

# Craniofacial Clefts and their Repair

## Our Ideology

**Prof. Dr. Dr. Srinivas Gosla Reddy**

MBBS, MDS, FRCS (Edin.), FDSRCS (Edin), FDSRCS (Eng.), FDSRCPS (Glasg.), PhD

**Dr. Likith Ram Reddy MD DDS**

**Dr. Sri ramchandra Damaraju MS MCh**

**Dr. Rajgopal R. Reddy**

MBBS, BDS, FDSRCPS (Glasg.), PhD

**Dr. Ashish Fanan M.D.S.**

**Dr. Avni Pandey M.D.S.**

**GSR Institute of Craniofacial Surgery**  
**Hyderabad India**



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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
- 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



# Five Facial Ethnic Forms



Caucasian



Mongoloid



Latin American



African



Asian

Irrespective of the ethnicity of an individual  
**“Facial Balance”** and not **“Facial Symmetry”**  
dictates our perception of beauty





# Five Congenital Facial Defects



Ears

Eyes

Nose

Lips

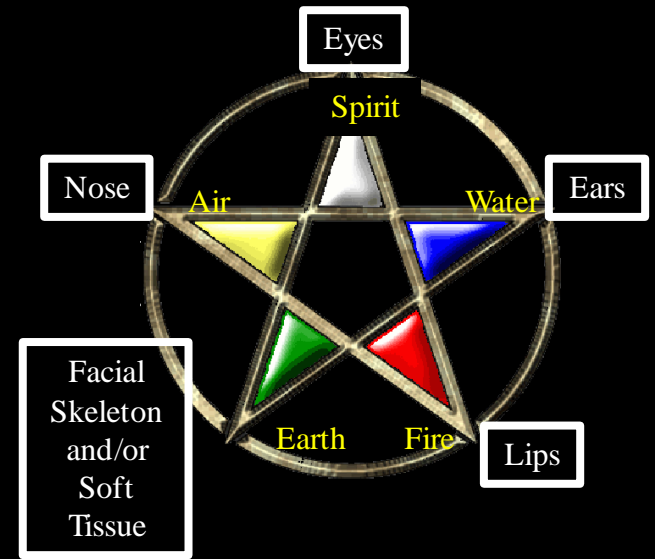
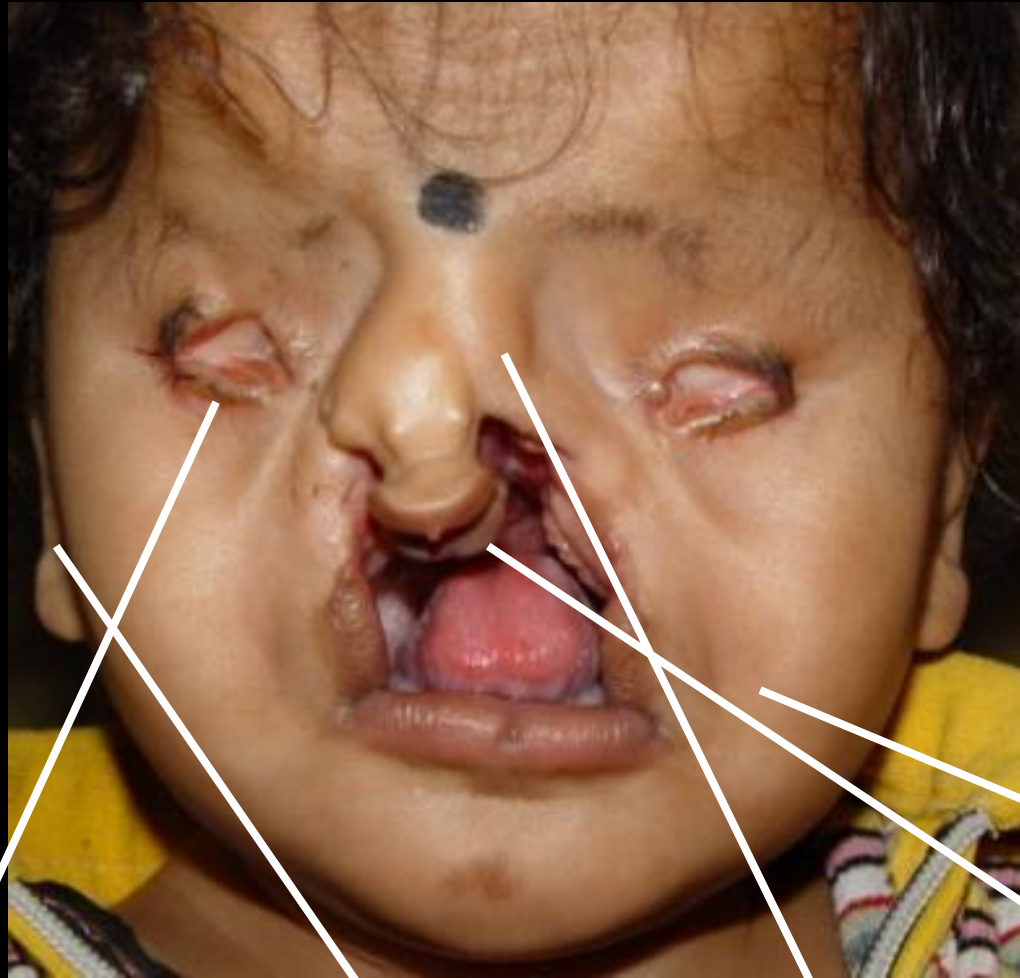
Facial  
Skeleton

Most of the above patients have  
**Facial Symmetry** but lack **Facial Balance**





# Five Congenital Facial Defects



Eyes

Ears

Nose

Lips

Facial Skeleton

## Complete Facial Imbalance



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# DIAGNOSIS OF CRANIOFACIAL CLEFTS



# CLASSIFICATION OF CRANIOFACIAL ANOMALIES

Any classification should be an ideal diagnostic tool and further an agenda to find a common treatment protocol.

We have attempted to classify craniofacial anomalies into **FOUR** groups depending on the site and type of defects (**Morphology**)

This classification is made up of two steps.

