

CRANIOFACIAL SURGERY

What?Where?When?Who? And How?

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Hyderabad, India.**



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Craniofacial Surgery

What?

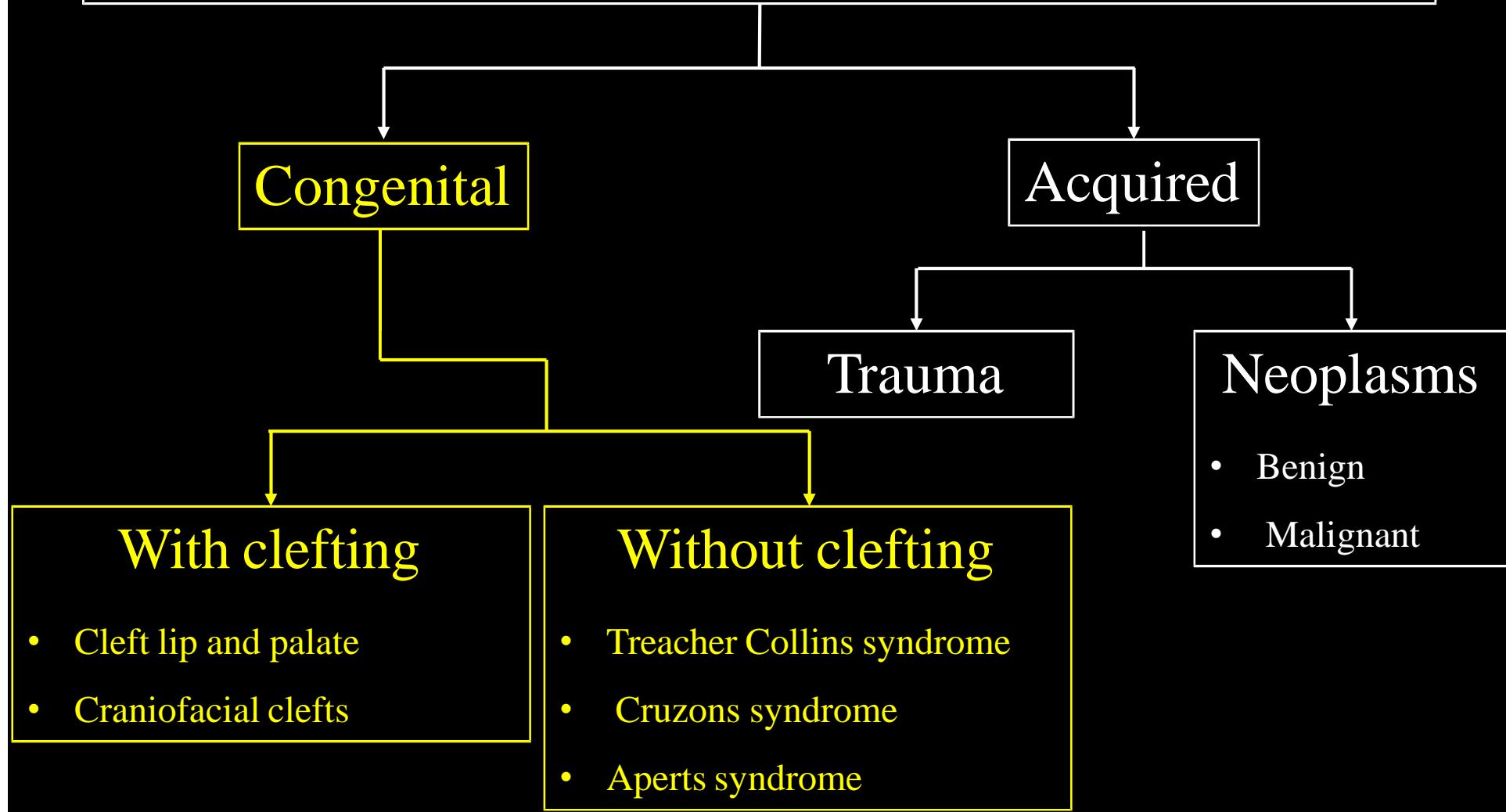
Where? When? Who? And How?



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Craniofacial Anomalies

Abnormalities of the Head and Neck region



Craniofacial Surgery

Where?

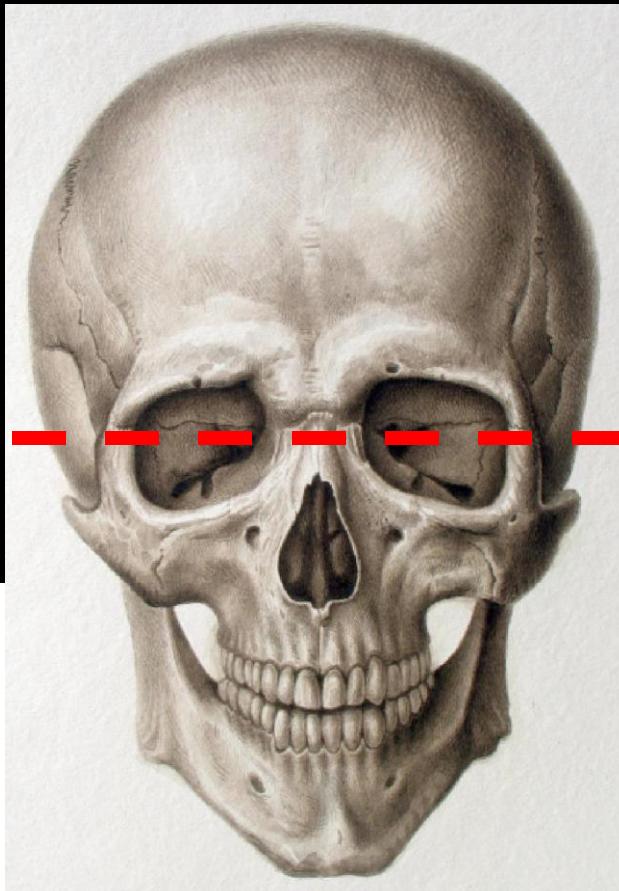
What?....When? Who? And How?



