleft orthognatic surgery, distraction osteogenesis, Le-fort I advancement

INTRODUCTION

Cleft palate surgery results in inhibition of forward translation of the maxilla during growth, shortening of the basal length, and retrusion of the alveolar process. It is estimated that >45% of treated cleft palate patients have moderate-to-severe maxillary hypoplasia.[1]

Conventional Le-fort I advancement for treating cleft maxillary hypoplasia has been reported by numerous authors with varying degrees of success. The relapse rate of conventional Le-fort I advancement in cleft patients is estimated to be around 25%–50% compared to 10% in noncleft individuals.[2,3] The other reported complications include worsening of velopharyngeal insufficiency and inability to achieve the desired advancement due to tissue scarring resulting in compromised functional and esthetic results.

Distraction osteogenesis for maxillary advancement was introduced in 1993 and has been widely used for maxillary hypoplasia.[4] Polley and Figueroa[5] reported the use of rigid external device for maxillary advancement. The merits of distraction osteogenesis for the advancement of the maxilla is highlighted in cleft orthognathic due to its potential to minimize the limitations of conventional

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Submission: 16.09.2020 **Revision:** 24.09.2020
Acceptance: 20.11.2020 **Web Publication:** 13.01.2021

CONCLUSION:

In managing cleft maxillary hypoplasia, it is extremely crucial to select the surgical procedure for advancement of the maxilla. We can evidently conclude that conventional Le-fort I advancement should be reserved for mild cases, i.e.,≤8 mm.

AMD should be preferred in moderate cases of <10 mm. A requisite for AMD using palatal distractor is that it should be firmly supported by the posterior teeth, and the vector should be favorable for distraction.

Distraction osteogenesis is to be used for discrepancies requiring >10 mm advancement or in cases where clockwise movement is desired.

Relapse is considerably higher in these cases; hence, over correction of the defect should be considered

Int. J. Oral Maxillofac. Surg. 2019; xxx: xxx–xxx
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International Journal of Oral & Maxillofacial Surgery

Meta-Analysis
Cleft Lip and Palate

Relapse rate after surgical treatment of maxillary hypoplasia in non-growing cleft patients: a systematic review and meta-analysis

L. Jiang[1,a], Y. Zheng[1,a], N. Li[2], X. Chen[1], Z. Lu[2], H. Tong[1], N. Yin[1], T. Song[1]

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L. Jiang, Y. Zheng, N. Li, X. Chen, Z. Lu, H. Tong, N. Yin, T. Song: Relapse rate after surgical treatment of maxillary hypoplasia in non-growing cleft patients: a systematic review and meta-analysis. Int. J. Oral Maxillofac. Surg. 2019; xxx: xxx–xxx.

Abstract. Maxillary hypoplasia in cleft lip and palate is a complex deformity. Despite surgical improvements, postoperative relapse persists. This systematic review was performed to determine the mean horizontal relapse rates for the surgical techniques used to treat maxillary hypoplasia: Le Fort I osteotomy with rigid fixation, Le Fort I distraction osteogenesis, and anterior maxillary distraction osteogenesis. This study followed the PRISMA statement. The PubMed, Embase, Science Direct, and Web of Science databases were searched through to June 2018. Studies on non-growing cleft lip and palate patients who had undergone one of the three surgical procedures and who had postoperative horizontal maxillary changes assessed at >6 months post-surgery were included. Stata SE was used to estimate pooled means, heterogeneity, and publication bias. The search strategy identified 326 citations, from which 24 studies were selected. Relapse rates following Le Fort I osteotomy with rigid fixation, Le Fort I distraction osteogenesis, and anterior maxillary distraction osteogenesis were 20%, 12%, and 12%, respectively. Relapse rates with and without bone grafting were 19% and 66%, respectively. The relapse rate following distraction osteogenesis with internal distraction was lower than that with external distraction. Study limitations were heterogeneity, which was above moderate, the low number of high-quality studies, and unidirectional assessment of postoperative maxillary movement.

Key words: relapse rate; maxillary hypoplasia; orthognathic surgery; cleft patients meta-analysis.

Accepted for publication

CONCLUSION:The relapse rate following distraction osteogenesis with internal distraction was lower than that with external distraction.

SUMMARY….

To decide on the treatment modality depends on :

1. Surgeon’s Choice.
2. Indication of the deformity.
3. Availability of the resources.

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