**Step I: Identification**

**Step II: Classification**

We call this **SAILER'S MORPHOLOGICAL CLASSIFICATION** of craniofacial anomalies





# SAILER'S MORPHOLOGICAL CLASSIFICATION

## STEP I

### RING I

**Deformity evident on  
APPEARANCE**

Eyes Forehead

Nose Ears

Mouth Chin

Malar region

Superior Skull

Posterior Skull

### RING II

**Deformity evident on  
EXAMINATION**

Palate

Tongue

Nostril

Outer ear

Teeth

### RING III

**Deformity evident on  
INVESTIGATION**

Craniofacial Sinuses

Facial Bones

Facial Muscles

Facial Spaces

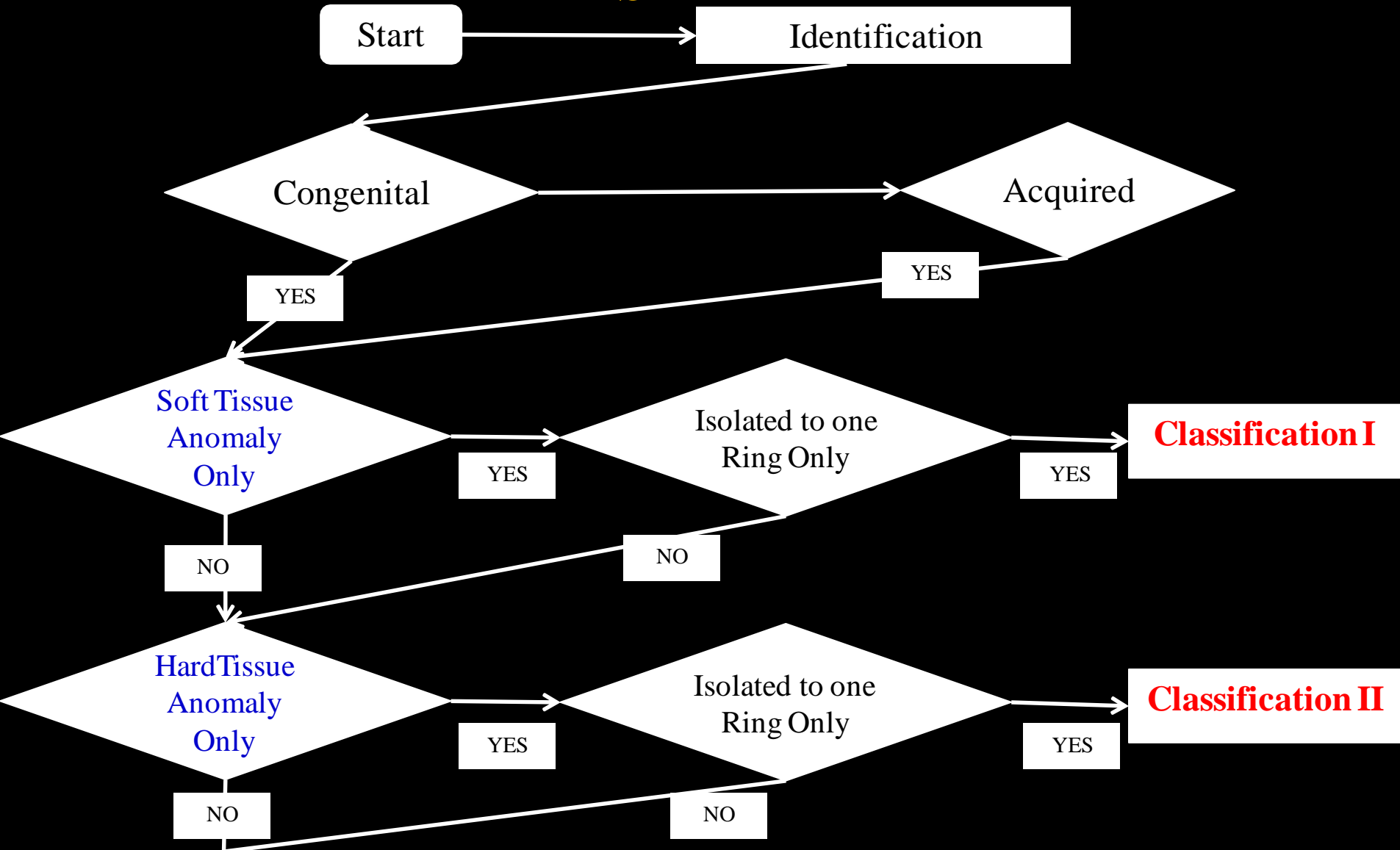
Brain

Spine



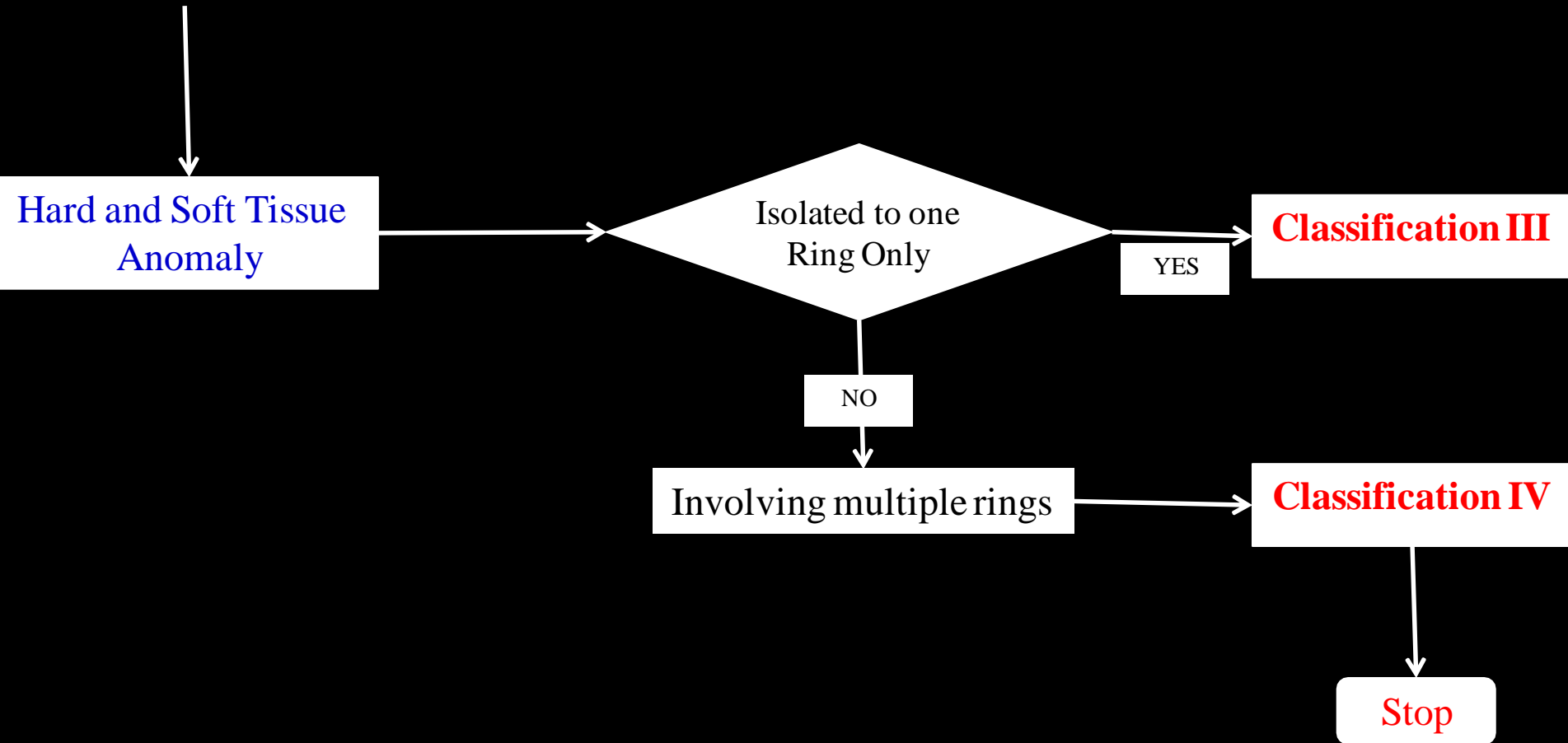
# SAILER'S MORPHOLOGICAL CLASSIFICATION

## STEP II



# SAILER'S MORPHOLOGICAL CLASSIFICATION

## STEP II



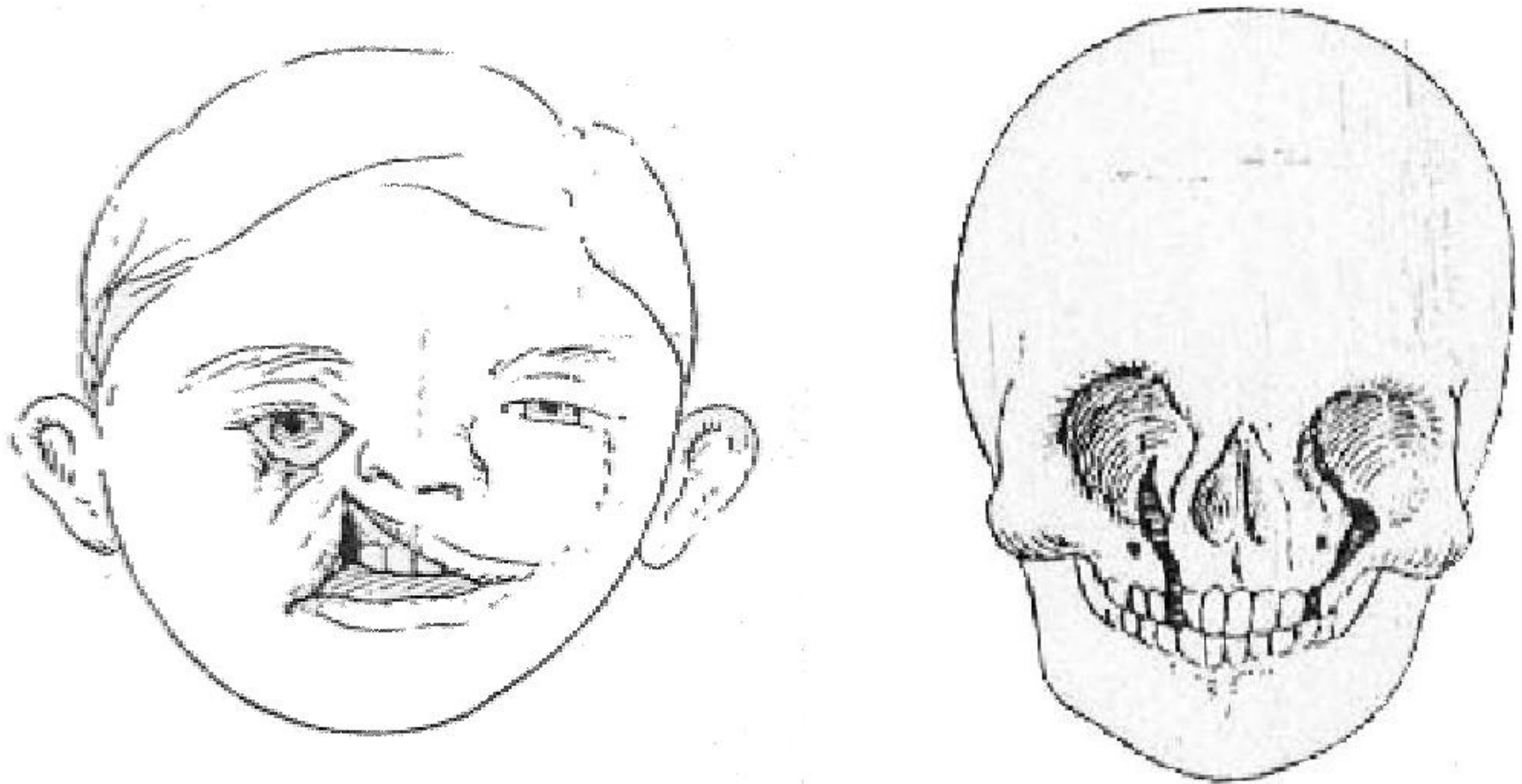


# Craniofacial Clefts



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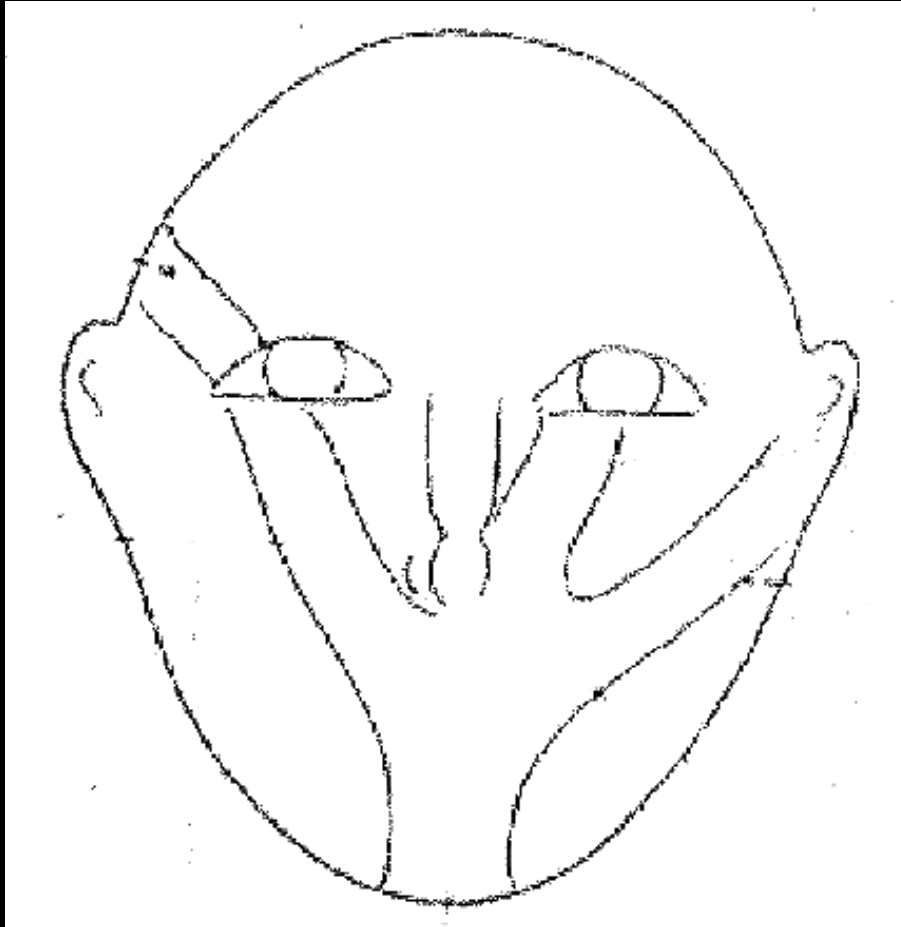
# Craniofacial Clefts



Boo - Chai Classification



# Craniofacial Clefts

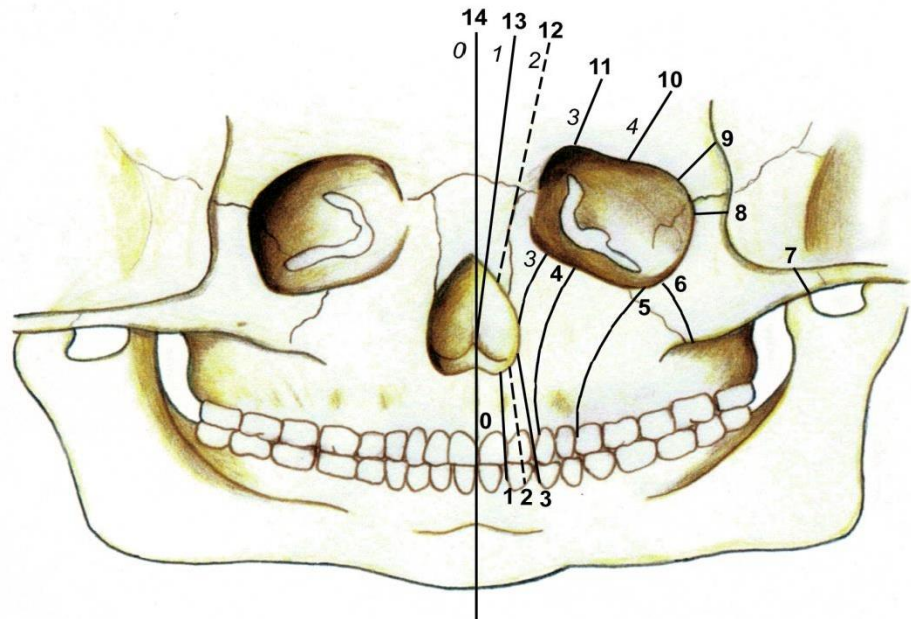
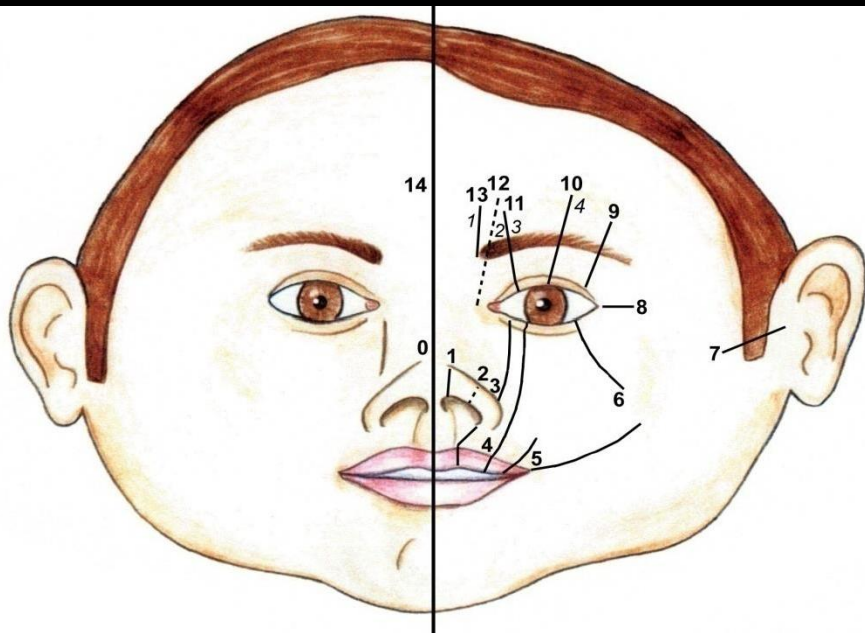


American Association of Cleft Palate Rehabilitation  
(AACPR) Classification of Facial Clefts





# Craniofacial Clefts



## TESSIER CLASSIFICATION

- Introduced by Paul Tessier
- It is the most comprehensive and popular classification of craniofacial clefts
- Divided into **soft tissue and hard tissue defects**



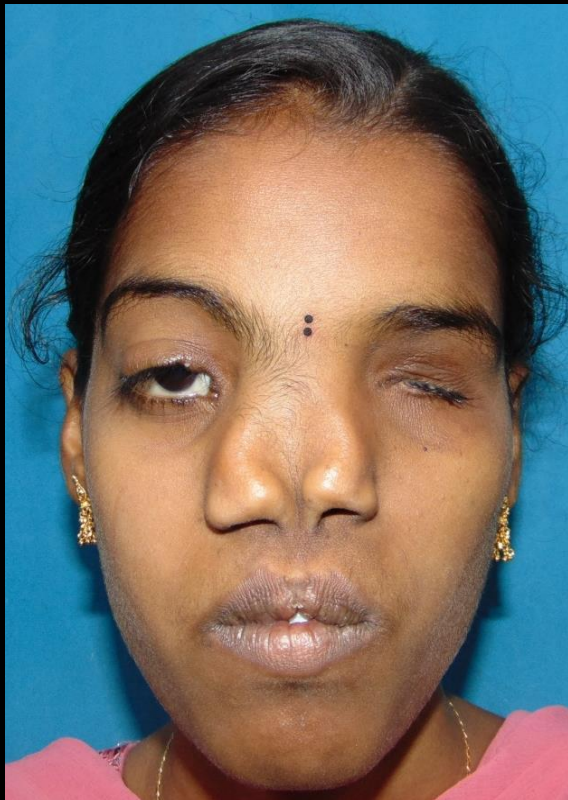
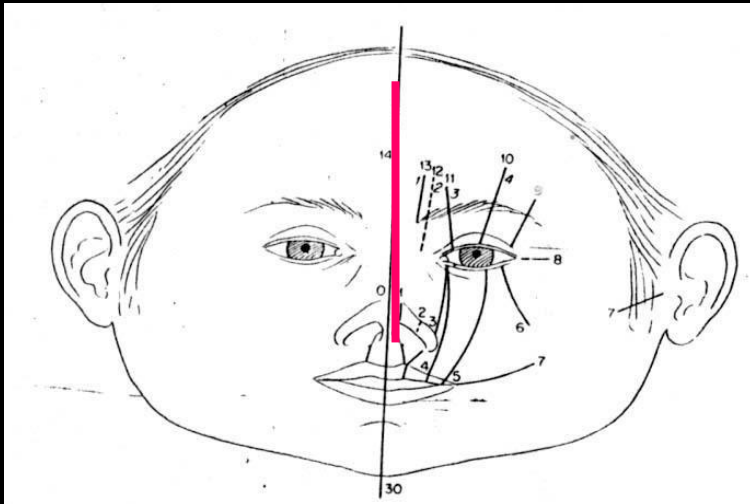
# Craniofacial Clefts

## Soft Tissue Defects



# Craniofacial Clefts Soft Tissue Defects

Tessier #0 – 14 facial cleft





# Craniofacial Clefts

## Soft Tissue Defects

Tessier # 0 facial cleft



Type I

Involving only vermilion  
not involving the white roll



TYPE II

Involving vermilion and  
the white roll



TYPE III

Involving vermilion,  
white roll and philtrum



# Craniofacial Clefts

## Soft Tissue Defects

Tessier # 0 facial cleft



### TYPE V

Involving collumella and  
tip, supratip and dorsum  
of the nose



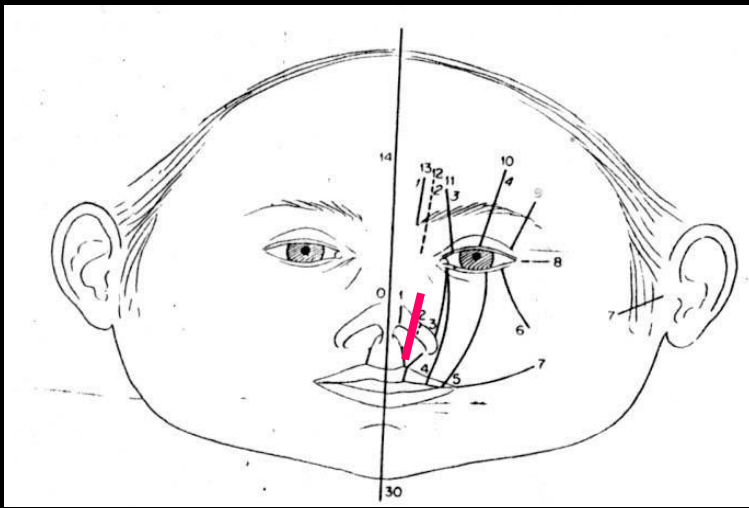
### TYPE VI

Involving collumella, tip,  
supratip, dorsum of the  
nose and fronto nasal area



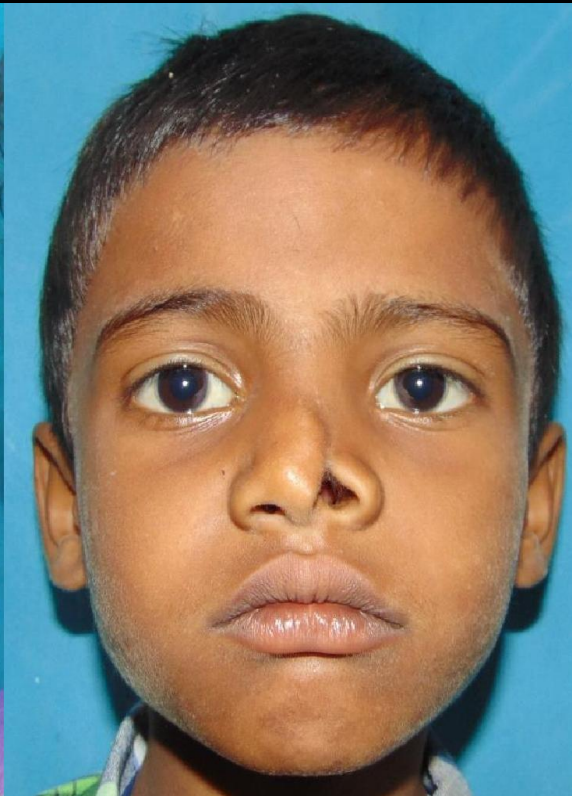
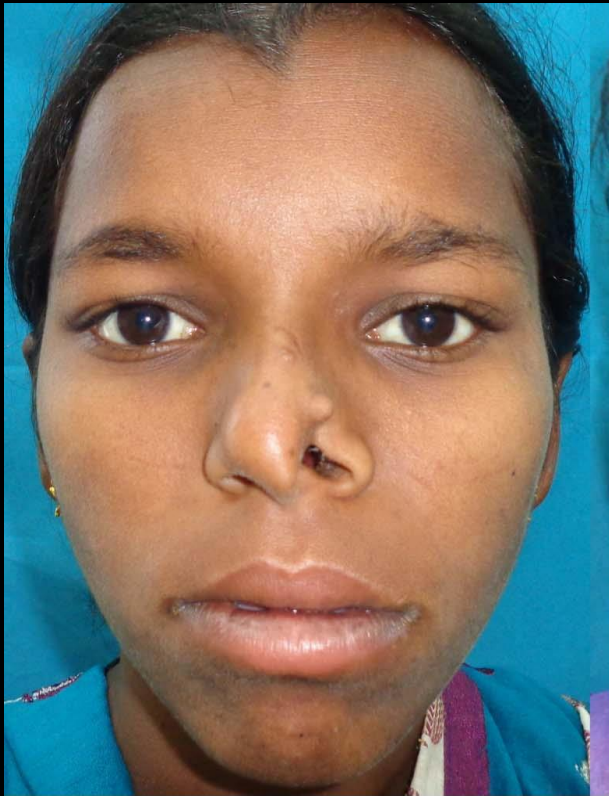
# Craniofacial Clefts