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Facial Skeletal Surgery

MAXILLOFACIAL
SURGERY



CRANIOFACIAL
SURGERY

maxillofacial and craniofacial



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Craniofacial Anomalies

- **Craniosynostosis**

Plagiocephaly/Trigonocephaly/Scaphocephaly/Brachycephaly

- **Craniofacial Dysostosis**

Crouzon Syndrome/Apert Syndrome/Pfeiffer Syndrome/Cloverleaf skull

- **Craniofacial Syndromes and Anomalies**

Treacher Collins Syndrome/Hemifacial Microsomia/Binder Syndrome/Pierre Robin Sequence/Craniofrontonasal Dysplasia/Craniofacial Clefts

- **Cleft Lip and Palate**

- **Benign and Malignant Head and Neck Tumors**

Encephaloceles/Dermoid cysts/Hemangiomas/Vascular Malformations/Fibrous Dysplasia/Sarcoma and other malignancies

- **Craniomaxillofacial Trauma**

- **Non-syndromic Orthognathic Deformities**

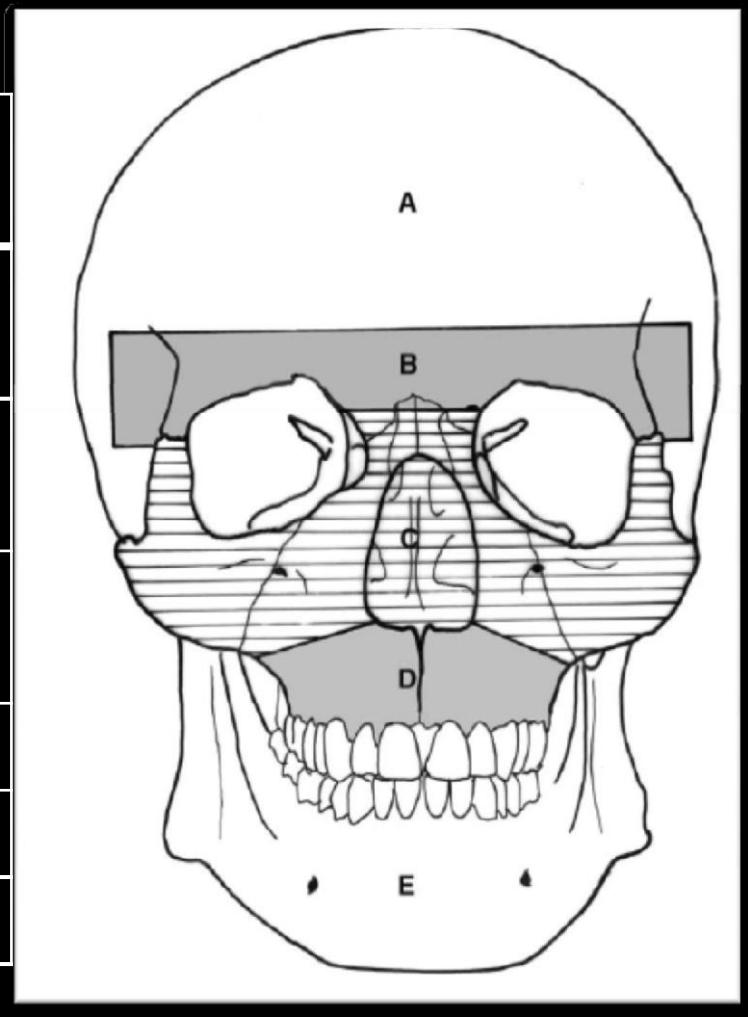


Classification Craniofacial Synostosis and Dysostosis

Tessier divided the craniofacial framework into five levels

Classified Synostosis and Dysostosis topographically and anatomically into six groups

Tessier's classification	Levels of malformation
Class 1: isolated cranial vault dysmorphism	Level A
Class 2: syndromic orbitocranial dysmorphism	Level B
Class 3: asymmetric orbitocranial dysmorphism	Level B and C
Class 4: Saethre-Chotzen group	Level A-C
Class 5: Crouzon group	Level A-D
Class 6: Apert group	Level A-E



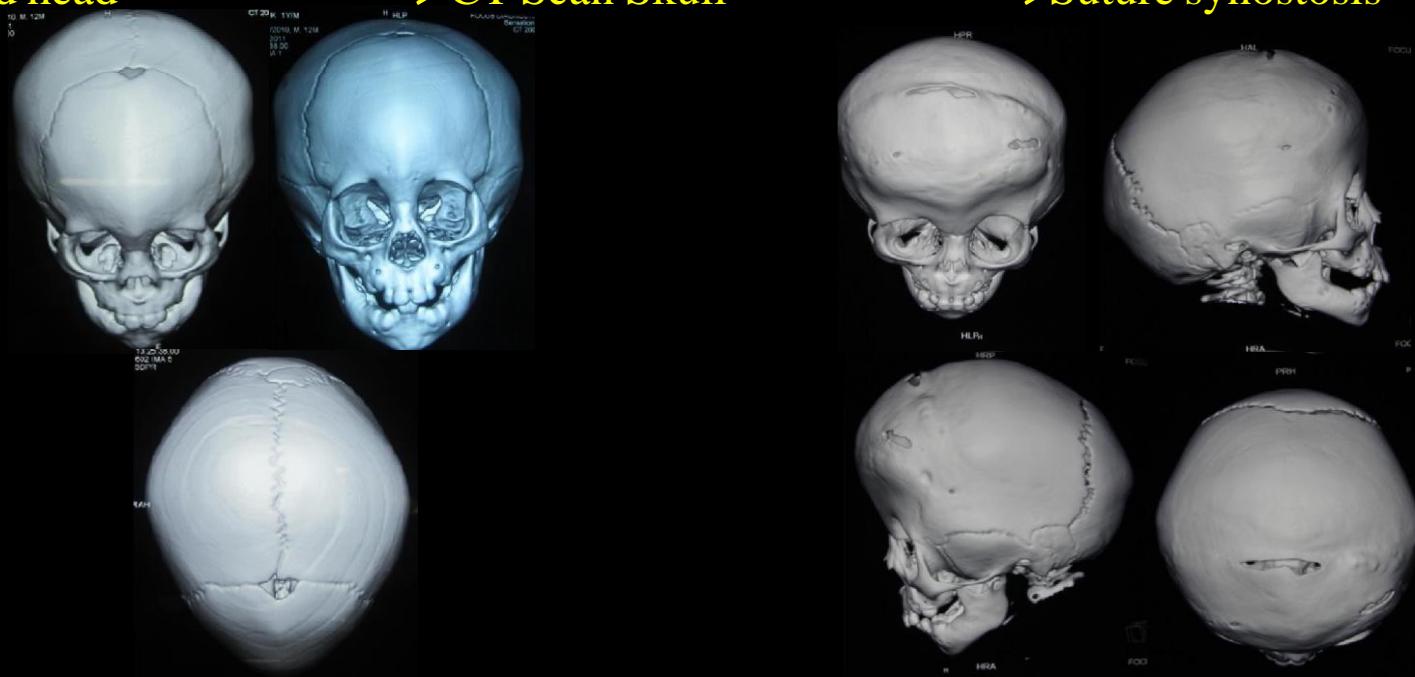
Craniosynostosis

Plagiocephaly/Trigonocephaly/Scaphocephaly/Brachycephaly

Premature fusion of cranial sutures

Plagio~ =	Oblique shaped =	Unilateral coronal or lambdoid suture synostosis
Trigon~ =	Triangular shaped =	Metopic suture synostosis
Scapho~ =	Boat shaped =	Sagittal suture synostosis
Brachy~ =	Flat shaped =	Coronal suture synostosis

Irregular shaped head → CT Scan Skull → Suture synostosis



Craniofacial Dysostosis

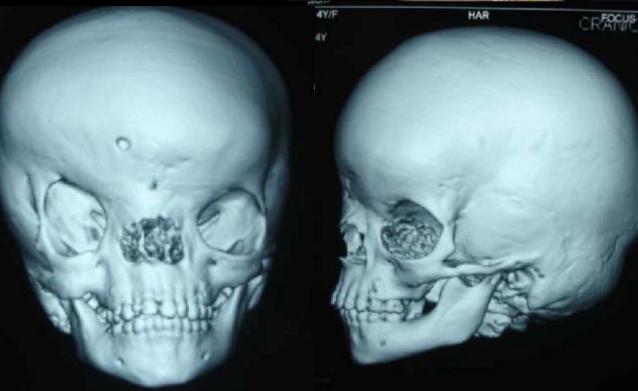
Crouzon Syndrome/Pfeiffer Syndrome/Cloverleaf skull

Crouzon Syndrome



- Craniosynostosis
- Exophthalmos
- Hypertelorism
- Stabismus
- Hypoplastic maxilla

Pfeiffer Syndrome



- Craniosynostosis
- Hypertelorism
- Retruded maxilla
- Stubby fingers and toes

Cloverleaf skull



- Severe craniosynostosis
- Cloverleaf shape of skull

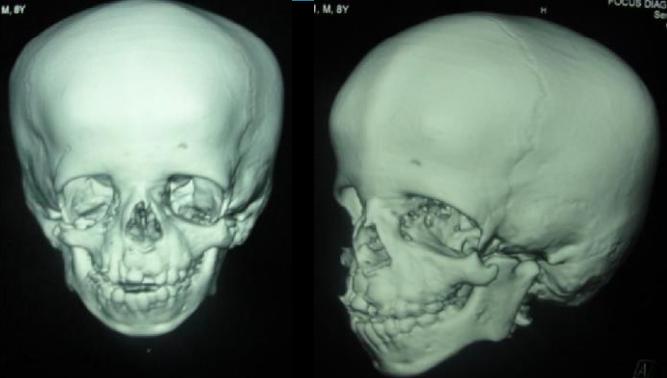


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Craniofacial Syndromes and Anomalies

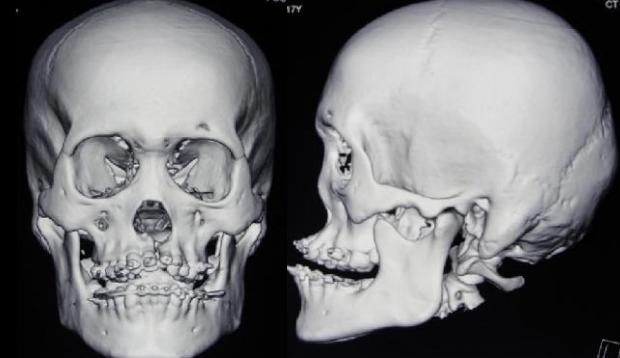
Treacher Collins Syndrome/Binder Syndrome