## Soft Tissue Defects



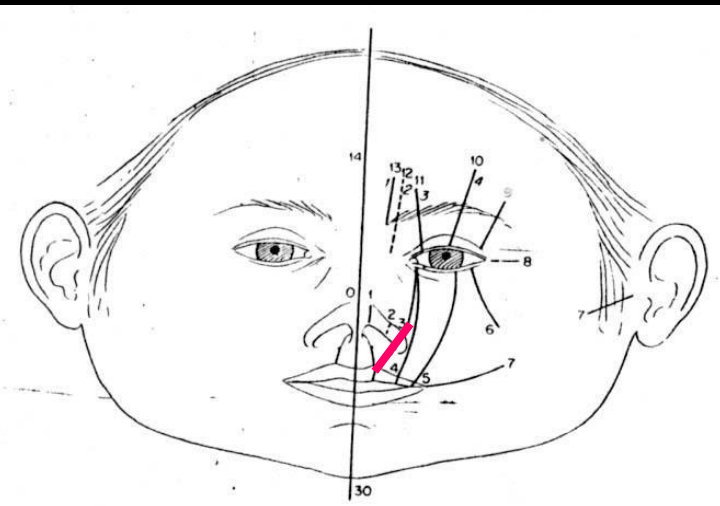
Tessier # 2 facial cleft

Minimal to severe notch





# Craniofacial Clefts Soft Tissue Defects



Tessier # 3 facial cleft



B/L Tessier # 3  
with ocular involvement



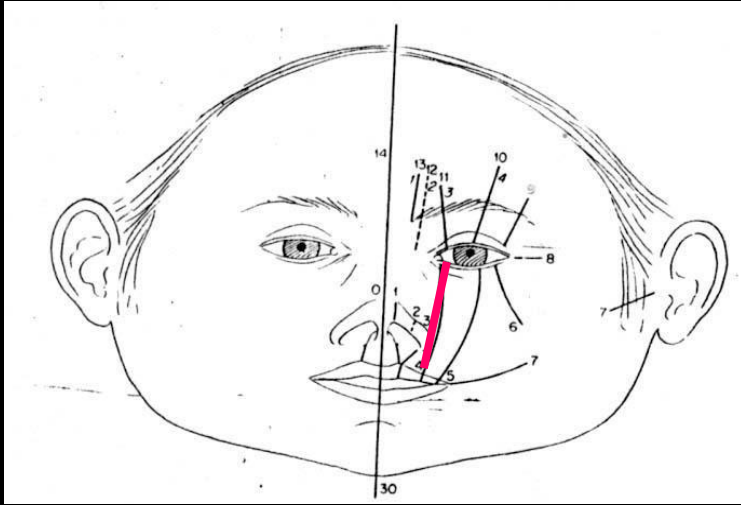
U/L Tessier # 3



U/L Tessier # 3  
With Oral Involvement



# Craniofacial Clefts Soft Tissue Defects



Unilateral Tessier #4 facial cleft



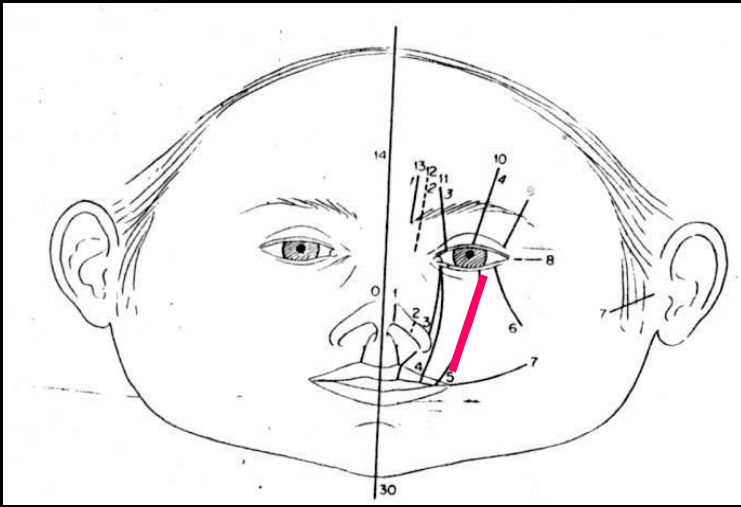
Bilateral Tessier #4 facial cleft





# Craniofacial Clefts Soft Tissue Defects

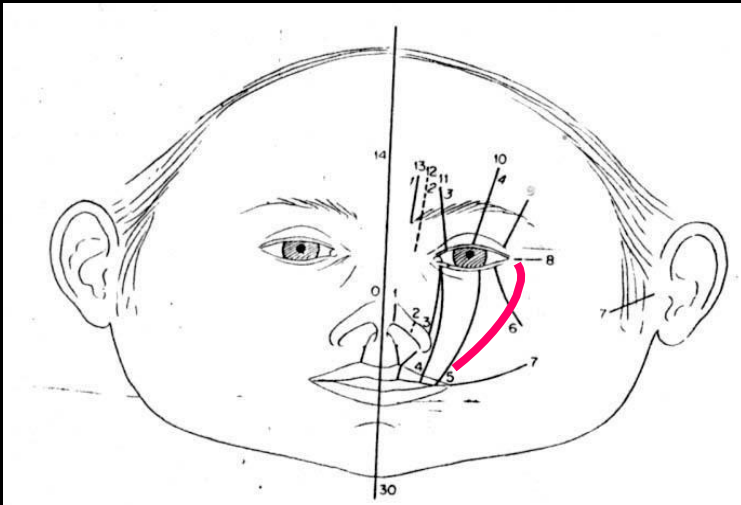
Tessier #5 facial cleft





# Craniofacial Clefts Soft Tissue Defects

Tessier #6 facial cleft



U/L Tessier #6

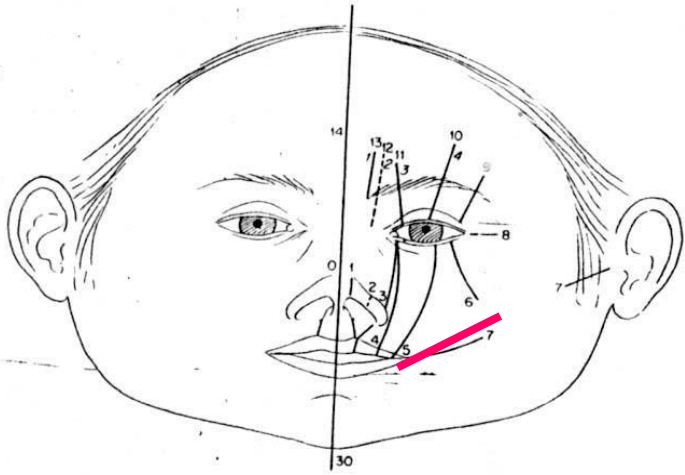


B/L Tessier #5 & #6



# Craniofacial Clefts Soft Tissue Defects

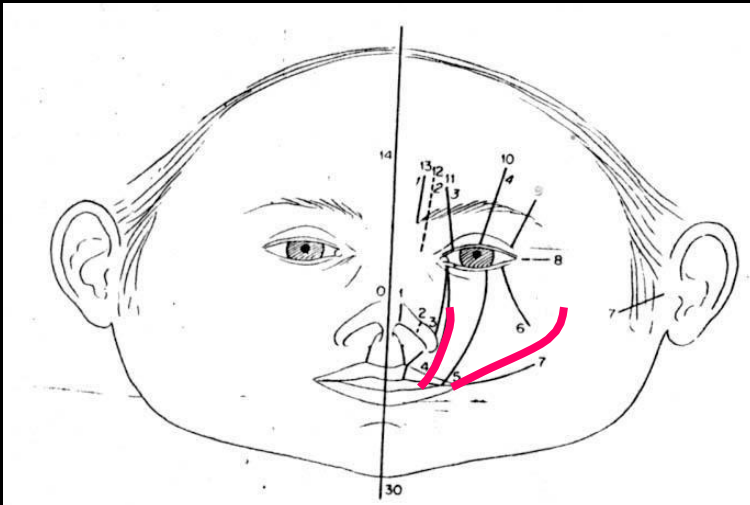
Tessier #7 facial cleft





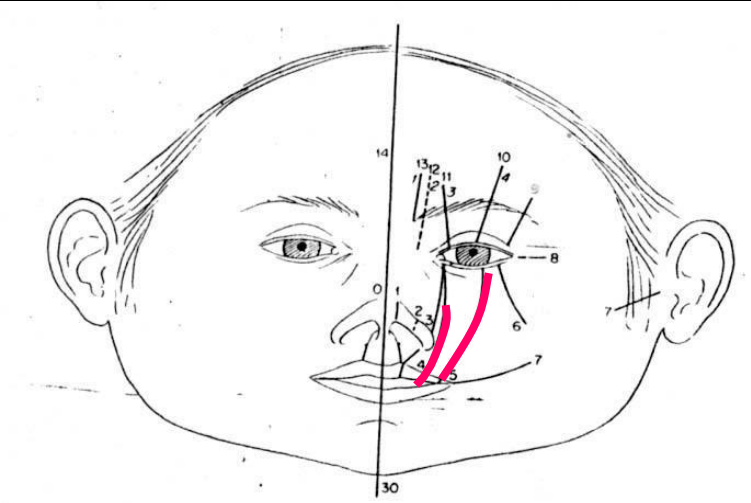
# Craniofacial Clefts Soft Tissue Defects

Tessier # 1, 4, 7 Facial Cleft



# Craniofacial Clefts

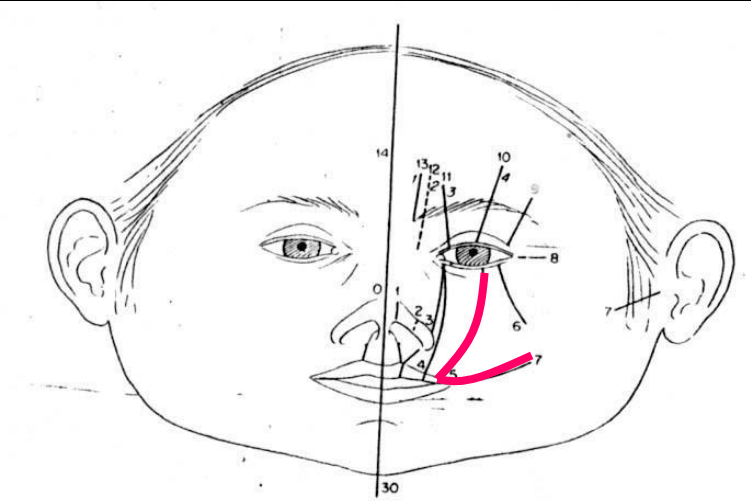
## Soft Tissue Defects



Tessier #4, #5 Facial Cleft



# Craniofacial Clefts Soft Tissue Defects



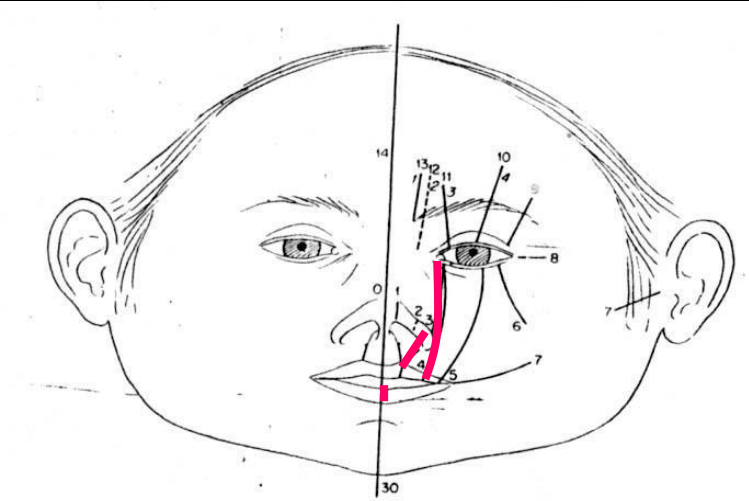
Tessier #5, #7 facial cleft





# Craniofacial Clefts

## Soft Tissue Defects



Bilateral Tessier # 3, # 4, # 30 Facial Cleft





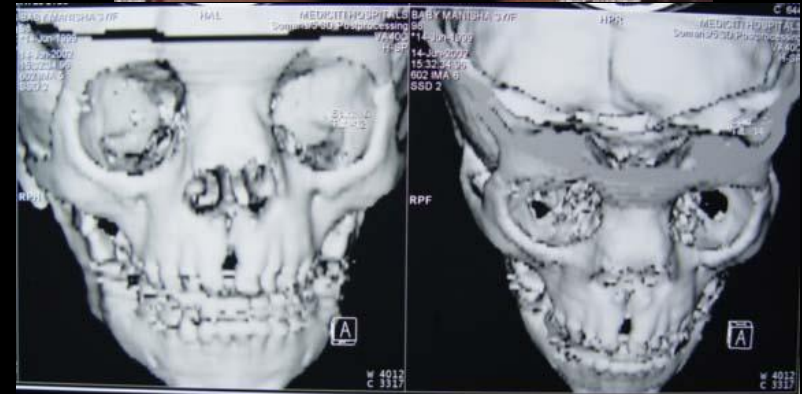
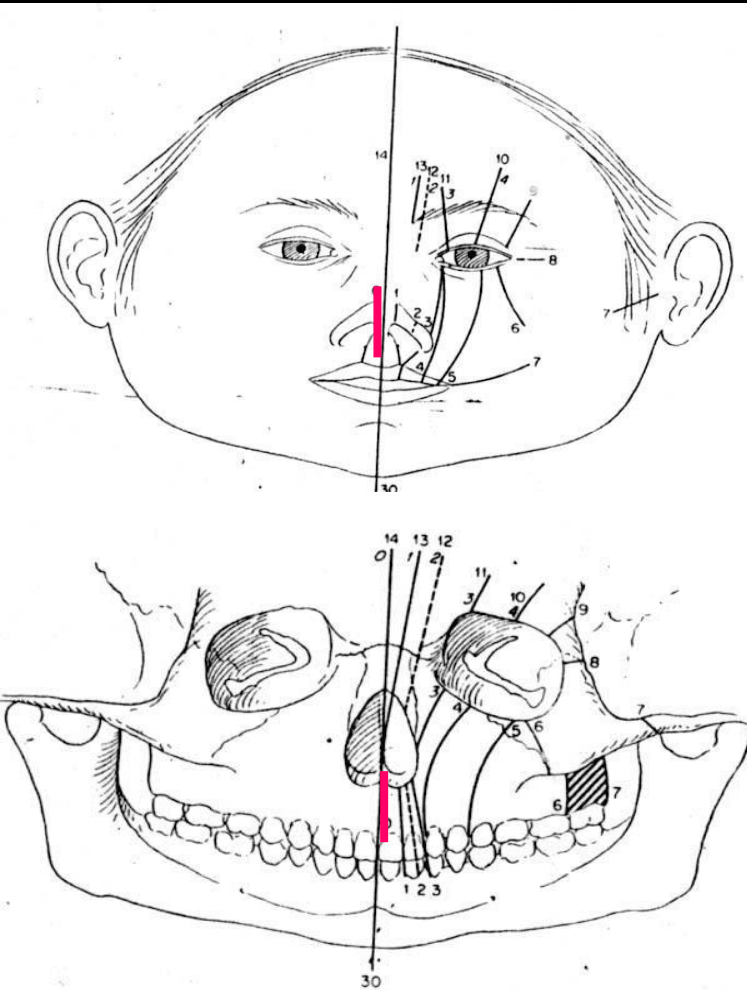
# Craniofacial Clefts