Treacher Collins Syndrome



- Micrognathia,
- Underdeveloped zygoma,
- Drooping of lateral lower eyelids
- Malformed or absent ears with conductive hearing loss

Binder Syndrome



- Midfacial hypoplasia with hypoplasia of cartilaginous nasal septum and premaxilla
- Complete absence of anterior nasal spine
- Class III skeletal and dental profile



Craniofacial Syndromes and Anomalies

Hemifacial Microsomia

Type I



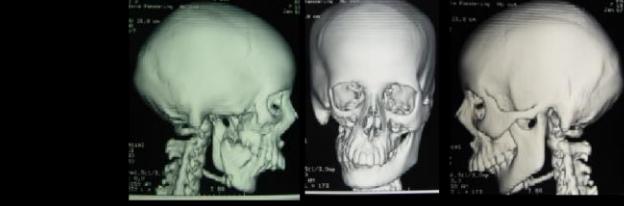
Type II b



Type II a



Type III



- Affects the development of the lower half of the face,
- Most commonly the ears, the mouth and the mandible



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Craniofacial Syndromes and Anomalies

Pierre Robin Sequence

Pierre Robin Sequence



3 main features

- cleft palate,
- micrognathia
(a small jaw)
- glossoptosis
(airway obstruction caused by backwards displacement of the tongue base)

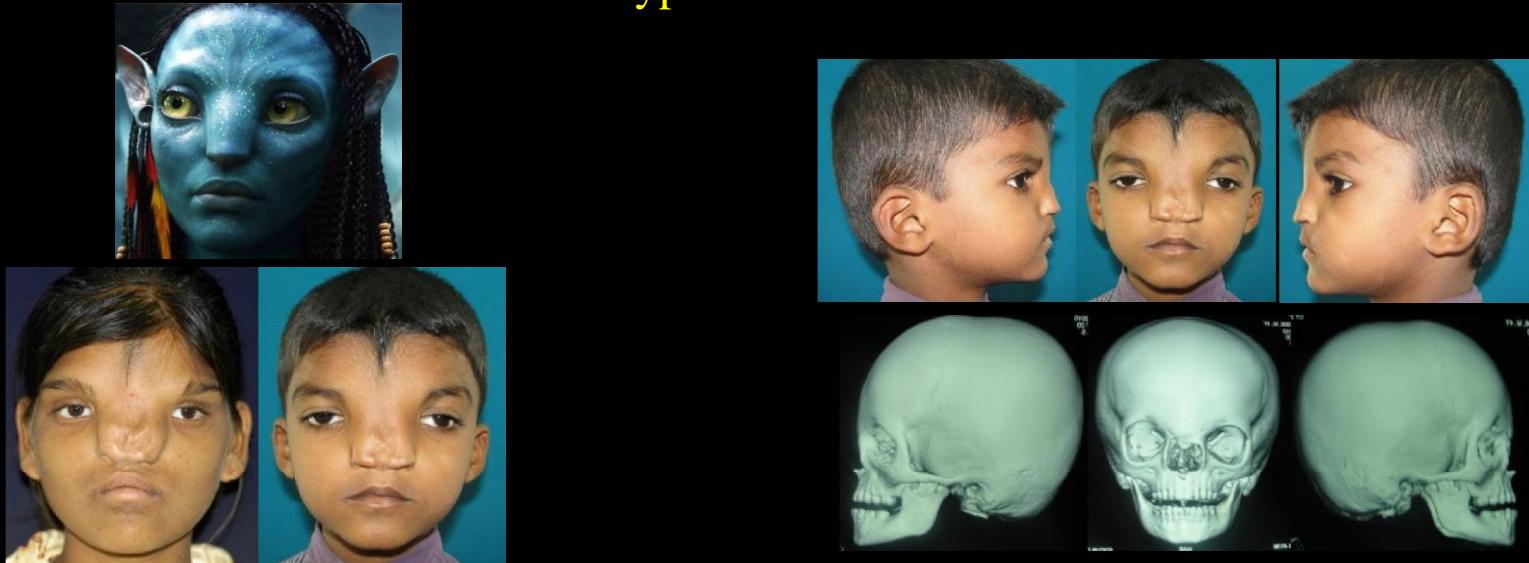


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Craniofacial Syndromes and Anomalies

Craniofrontonasal Dysplasia

Hypertelorism

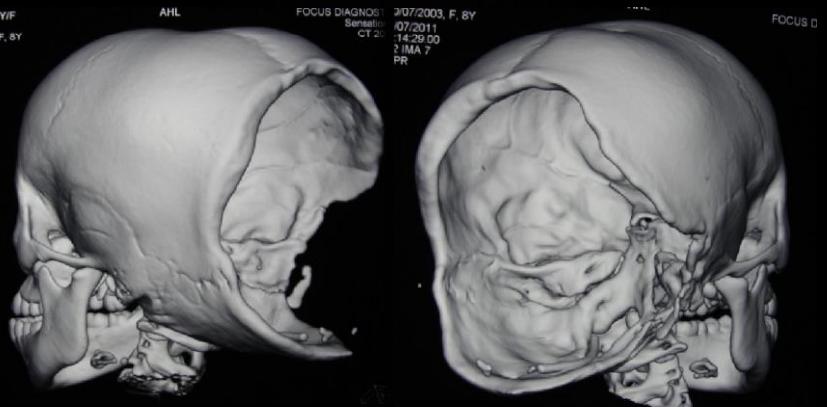


- Lateralization of the total orbital complex with increase in the interorbital distance and intercanthal width
- Increase in the distance between the lateral orbital walls and the interorbital distance to denote true hypertelorism
- May be symmetric, asymmetric or unilateral



Cranial Vault Defects

Dandy Walker Syndrome



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Craniofacial Syndromes and Anomalies

Craniofacial Clefts



Tessier #0
facial cleft



Tessier #2
facial cleft



Tessier #3
facial cleft



Tessier #4
facial cleft



Tessier #5
facial cleft



Tessier #7
facial cleft



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



Tessier 0-14
Facial Cleft
Orbital Hypertelorism



Cleft Lip



Incomplete unilateral cleft lip

Complete Unilateral cleft lip



Incomplete bilateral cleft lip

Complete bilateral cleft lip



Cleft Palate

Cleft of hard and soft palate associated with cleft lip



Unilateral cleft palate



Bilateral cleft palate



Isolated cleft palate



Submucous cleft palate



Craniofacial Tumors

Encephaloceles

Meningocephalocele



Meningocele



neural tube defect

sac-like protrusions of the brain and the membranes that cover it through openings in the skull.
caused by failure of the neural tube to close completely during fetal development.

Seen between the

forehead and nose, or

on the back side of the skull



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Craniofacial Tumors

Hemangiomas/Vascular Malformations

Vascular Malformations

Capillary



Venous



Lymphatic



Arterio-venous



Hemangioma



- Vascular Malformations
- Congenital vascular lesions
- Continue to grow throughout life

Growth caused by

- Progressive ectasia of existing vessels
- Usually caused by trauma, sepsis or hormonal changes

- Hemangiomas
- Acquired vascular lesions
- Period of growth followed by involution

Growth caused by

- Rapid proliferation by hyperplasia of endothelial cells
- Followed by spontaneous involution



Craniofacial Tumors

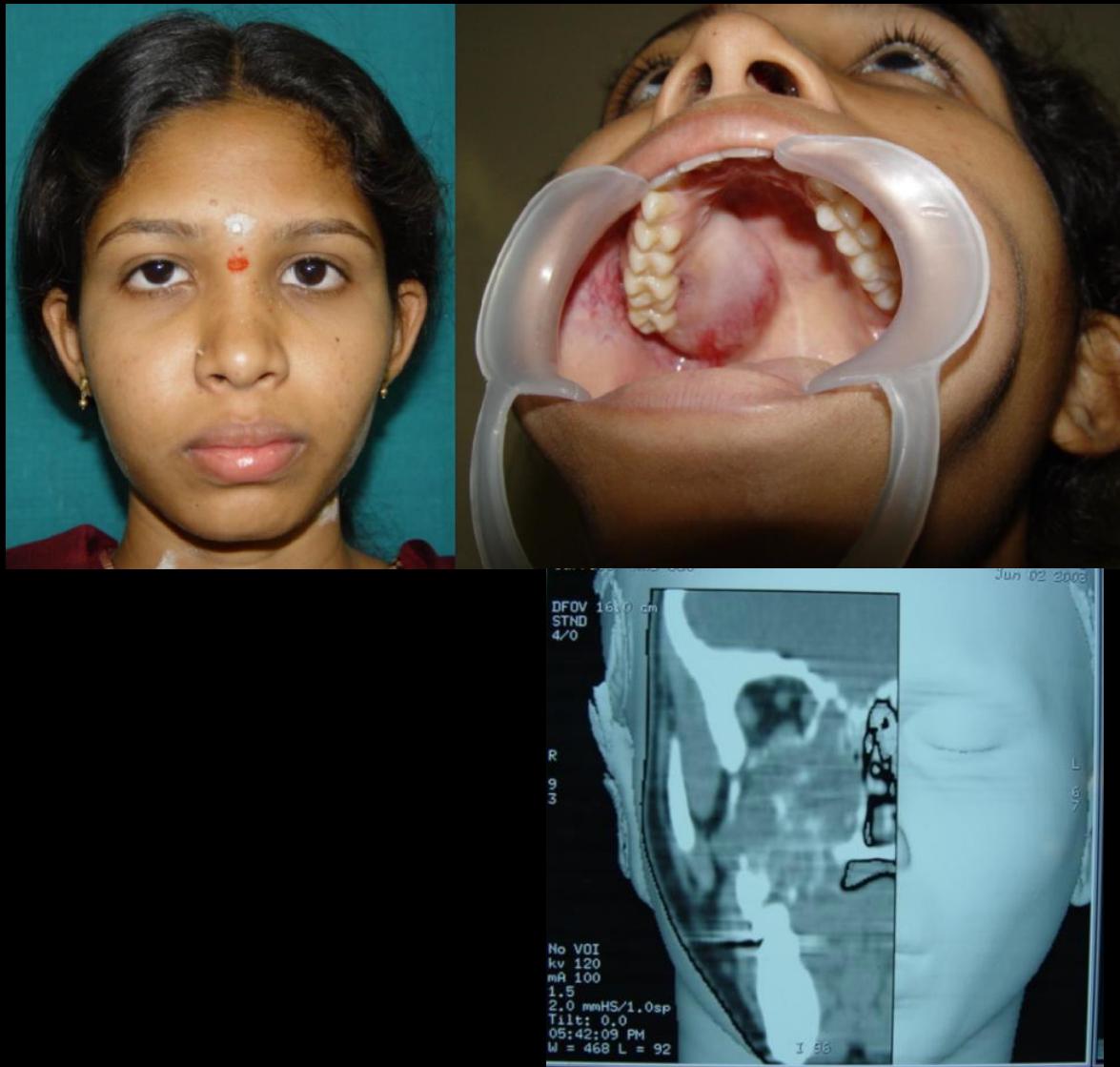
Plexiform Neurofibroma and benign tumors



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Craniofacial Tumors

Sarcoma and other malignancies



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Craniomaxillofacial Trauma



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Non-syndromic Orthognathic Deformities



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Craniofacial Surgery

When?