## Soft and Hard Tissue Defects



# Craniofacial Clefts

## Soft and Hard Tissue Defects

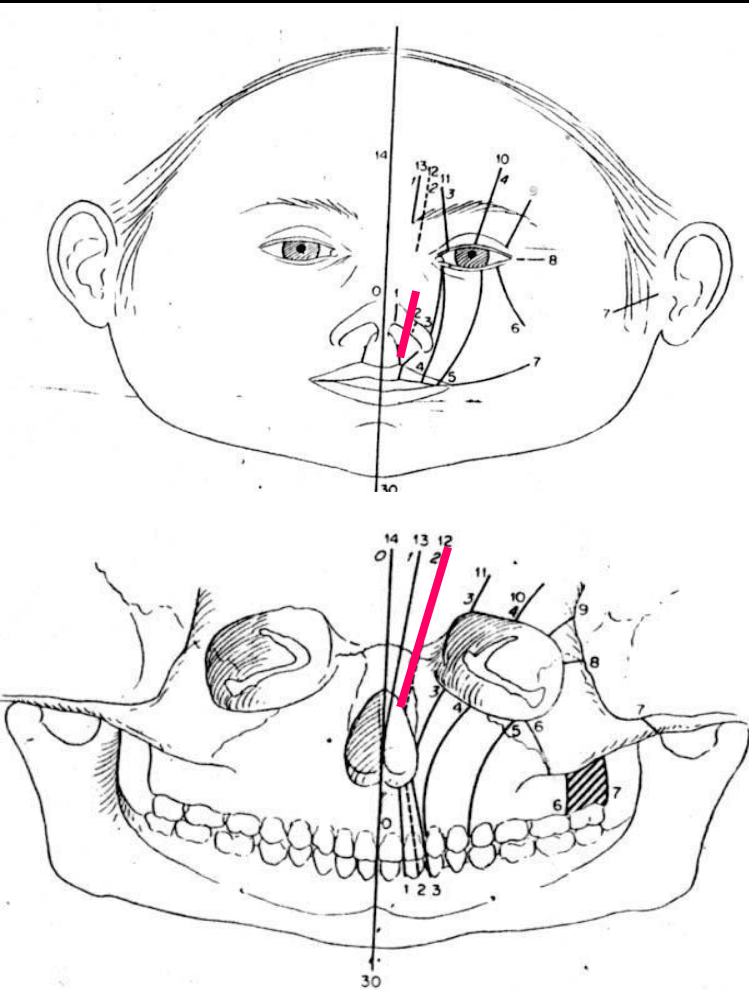


Tessier #0 facial cleft



# Craniofacial Clefts

## Soft and Hard Tissue Defects

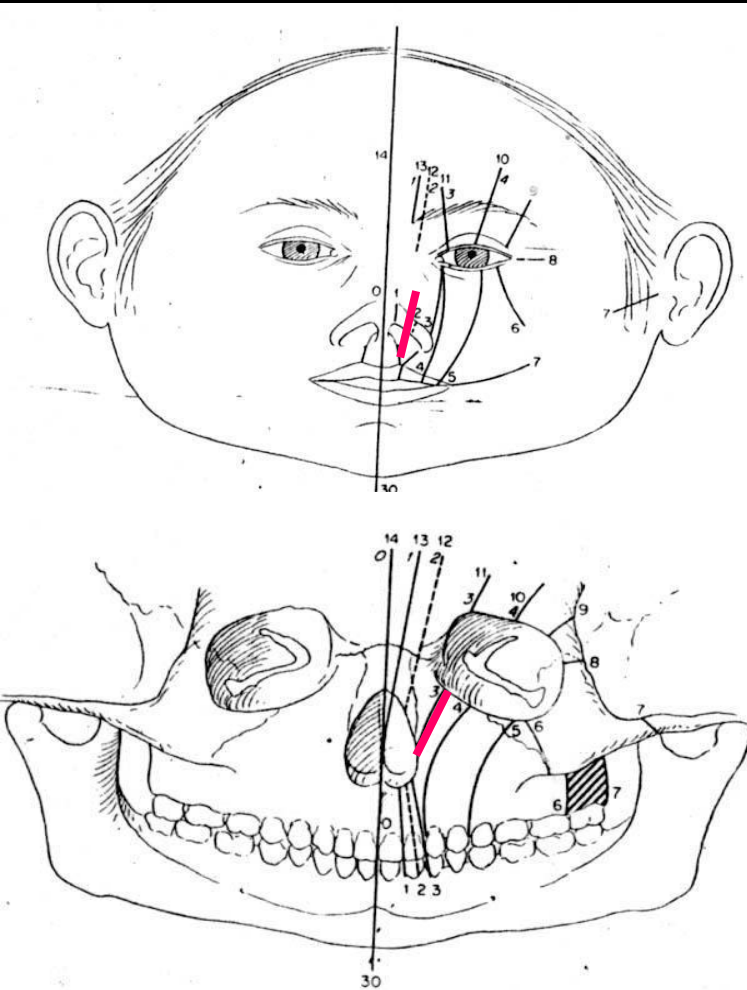


Tessier # 2 facial cleft



# Craniofacial Clefts

## Soft and Hard Tissue Defects



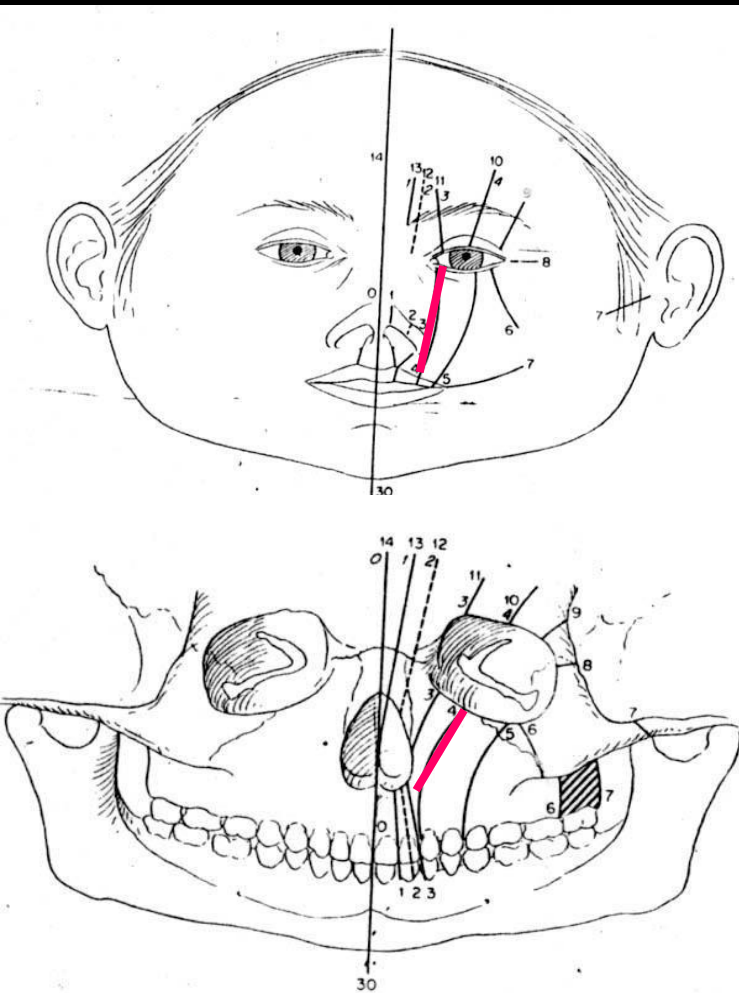
Tessier # 3 facial cleft





# Craniofacial Clefts

## Soft and Hard Tissue Defects

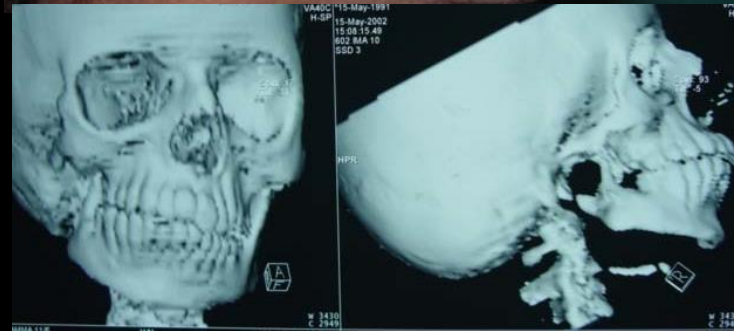
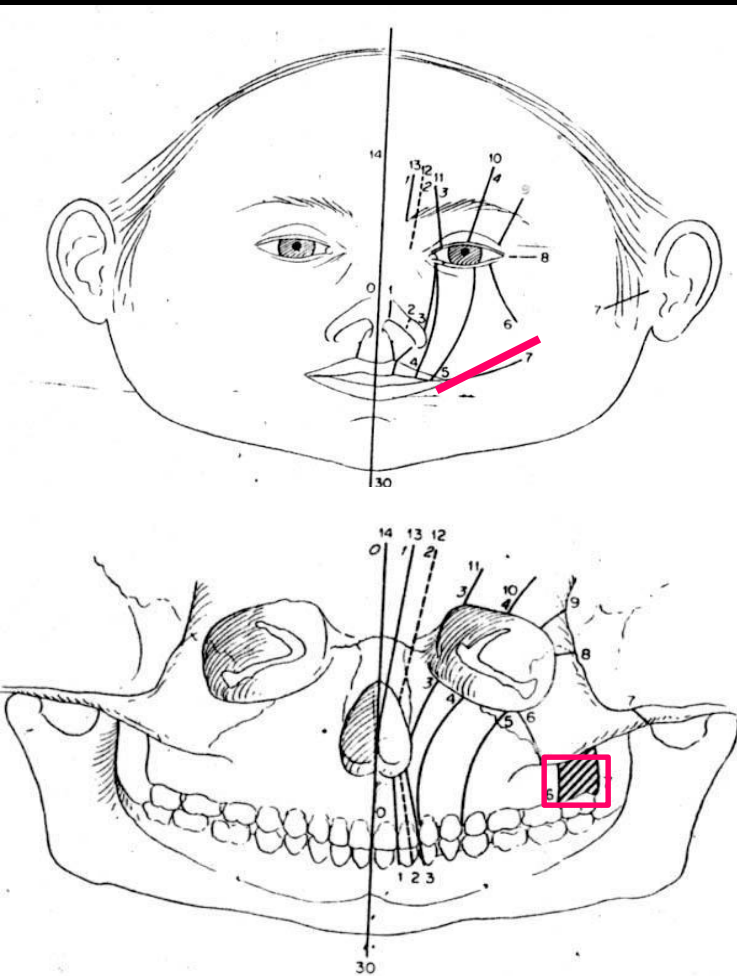


Unilateral Tessier #4 facial cleft



# Craniofacial Clefts

## Soft and Hard Tissue Defects



Tessier #7 facial cleft

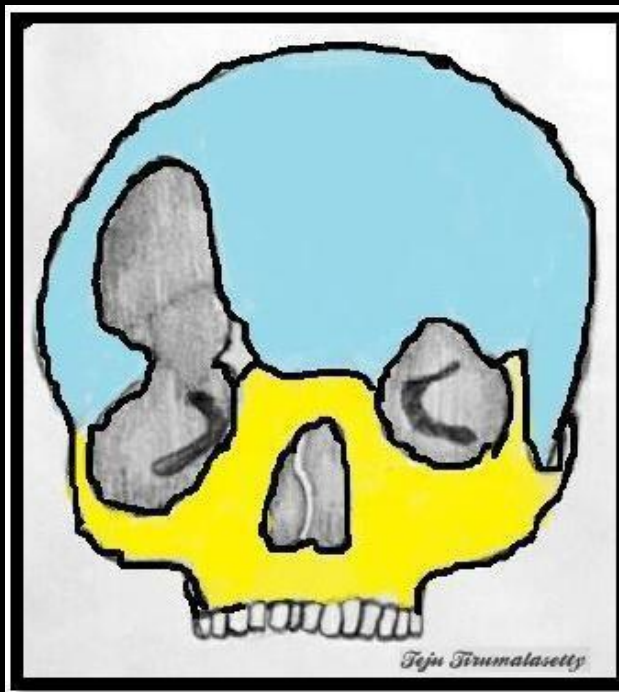
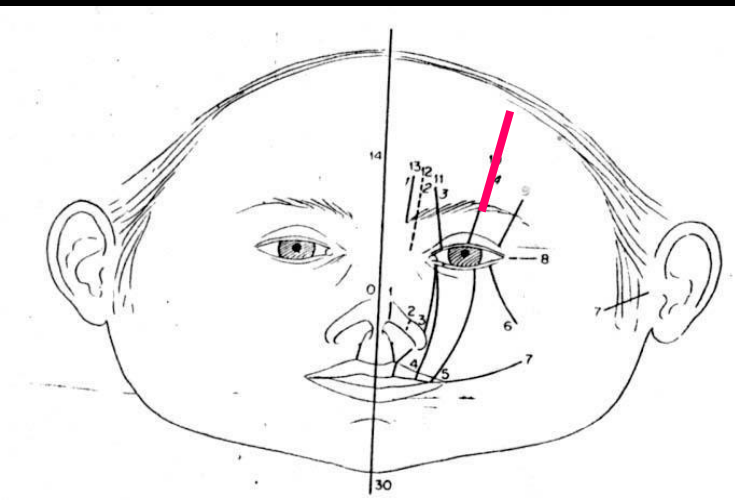




# Craniofacial Clefts

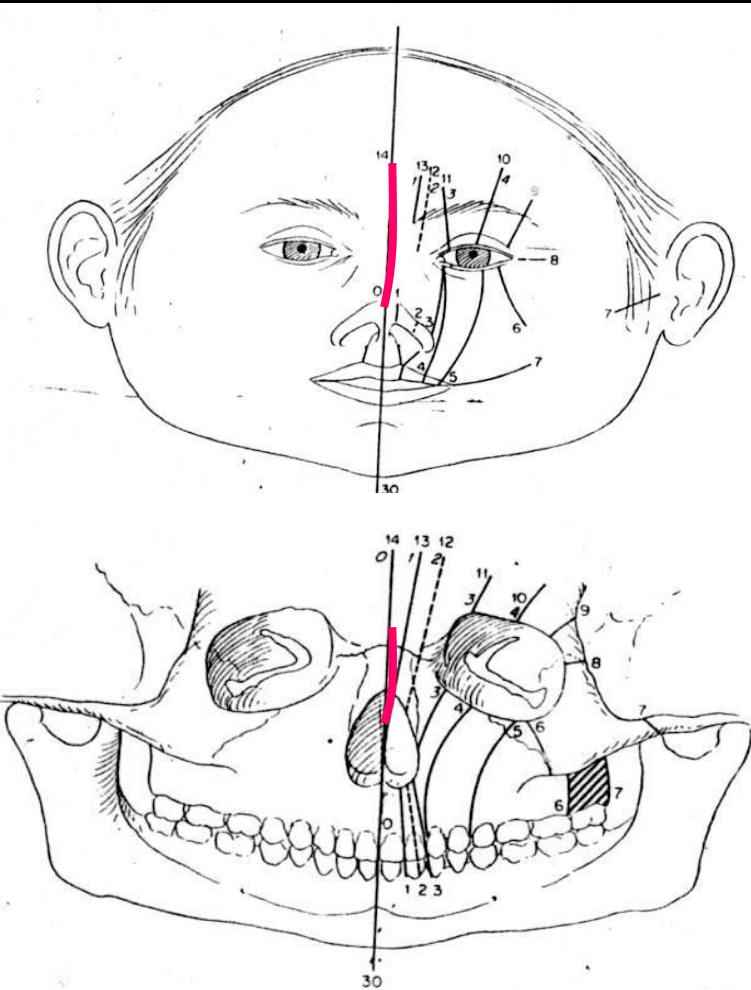
## Soft and Hard Tissue Defects

Tessier # 10 facial cleft



# Craniofacial Clefts

## Soft and Hard Tissue Defects

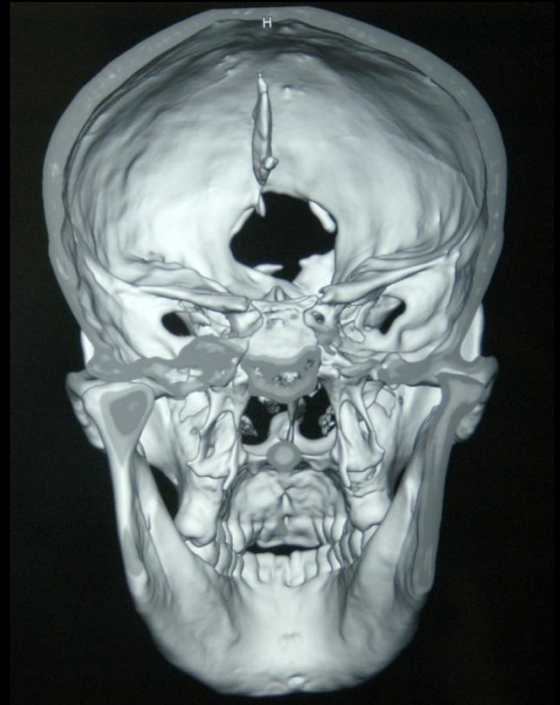
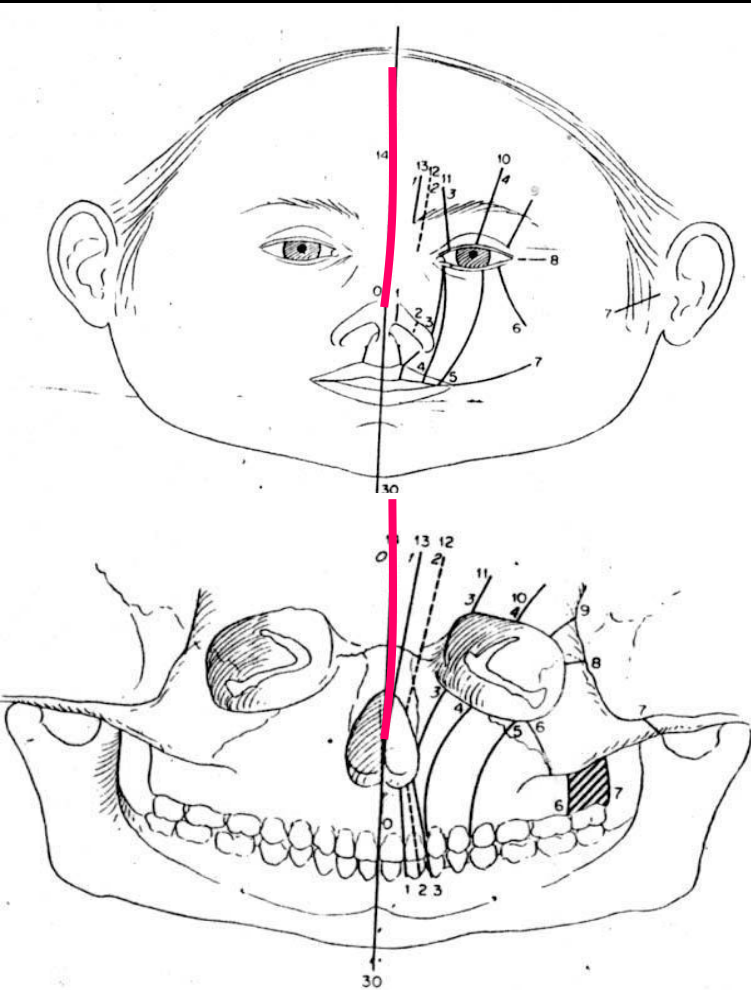