What? Where?.... Who? And How?



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Craniofacial Anomalies

Abnormalities of the Head and Neck region

Congenital

Acquired

Soft Tissue:	3-12 months
Bone:	
Skull Reshaping:	Infancy
Orbital Rim Advancement:	6-24 months
Ant. Cranial Vault Recon.:	6-24 months
Post. Cranial Vault Recon.:	6-24months
Midface deformity:	5-7 years
Jaw Deformity:	13-18 years

Immediate



Craniofacial Surgery

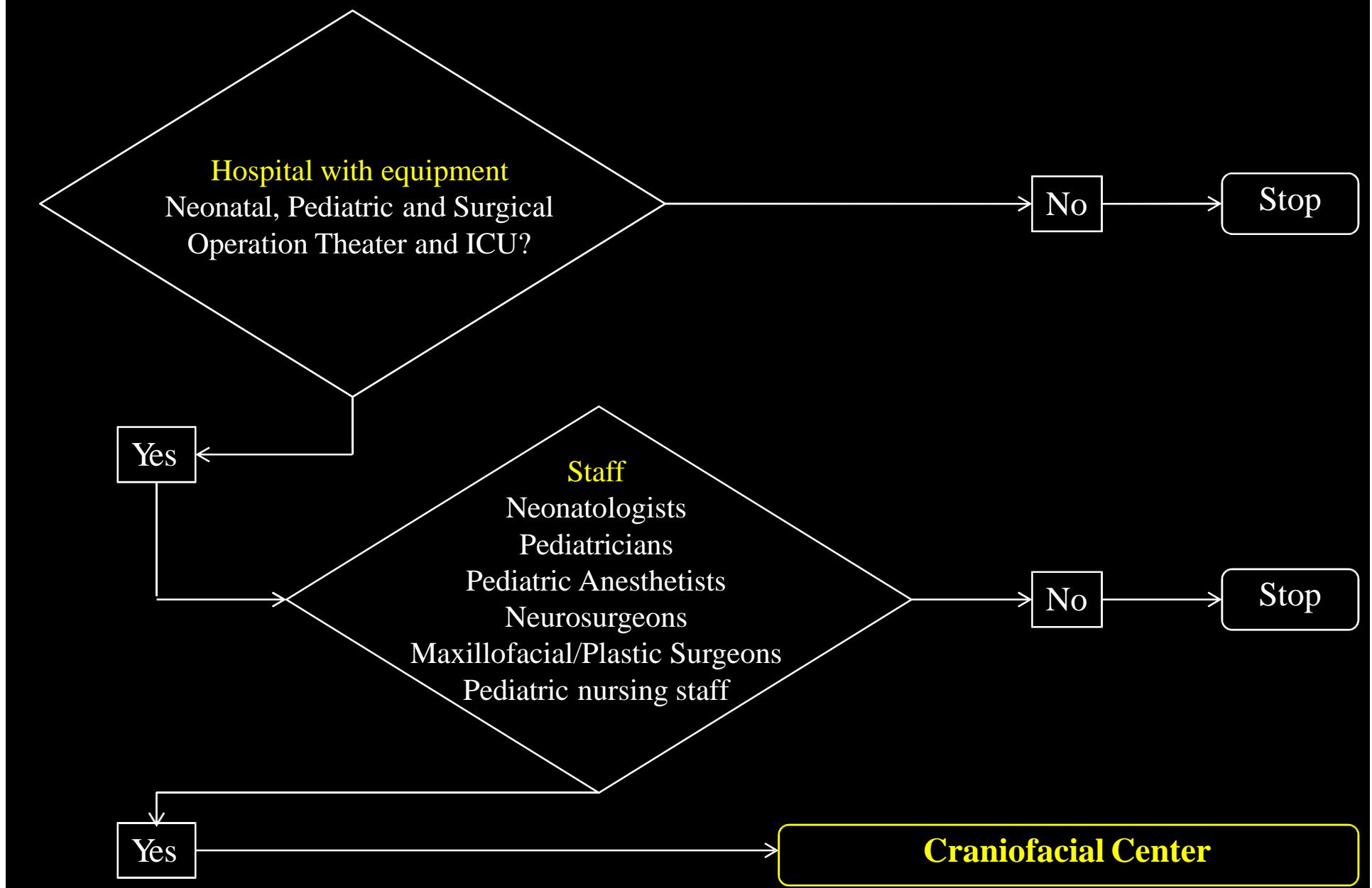
Who?

What? Where? When?.... And How?



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Craniofacial Division or Center



Craniofacial Surgery

And How?

What? Where? When? Who?....