Tessier # 0-14 Facial Cleft with Orbital Hypertelorism



# Craniofacial Clefts

## Soft and Hard Tissue Defects



Tessier # 14 Facial Cleft with frontal  
Encephalocele



# MANAGEMENT OF CRANIOFACIAL CLEFTS



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# Principles of craniofacial cleft management

1. Soft tissue

2. Hard tissue





# PRINCIPLES OF MANAGEMENT

## Soft Tissue Management

**Lip**      Vermilion notch  
              Philtral Height  
              Collumellar Height

**Nose**     Symmetrical Ala  
              Projecting Nasal Tip  
              Naso Labial Folds

**Eye**       Medial Canthal Ligament  
              Repositioning of Tarsal plates  
              Repositioning of the Lacrimal puncta  
              Excision and removal of the colobomas of eyes  
              Recreation of sufficient conjunctiva





# Principles of craniofacial facial cleft management

## Hard Tissue Management

Bone grafting and other hard tissue surgery like

Resection of encephaloceles

Hypertelorism correction

Orthognathic Surgery/Distractive Surgery



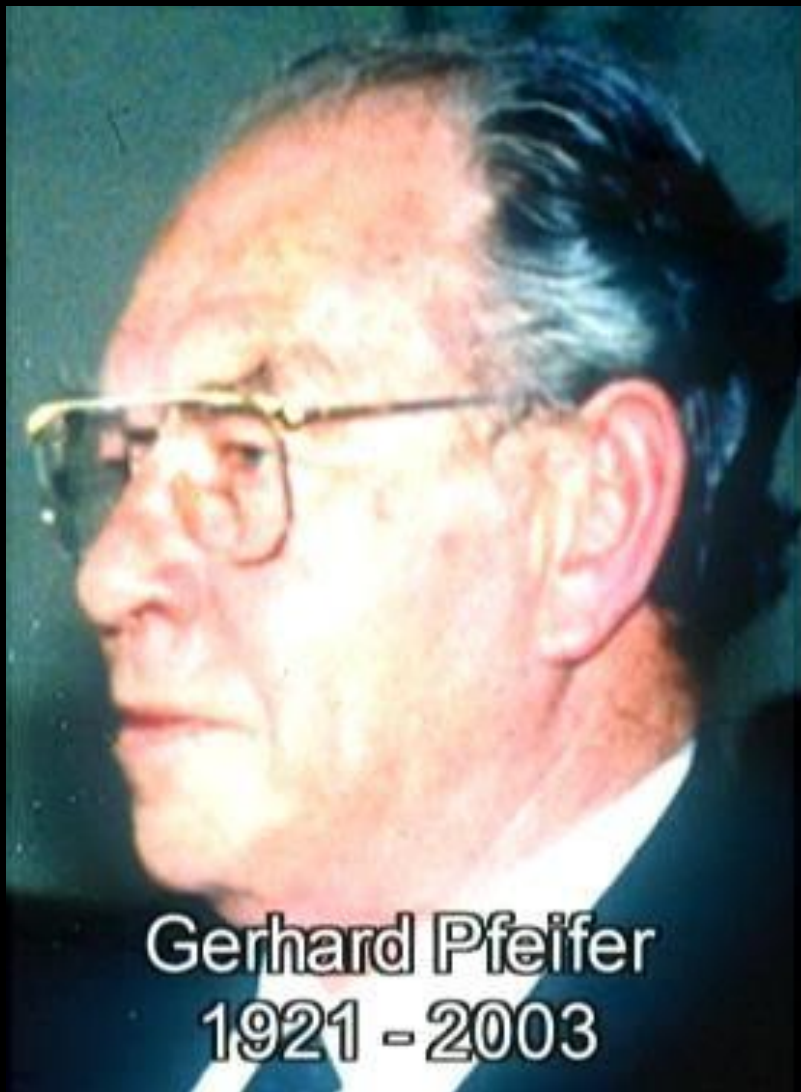
# Principles of facial cleft management

## SOFT TISSUE MANAGEMENT



# PFEIFER WAVE LINE INCISION ON THE FACE





## Teratological Regions of the Head



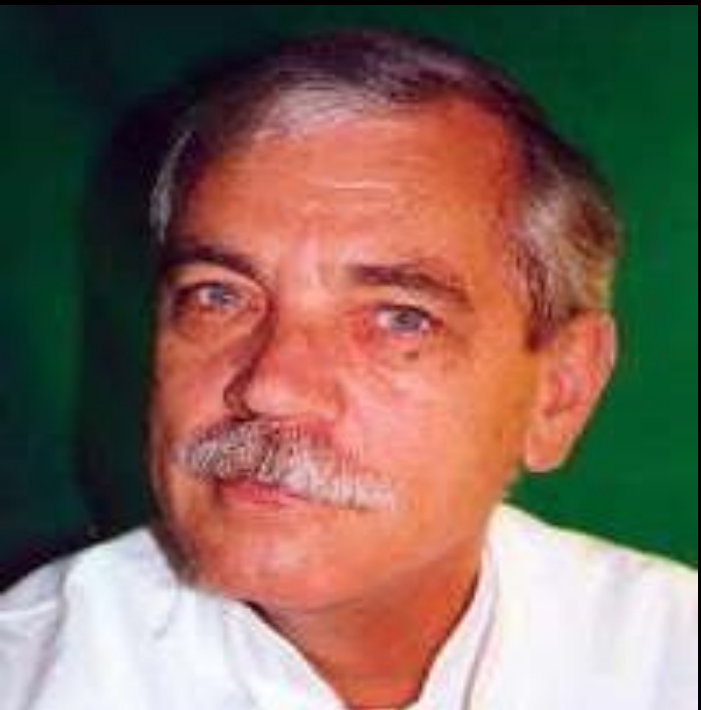
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Prof. Dr. Johannes Schubert, Former Director,  
Division of Cranio-maxillofacial Surgery, University Hospital,  
Halle Germany

Prof. Schubert introduced me to the work of Prof. Gerhard Pfeifer on a visit to my center in Hyderabad in 2002.



Prof. Dr. Karsten Gundlach, Former Director,  
Division of Cranio-maxillofacial Surgery, University Hospital,  
Rostok Germany

In 2003, When I visited University Hospital Rostok Prof. Gundlach gave me publications that Prof Pfeifer and he did while they were in University Hospital, Hamburg.



# Pfeifer wave line incision in cleft lip surgery

The wave line incision is a very simple incision with corresponding waves on the cleft and non cleft sides.

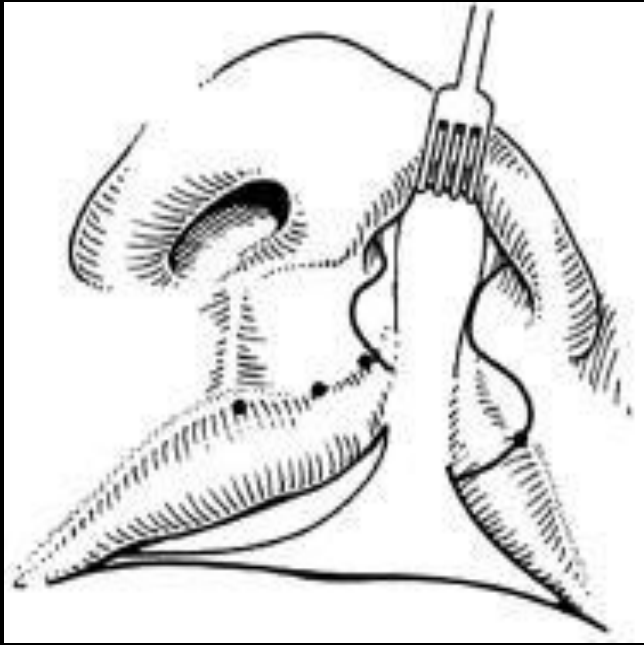
This simple incision line needs very few measurements

More importantly it produces a straight line scar that conforms almost to the philtral columns.

Over a twenty year period our unit used the Pfeifer wave line incision extensively to repair cleft lips both unilateral and bilateral and both incomplete and complete.



# Pfeifer's Incision for Unilateral Cleft Lip (2000-2003)



Produces better results

- where the height of the lip on the cleft side was greater and
- where the columella height and width were greater than mean values

Source:

Choice of Incision for Primary Repair of Unilateral Complete Cleft Lip: A Comparative Study of Outcomes in 796 Patients.

GoslaSrinivas Reddy et. al.; Plastic Reconstr. Surg.; 121: 932, 2008



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## Choice of Incision for Primary Repair of Unilateral Complete Cleft Lip: A Comparative Study of Outcomes in 796 Patients

Gosia Srinivas Reddy, B.D.S.,  
M.D.S.

Roger M. Webb, F.D.S.,  
R.C.S., M.R.C.S.

Ragupathi R. Reddy, B.D.S.

Likith V. Reddy, D.D.S., M.D.

Peter Thomas, B.Sc. (Hons.),  
Ph.D.

A. F. Markus, F.D.S.R.C.P.S.,  
F.D.S.R.C.P.S.

Hyderabad, India; Paed,  
Craniofacial, and University, Ohio

**Background:** No one technique of cleft lip repair consistently produces ideal aesthetic and functional results. This study was carried out in a developing, high-volume center. It compares outcomes attained using two different designs of skin incision used for primary closure of unilateral complete cleft lip and sought to identify the most appropriate technique for clefts of varying morphology.

**Methods:** Seven hundred ninety-six patients were entered into the study. In each group of slightly less than 400 patients, either a modified Millard or Pfeiffer way line incision was used, both in conjunction with functional repair of the underlying tissues as described by Delaire. Soft-tissue measurements of the lip and nose were recorded preoperatively. Analysis was based on postoperative assessment of the white roll, vermillion border, scar, Cupid's bow, lip length, and nostril symmetry and appearance of the alar dome and base.

**Results:** Comparison of the two cohorts using Pearson chi-square testing for association and linear trend found a Millard incision gave significantly better results for vermillion match, whereas the Pfeiffer method led to a better postoperative lip length. Preconceptions that one particular technique was better suited to certain preoperative cleft anatomical forms were not proven statistically.

**Conclusions:** Certain preoperative anatomical features may lead the surgeon to choose one particular incision pattern in preference to another, but in this study, it was found that one technique was essentially as good as the other. This suggests that the technique for closure of the underlying tissues is probably of more importance. (*Plast. Reconstr. Surg.* 121: 932, 2008.)

**S**urgeons have repaired the deformity of cleft lip for the past 2000 years, since the first attempt performed during the Chin Dynasty in China.<sup>1</sup> Many techniques have been used since that time, and it is clearly apparent that no agreement exists as to which represents the optimum method.

Historically, incisions have been either straight line or broken line, but more recently, in the twentieth century, flap design developed over two distinct periods. In the first, up to 1949, and including Le Mesurier,<sup>2</sup> lengthening of the lip on the left side was

achieved with some sacrifice of the ipsilateral Cupid's bow. This maneuver, however, tended to produce an aesthetically unfavorable peaking of the lip. In the second half of the century, several attempts were made to counter this shortcoming. Tennison<sup>3</sup> utilized a triangular flap on the external surface of the lower margin of the lip, while Pent and Psamme<sup>4</sup> used a superiorly based flap. Nevertheless, because of scar contracture, this latter approach also produced unacceptable aesthetic outcomes. A combination of superior and inferior flaps was used by Trauner<sup>5</sup> and Skoog<sup>6</sup> to counter these problems. A further alternative was described by Malek,<sup>7</sup> who used a flap based on a precisely measured equilateral triangle to achieve perfect equality in the length of

From the GSR Institute of Craniofacial Surgery, the South Coast Higher Surgical Training Program in Maxillofacial Surgery, the Division of Oral and Maxillofacial Surgery, University of Cincinnati, Dorsal Research and Development Support Unit, Bournemouth University, and Dorsal Cleft Center.

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**Disclosure:** None of the authors has any financial interest in this work, and no competing interests are declared.

- The Millard flap produced better results when there was a need to rotate the cupid's bow
- Pfeiffer's design produced better results in the vertical elongation of the lip

It was found that one technique was essentially as good as the other.

Choice of Incision for Primary Repair of Unilateral Complete Cleft Lip: A Comparative Study of Outcomes in 796 Patients.  
Plastic and Reconstructive Surgery 121: 932, 2008





# An incision utilizing the advantages of both Millard and Pfeifer incision

## Afroze incision

- Developed to address the problem of **lip length discrepancy and vermillion matching** using only one incision.
- Combined the **Millard incision on the non-cleft side** (medial side) and the **Pfeifer incision on the cleft side** (lateral side).
- **Millard incision** on the non-cleft side **aids rotation** and the **Pfeifer incision** on the cleft side **aids lengthening** trying to address horizontal and vertical discrepancies of the lip.

Source:

Afroze Incision for Functional Cheiloplasty, Technical Note

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



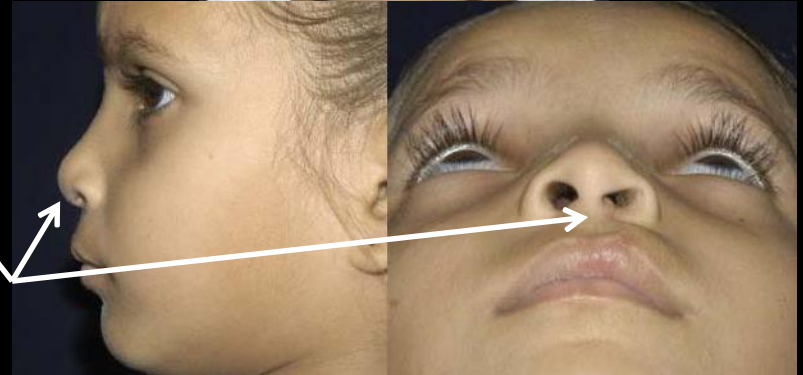
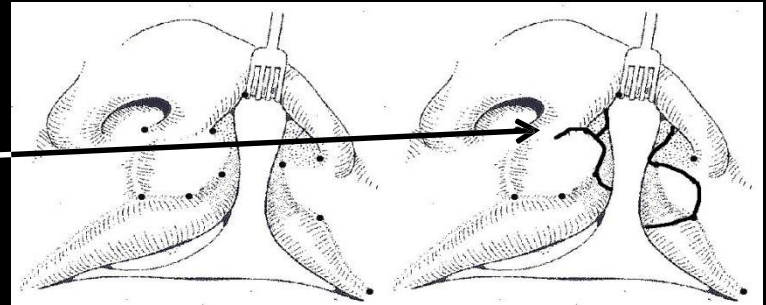
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# Afroze Incision

The Afroze incision **does not cross onto the base of columella.**

Incisions which cross the columella cause scarring leading to growth retardation and severe downward pull of the columella on affected side

The Afroze incision separates the medial part of ala on cleft side and its associated mal-aligned muscle to further lift the tip of the nose and improve the alar contour and reduce the webbing in the nose



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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## Afroze Incision for Functional Cheiloseptoplasty

Gosla Srinivas Reddy, DDS, MD,\* Rajgopal R. Reddy, BDS, MBBS,\* Nilesh Pagaria, BDS, MDS,\*  
and Stefan Berge, MD, DD, PhD†

**Abstract:** Repair of unilateral cleft lip is a fascinating and challenging procedure. Although a great number of operations have been described for the unilateral cleft lip repair, none fulfill all the plastic surgical criteria, and in most cases, cleft lip repairs require secondary operations in an attempt to achieve described goals of primary cheiloplasty. The Afroze incision is a combination of 2 incisions, that is, the Millard incision on the noncleft side and Pfeiffer incision on the cleft side. The flap design is the Millard flap on the noncleft side rotated downward, and the peak of the distal curve of the Pfeiffer flap is positioned in the triangular defect formed by the movement of the Millard flap. The proximal curve lengthens downward to receive the Millard's "C" flap. The advantage of this technique is that there is no tension on the postoperative scar because the incision is essentially horizontal in nature, and the contracture of the scar occurs horizontally rather than vertically. Primary septal repositioning is performed, which provides stability and exact positioning of the previously lifted alar crus of the cleft side and nasal tip, and the nose can grow in a balanced way with equal muscular force being exerted on both sides. This incision can be used in all types of complete unilateral cleft lip regardless of the width of the cleft, shortening the cleft lip segment.