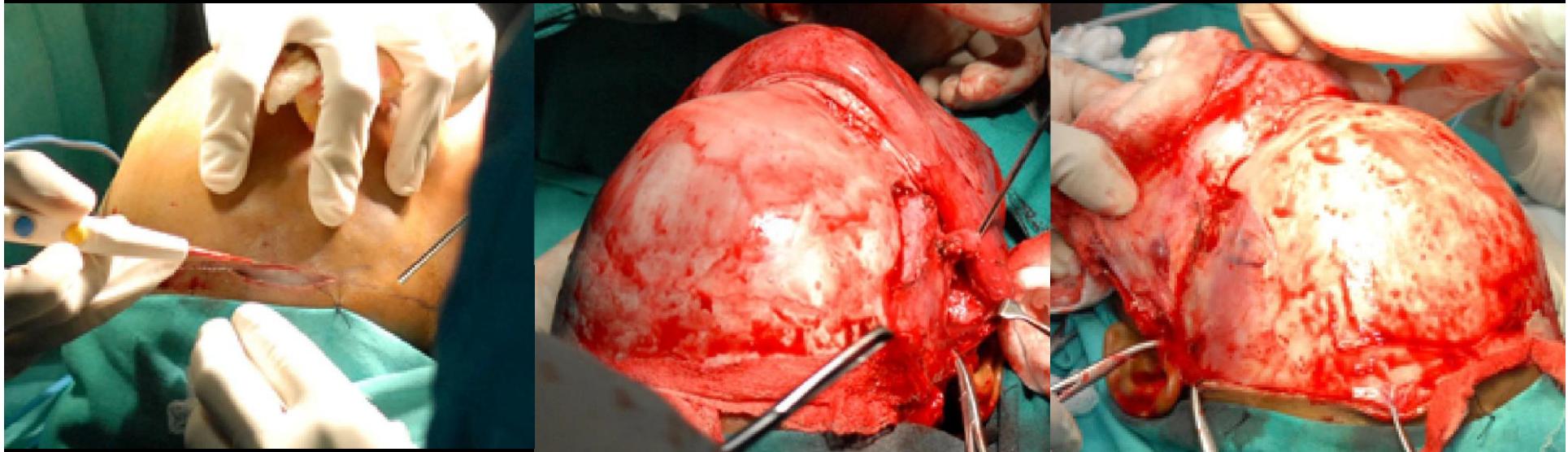


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Craniofacial Treatment
Pediatric Anesthetists, Neurosurgeons,
Maxillofacial/Plastic Surgeons
Pediatric nursing staff
In
Pediatric and Surgical
Operation Theater and ICU



Bicoronal Incision

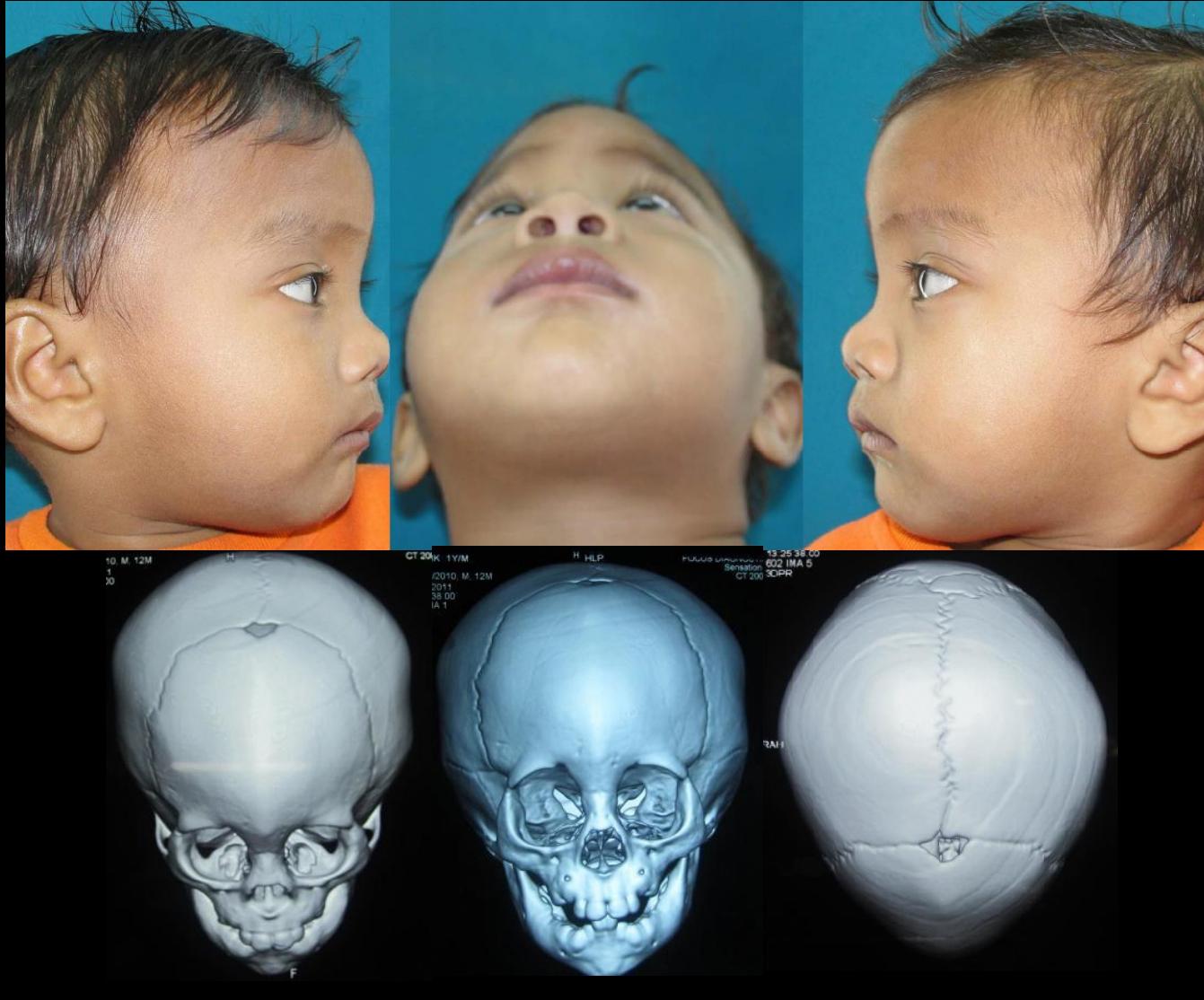


The skin incision for approaching the cranium, supraorbital area and the zygomatic area consists of bicoronal incision with the dissection as far forward and anterior as possible.