**Key Words:** Complete unilateral cleft lip, Afroze incision, cheiloseptoplasty

*J Craniofac Surg* 2009;20: 1733-1736

Repair of unilateral cleft lip is a fascinating and challenging procedure. The aims of a unilateral cleft lip repair are to achieve a lip length on the cleft side matching that on the normal side, an inconspicuous residual scar that does not cross anatomic boundaries, an adequate Cupid's bow width, an absence of notching of the vermilion border (whistle tip deformity), and an absence of peaking of the vermilion at the Cupid's bow on the cleft side. Although a great number of operations have been described for the unilateral

cleft lip repair, none fulfill all the above criteria, and in most cases, cleft lip repairs require secondary operations in an attempt to achieve this described goal.

The Millard repair is based on a rotation flap on the noncleft (medial) side coupled with an advancement flap on the cleft (lateral) side. One of its main advantages is that the technique allows adjustment as the operation proceeds, with further rotation and advancement movements tailored to the individual case. It requires the approximation of a pair of convex curves that ultimately may leave a scar crossing the midline at the base of the columella. The Pfeiffer incision is designed using the concept of "morphologic order." Measurements of noncleft side height and length are recorded and translated to the cleft side using a flexible wire, thus determining natural anatomic points. The 2 curves are brought together such that the highest and lowest points of 1 curve are approximated with the corresponding highest and lowest points of the other, thus creating a straight line.

On comparison of the 2 techniques, each has its own advantages and shortcomings. The Millard flap produced better results when considering vermilion approximation. In this respect, it is rather more flexible than a straight line design, and the operator is able to position the rotation flap on the noncleft side where it is judged likely to produce the best outcome. This technique also has an improved outcome where preoperatively the lip is wider on the noncleft side. This would lead to a reduction in rotational requirement of the flap on the medial side, resulting in less distortion and a Cupid's bow with better form. Repairs using flaps according to Pfeiffer's design resulted in a better length of lip postoperatively. By its nature, the more waves incorporated in the incision, the greater the height of the lip. A prominent wave placed just above the mucocutaneous junction will tend to exaggerate this factor.

Afroze incision is a combination of 2 incisions: Millard incision on the noncleft side and Pfeiffer incision on the cleft side. The flap design is such that Millard flap on the noncleft side is rotated downward, and the peak of the distal curve of the Pfeiffer flap is positioned in the triangular defect formed by the movement of the Millard flap. The proximal curve lengthens downward to receive the Millard's "C" flap. The advantage of this technique is that there is no tension on the postoperative scar because the incision is essentially horizontal in nature and the contracture of the scar occurs horizontally rather than vertically. There is also no pressure on the Cupid's bow for the same reason.

### INCISION MARKING

On the noncleft side, the Cupid's bow is marked by 3 points. Point 1 is the highest point on the contralateral white roll, point 2 is the deepest point on the white roll, point 3 is marked on the white roll at a distance that is 2 mm more than the distance between points 1 and 2.

On the cleft side, point 4 is marked at a point where the white roll begins to fade (Figs. 1-3).

The Millard incision on the noncleft side is extended from point 3 along the junction of skin and vermilion mucosa and further

From the \*DSR Institute of Craniofacial Surgery Hyderabad, Andhra Pradesh, India, and †Radboud University Nijmegen Medical Centre, Nijmegen, the Netherlands.

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Address correspondence and reprint requests to Gosla Srinivas Reddy,

DDS, MD, DSR Institute of Craniofacial Surgery, Postal Address:

17-1-383/55, Vinay Nagar Colony, 1 N. radon, Saidabad, Hyderabad.

Andhra Pradesh 500059, India; E-mail: gosla@craniofacialinstitute.org

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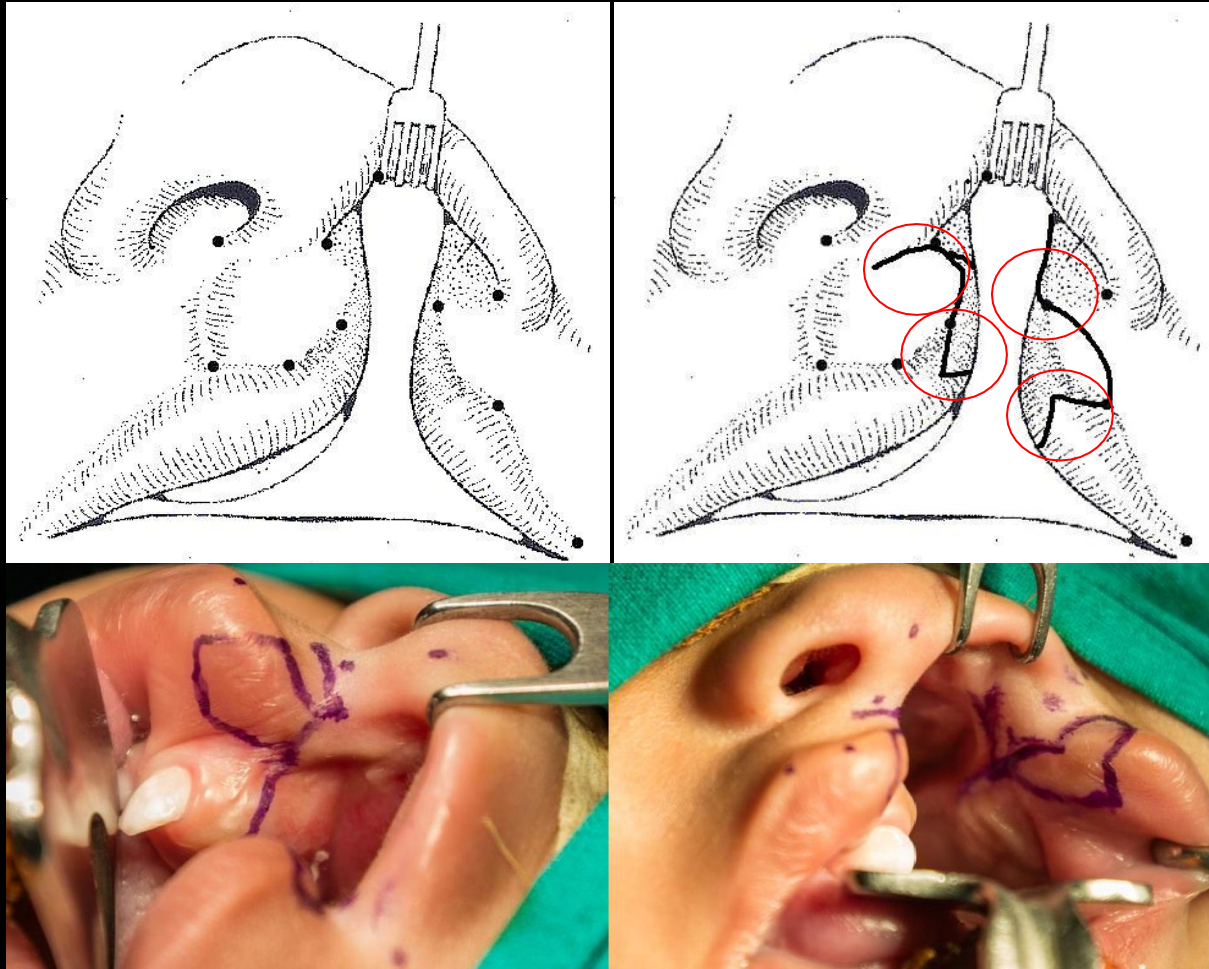
Afroze Incision for Functional Cheiloplasty,  
*J. Craniofac. Surg.* 20(8):1733-1736, September 2009.



[www.craniofacialinstitute.org](http://www.craniofacialinstitute.org)

# Morpho-functional Cleft Lip Repair

## Incision design for unilateral cleft lip surgery



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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## Comparison of Three Incisions to Repair Complete Unilateral Cleft Lip

Srinivas Gada Reddy, M.D.S.,  
M.B.B.S.

Rajagopal R. Reddy, B.D.S.,  
M.B.B.S.

Eswari M. Brankibasi, Ph.D.  
Rajendra Prasad, B.D.S.,  
M.D.S.

Anne Marie Knijgers Jagtman,  
D.D.S., Ph.D.

Sietaan Berge, M.D., D.D.S.,  
Ph.D.

*Hyderabad and Bangalore,  
Karnataka, India, and Nijmegen,  
The Netherlands*

**Background:** The incision design for correcting a unilateral cleft lip is important because all subsequent stages of surgery depend on the access and maneuverability of the incision. This prospective cohort study compares the aesthetic and functional outcomes of three different skin incisions for primary unilateral cleft lip repair.

**Methods:** Patients with complete unilateral cleft lips ( $n = 1200$ ) were enrolled and divided into three groups of 400 patients. Each group of patients was operated on with the Millard incision, Pfeiffer wave line incision, or Afroze incision. Outcome assessments were performed 2 years postoperatively and consisted of assessment of the white roll, vermillion border, scar, Cupid's bow, lip length, nostril symmetry, and appearance of alar dome and base.

**Results:** With regard to white roll, vermillion border, scar, Cupid's bow, and lip length, the Afroze incision always gave superior results compared with the Millard or Pfeiffer incision. Depending on the cut-off for treatment success, the Afroze incision also showed better results regarding nostril symmetry. With respect to the alar base and alar dome, all three incisions showed comparable outcomes.

**Conclusion:** The Afroze incision is superior regarding a broad spectrum of outcomes in a heterogeneous population of patients with unilateral cleft lip. (*Plast. Reconstr. Surg.* 125: 1208, 2010.)

The anatomical basis for a cleft lip defect is far removed from the normal orientation. Compared with the noncleft patient, the three groups of superficial facial muscles (i.e., the nasolabial, bilabial, and labiomental) are all displaced inferiorly. The orbicularis oris muscle finds a new and abnormal insertion on the cleft side and a partially distorted insertion on the noncleft side.<sup>1</sup> The Cupid's bow on the cleft side and the white skin roll on both sides are also distorted.<sup>1</sup> The treatment goals for cleft lip defects are early correction of the cleft, with primary correction to a tension-free, mobile, and balanced lip.<sup>1</sup>

The repair of any cleft lip deformity should take not just incision lines into account. A functional anatomical repair of the underlying hard

and soft tissues is essential. Manipulation and repositioning of the microcutaneous tissues must be addressed only once sound foundations have been laid. A primary surgical approach that allows natural facial growth and development, minimizing the need for future secondary procedures, should be every cleft surgeon's goal.<sup>2</sup>

Many surgical techniques and flap designs have been documented to repair unilateral cleft lips.<sup>2-10</sup> Probably the most commonly used is the rotation-advancement technique described by Millard.<sup>11,12</sup> The Millard incision is based on a rotation flap on the noncleft side coupled with an advancement flap on the cleft side.<sup>11,12</sup> In one form or another, it is the most widely practiced method today.<sup>3</sup>

The Pfeiffer incision is designed using the concept of "morphologic order."<sup>3</sup> Measurements of the noncleft side height and length are recorded and translated to the cleft side using a flexible wire, thus determining natural anatomical points.

**Disclosure:** The authors have no financial interest in this work, and no competing interests are declared.

*From the GSR Institute of Craniofacial Surgery, the Department of Preventive and Curative Dentistry, Radboud University Nijmegen Medical Center; A. R. Shetty Memorial Dental College and Hospital; and the Department of Orthodontics and Oral Biology, Cleft Palate Craniofacial Unit, and the Department of Oral and Maxillofacial Surgery, Radboud University Nijmegen Medical Center. Received for publication June 12, 2009; accepted October 21, 2009.*

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Comparison of Three Incisions to Repair Complete Unilateral Cleft Lip.  
Plastic and Reconstructive Surgery, 125 (4): 1208-1216, 2010.



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# Comparison between Pfeifer/Millard/Afroze Incision

- With regard to white roll, vermilion border, scar, cupid's bow and lip length the Afroze incision always gave superior results compared to the Millard technique.
- This study showed the Afroze incision to be superior on a broad spectrum of outcomes in a heterogeneous population of unilateral complete cleft lip patients.

Source:

Gosla Reddy et al. Comparison of Three Incisions to Repair Complete Unilateral Cleft Lip. Plastic and Reconstructive Surgery, 125 (4): 1208-1216, April 2010.



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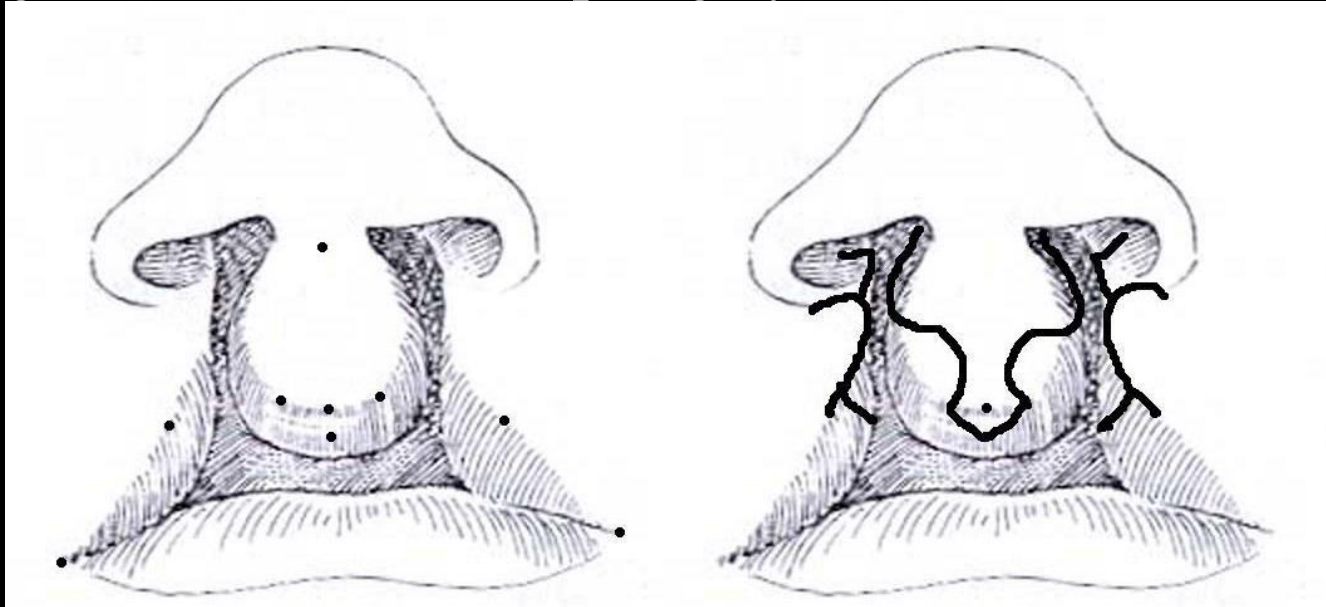
# Unilateral Cleft Lip Repair





# Bilateral Cleft Lip Repair

Incision design for bilateral cleft lip surgery





# Bilateral Cleft Lip Repair



Preoperative

5 days postoperatively

9 months postoperatively

3 years postoperatively



## A Comparative Study of Two Different Techniques for Complete Bilateral Cleft Lip Repair Using Two-Dimensional Photographic Analysis

Shrinwas Omka Raddy,  
M.B.B.S., M.D.S., Ph.D.  
Rajagopal R. Reddy,  
M.B.B.S., D.D.S.  
Mun J. Ziaee, M.D., D.D.S.  
Laksh V. Reddy, M.D., D.D.S.  
Anthony F. Markus,  
F.D.S.R.C.S., F.D.S.R.C.P.S.,  
F.R.C.S.  
Jeffrey J. Bergs, M.D.,  
D.D.S., Ph.D.  
*Addis Ababa, Ethiopia; India;  
Colago, Germany; New Orleans, La.;  
Bournemouth, United Kingdom; and  
Nijmegen, The Netherlands*



**N**o greater problem exists in the whole field of surgery than the successful treatment of patients suffering from complete, bilateral cleft lip-cleft palate repair.<sup>1</sup> The challenge is to construct the nasolabial complex in three dimensions, incorporating soft and hard tissue and

**Background:** The aim of this study was to compare the clinical outcomes of two techniques to repair complete bilateral cleft lip by using indirect two-dimensional photographic analysis.

**Methods:** One hundred eight bilateral cleft patients were included in this study. 54 patients operated on with the Millard technique and 54 patients operated on with the Afrose technique. Each group of patients was further separated into two subgroups containing symmetrical and asymmetrical cleft lips. All patients were photographed preoperatively and 4 years postoperatively in frontal and submentovertical views in a reproducible way. Eight measurements were performed on the photographs. From these measurements, seven ratios were calculated to compare the two techniques.

**Results:** The outcomes of the interobserver and intraobserver measurements were analyzed using the Pearson correlation test. There was a statistically significant reliability in the intraobserver and interobserver ratios. Analysis of the ratios was performed using the independent samples *t* test (5 percent level of significance). The authors found that the Afrose technique was better than the Millard technique in six of the seven parameters for symmetrical clefts and in four of the seven parameters for asymmetrical clefts; however, there was no statistically significant difference seen between the two techniques.

**Conclusions:** The Afrose technique seems to have good clinical outcomes on bilateral cleft lip patients, but more research and long-term follow-up are needed to determine the full outcome of the technique in various parameters. (Plast Reconstr Surg 132: 00, 2013.)

**CLINICAL QUESTION/LEVEL OF EVIDENCE:** Therapeutic, III.

*From the G.S.R. Hospital, Institute of Cranio-Maxillofacial and Facial Plastic Surgery; the Department of Plastic Surgery, Chong College Marikina, University Witten-Herbold; the Department of Oral and Maxillofacial Surgery, Louisiana State University Health Sciences Center; School of Dentistry, Nijmegen Hospital; and Radboud University Nijmegen Medical Center.*

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anticipating four-dimensional changes of growth and distortion.<sup>2</sup>

A number of surgical procedures with many variations for the repair of bilateral cleft lip are well described.<sup>3-5</sup> The Millard technique and its variations are extensively used to repair bilateral cleft lips.<sup>6</sup> The Afrose technique is based on a combination of a variation of the Millard technique on the cleft segment and a variation of the Pfeiffer technique on the prelabium. The aim of this study was to compare the clinical outcomes of the Millard technique and the Afrose technique by using indirect photographic measurements in complete bilateral cleft lips.

**Disclosure:** The authors have no financial interest or declare in relation to the contents of this article.

A comparative study of two different techniques for complete bilateral cleft lip repair using two-dimensional photographic analysis

Plastic and Reconstructive Surgery 2013





# Craniofacial Cleft Repair

## Flap Design

Local rotational flaps



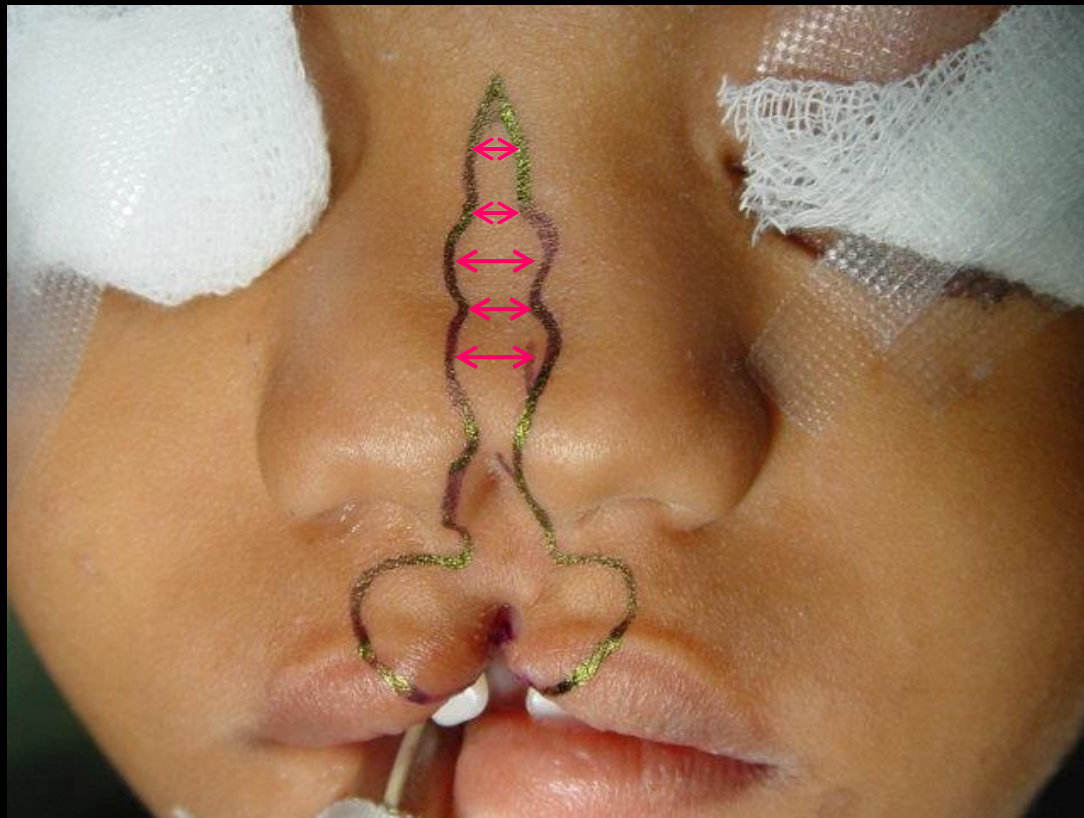
Z-plasty



# Craniofacial Cleft Repair

## Flap Design

Pfeifer wave design





# Craniofacial Cleft Repair

## Flap Design

Nasolabial Transposition Flap



Nasal Dorsum Rotational Flap



Forehead-Eyelid-Nasal Transposition Flap

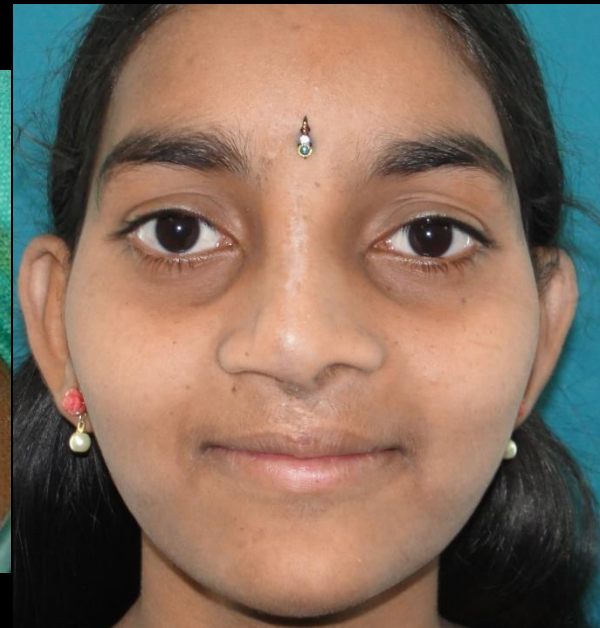


Designed in collaboration with  
Joachim Obwegeser



# Craniofacial Cleft Repair

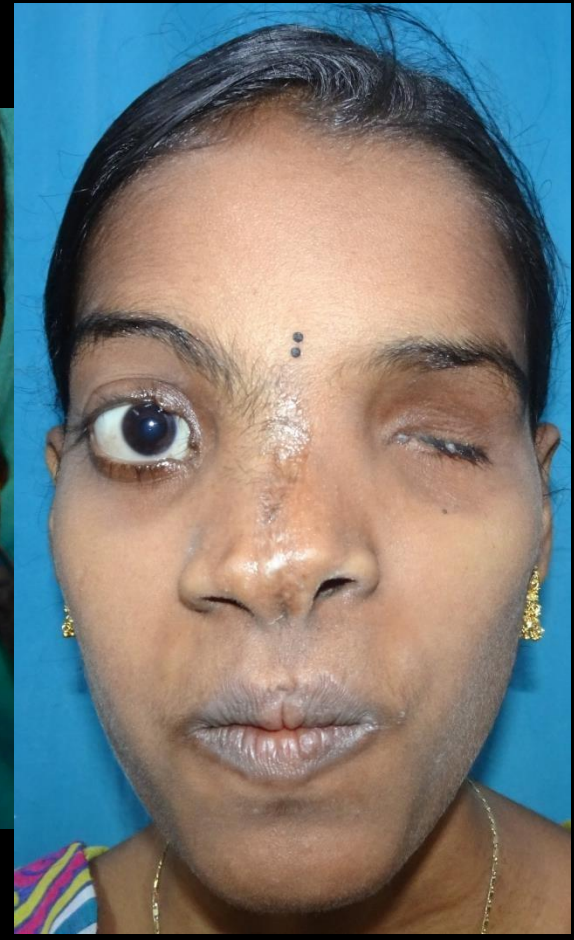
Tessier # 0-14 Facial Cleft





# Craniofacial Cleft Repair

Tessier # 0-14 Facial Cleft



# Craniofacial Cleft Repair

## Tessier # 2 Facial Cleft





# Craniofacial Cleft Repair

## Tessier # 2 Facial Cleft



# Craniofacial Cleft Repair

## Tessier # 2 Facial Cleft





# Craniofacial Cleft Repair

## Tessier #3 Facial Cleft



# Craniofacial Cleft Repair

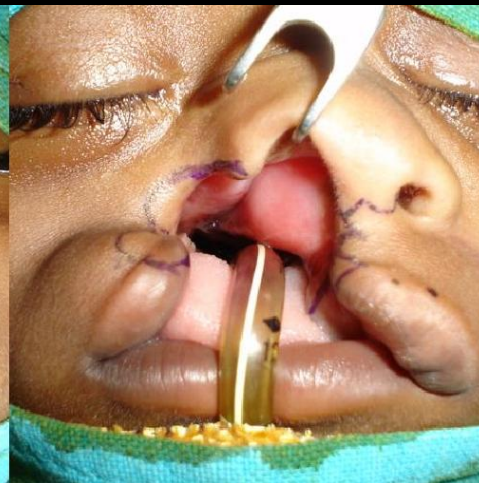
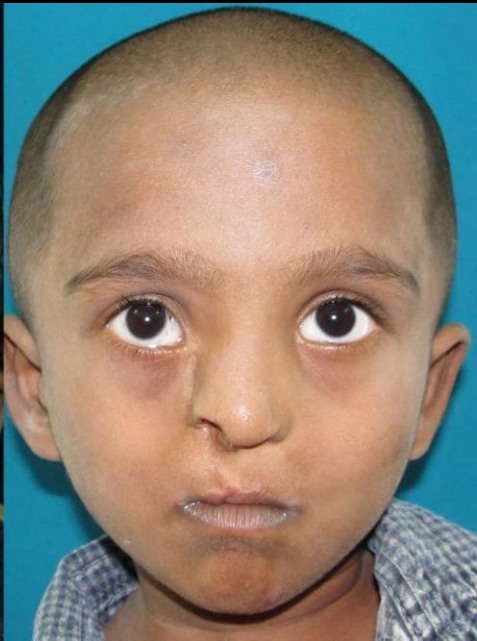
## Tessier #3 Facial Cleft





# Craniofacial Cleft Repair

## Tessier #3 Facial Cleft



# Craniofacial Cleft Repair



Bilateral Tessier # 4 Facial Cleft





# Craniofacial Cleft Repair



Bilateral Tessier # 4 Facial Cleft





# Craniofacial Cleft Repair

## Unilateral Tessier # 5 Facial Cleft





# Craniofacial Cleft Repair



Tessier # 2, 3, 7 Facial Cleft



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# Craniofacial Cleft Repair



Tessier # 1, 4, 7 Facial Cleft





# Craniofacial Cleft Repair



Tessier # 3, 4, 5 Facial Cleft



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# Craniofacial Cleft Repair

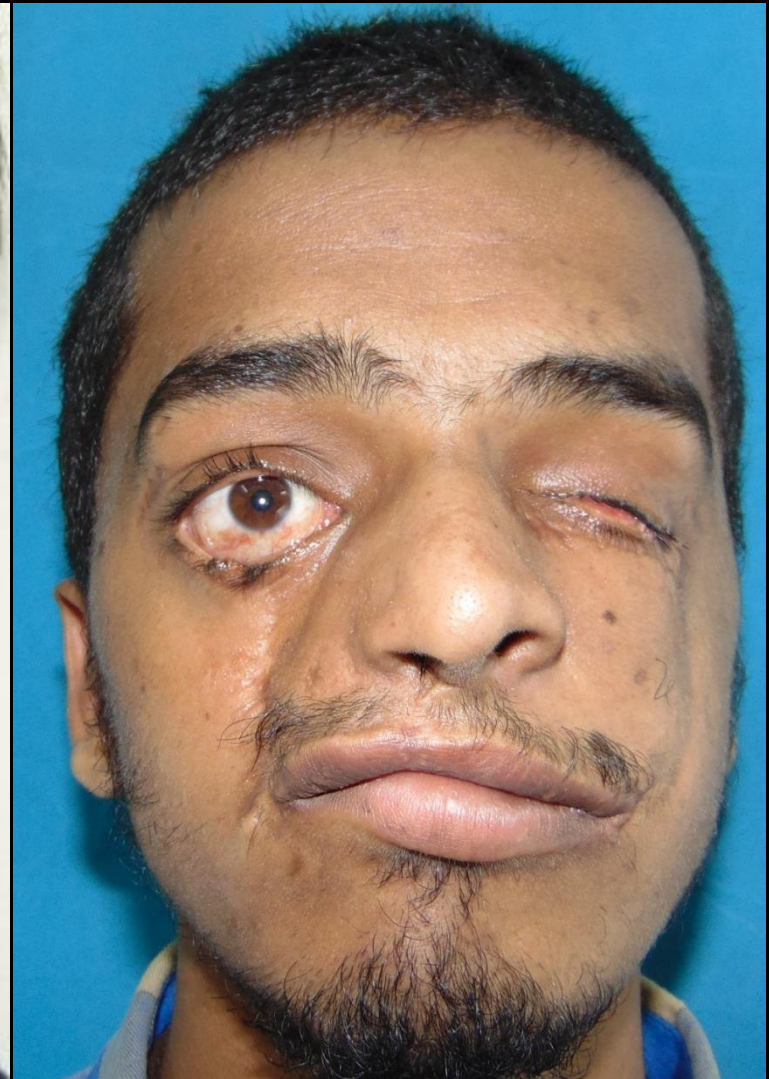


Tessier # 3, 5, 7 Facial Cleft





# Craniofacial Cleft Repair



Tessier # 3, 5, 7 Facial Cleft





# Craniofacial Clefts SOFT AND HARD TISSUE REPAIR/RECONSTRUCTION



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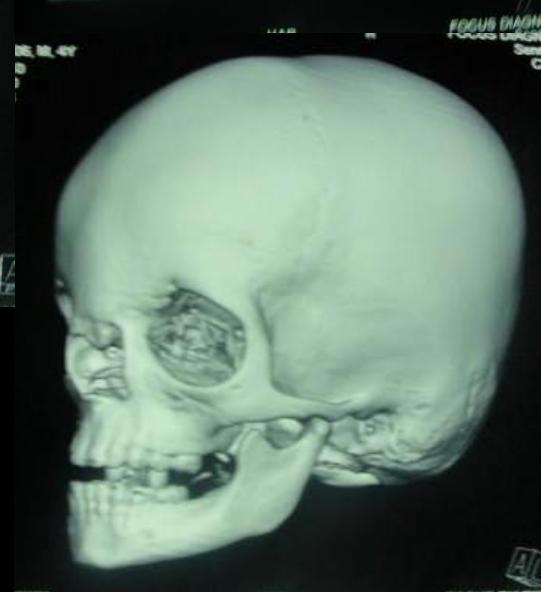
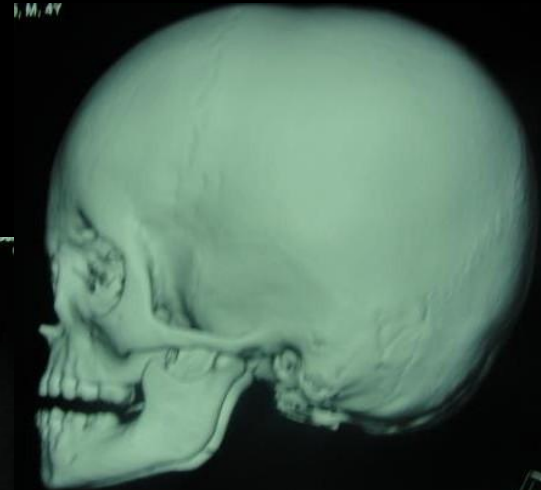
# Treatment

## Tessier #0-14 Craniofacial Cleft



# Treatment

## Tessier #0-14 Craniofacial Cleft





# Treatment

## Tessier #0-14 Craniofacial Cleft



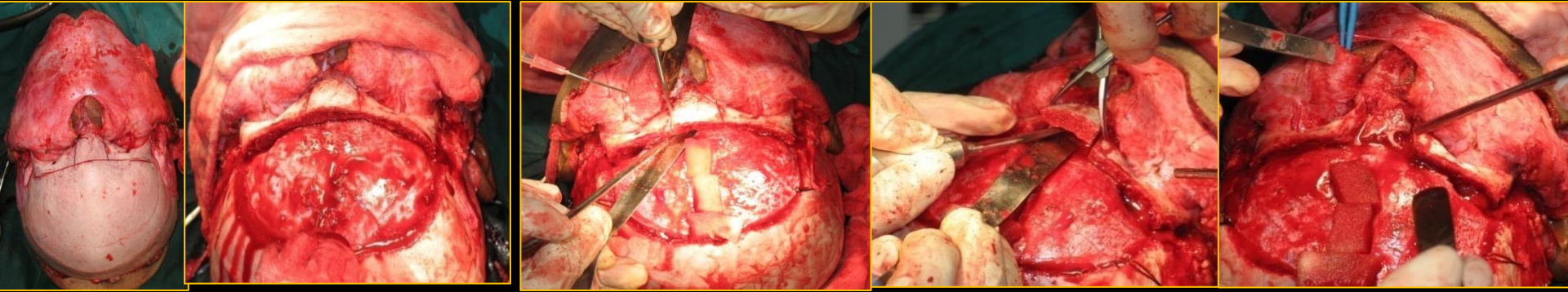
### Skin Incision

The skin incision for the intracranial correction of orbital hypetelorism consists of bicoronal incision with the dissection as far forward and anterior as possible.



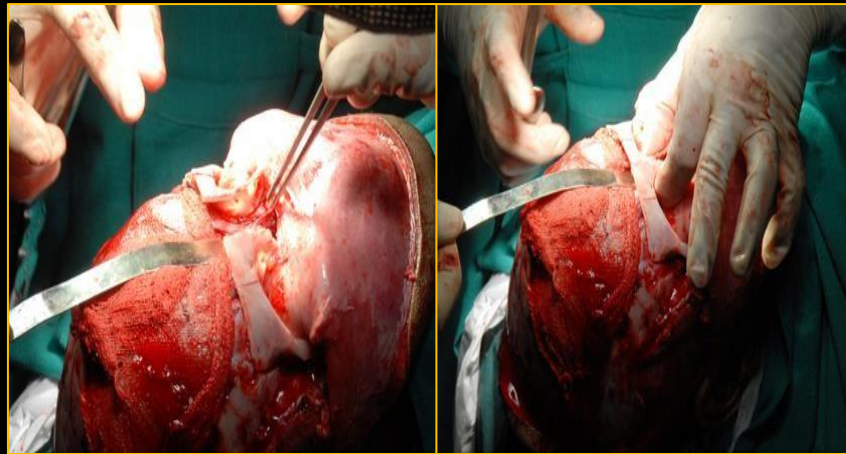
# Naso-orbital Complex

## Hypertelorism



Transfrontal Craniotomy

Orbital roof osteotomy



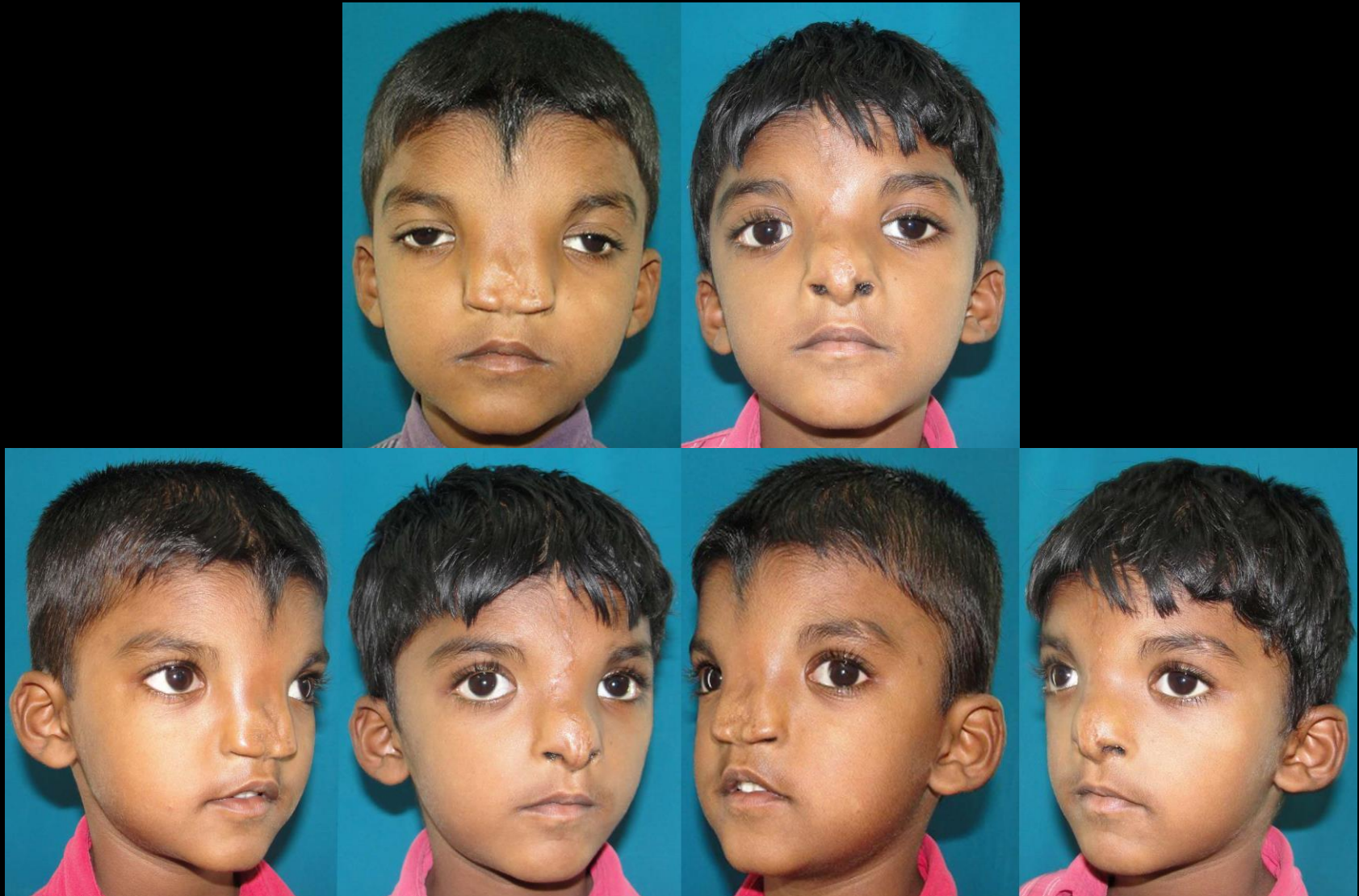
Orbital approximation





# Treatment

## Tessier #0-14 Craniofacial Cleft



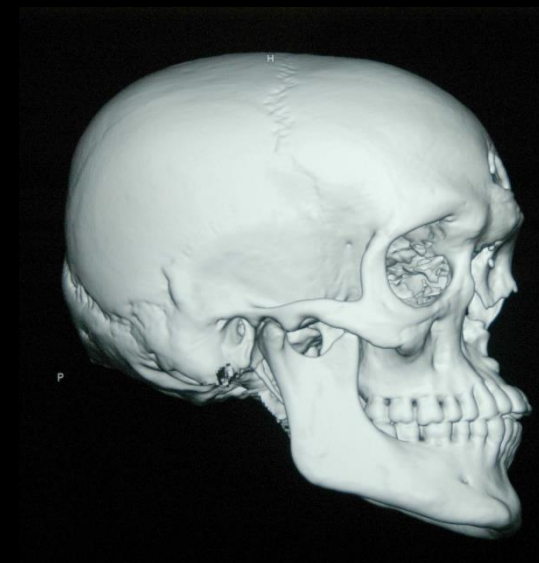
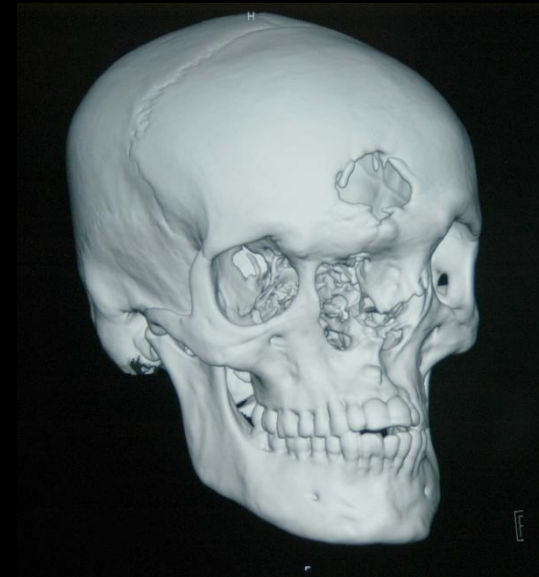
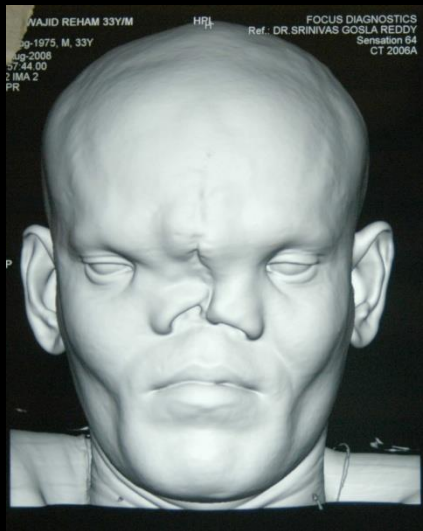


# Treatment

## Tessier #14 Craniofacial Cleft

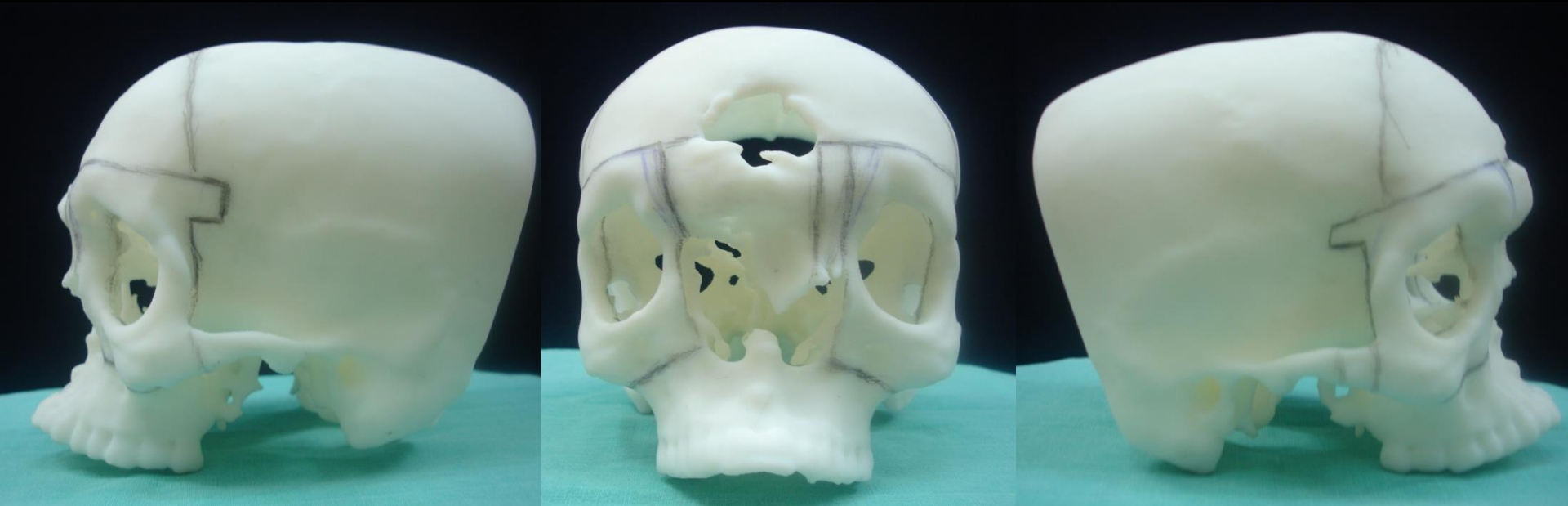


# Treatment CT Scan



# Treatment

## Stereo Lithographic Models





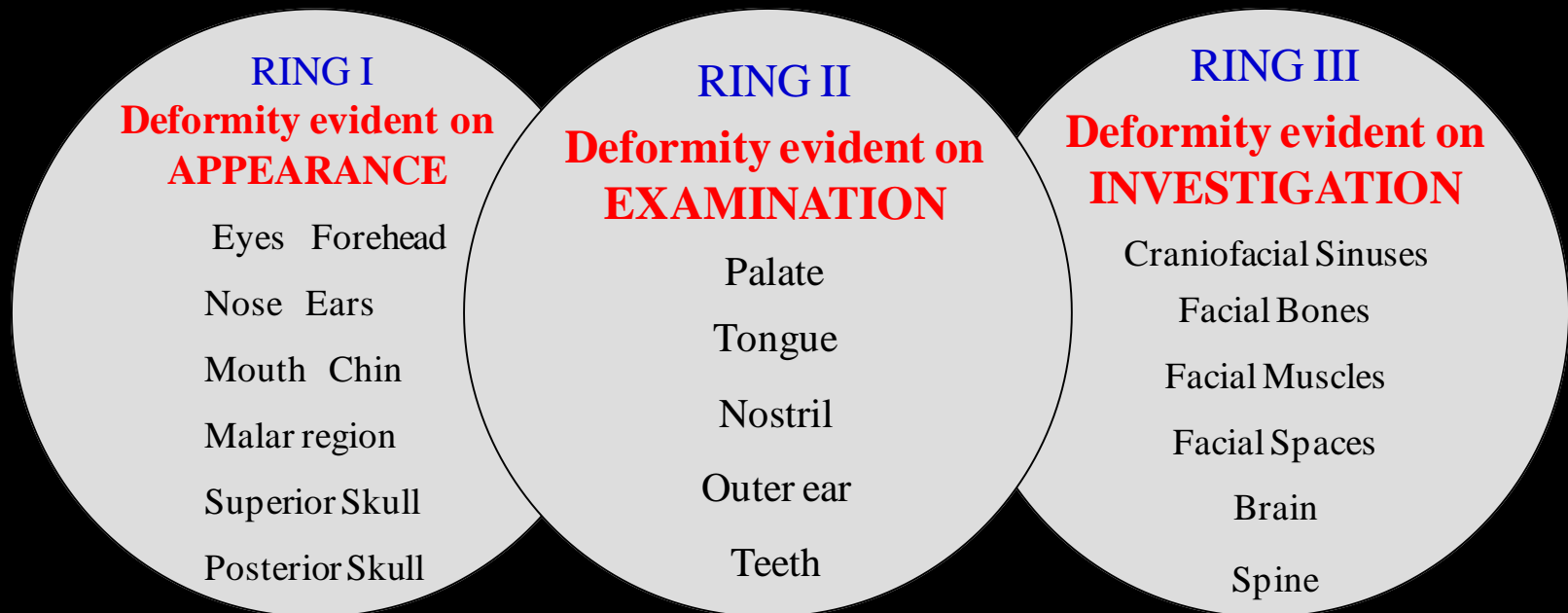
# Treatment

## Tessier #14 Craniofacial Cleft



# My Message

- Craniofacial cleft repair is not a complex surgery
- Diagnosis of the defect should always be made with respect to the morphology of the defect
- Identify the defect in **Morphological Sub Units**
- Correct each sub unit collectively or independently



# Bring the Smile Back



## Thank You



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