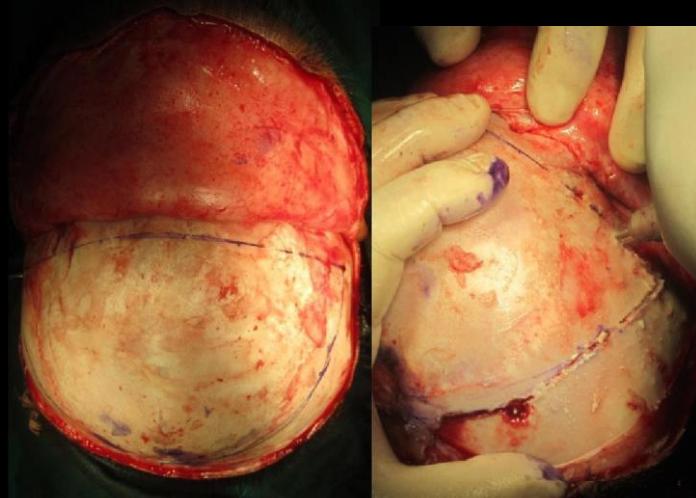
Craniosynostosis

Plagiocephaly/Trigonocephaly/Scaphocephaly/Brachycephaly

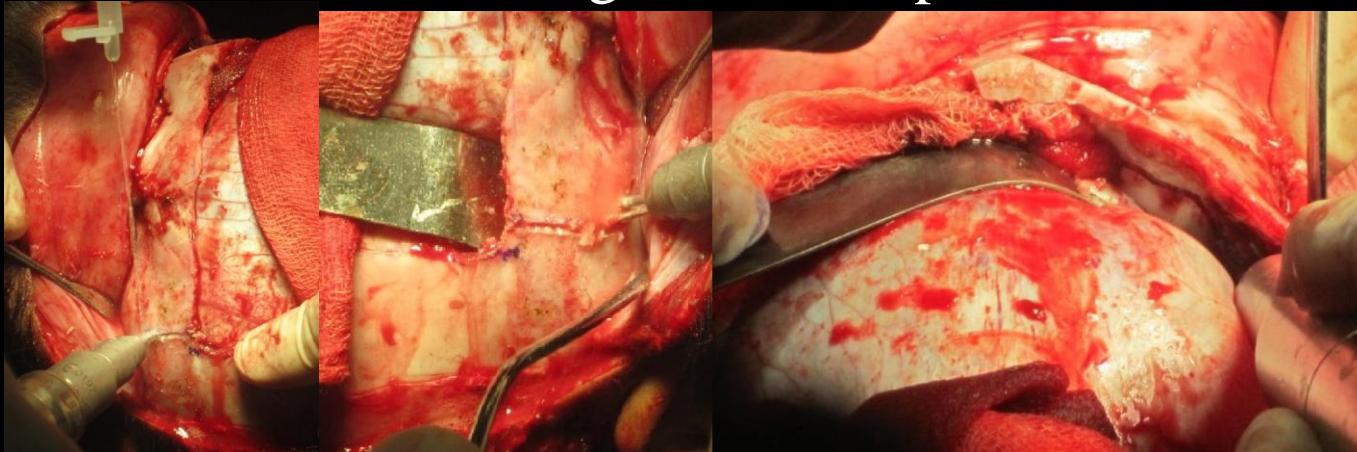


Craniosynostosis

Plagiocephaly/Trigonocephaly/Scaphocephaly/Brachycephaly



Raising Frontal Flap



Harvesting supraorbital band

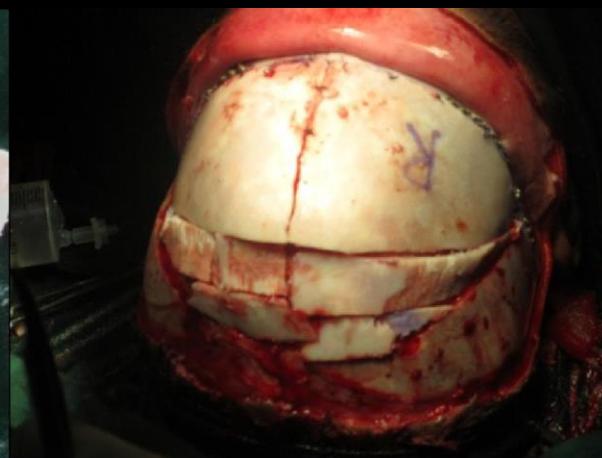
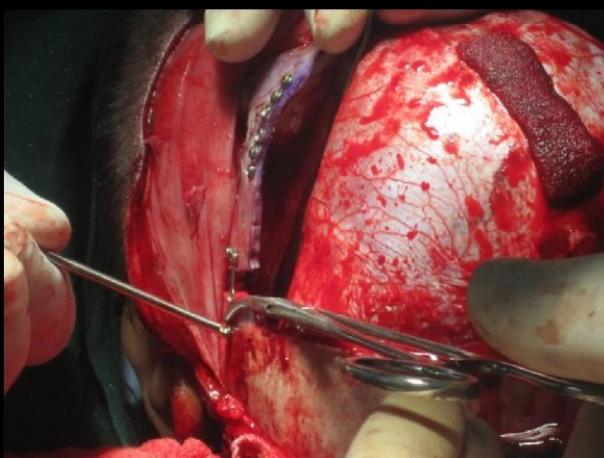


Craniosynostosis

Plagiocephaly/Trigonocephaly/Scaphocephaly/Brachycephaly



Superior Orbital rim advancement and fixation



Fixation



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Craniosynostosis

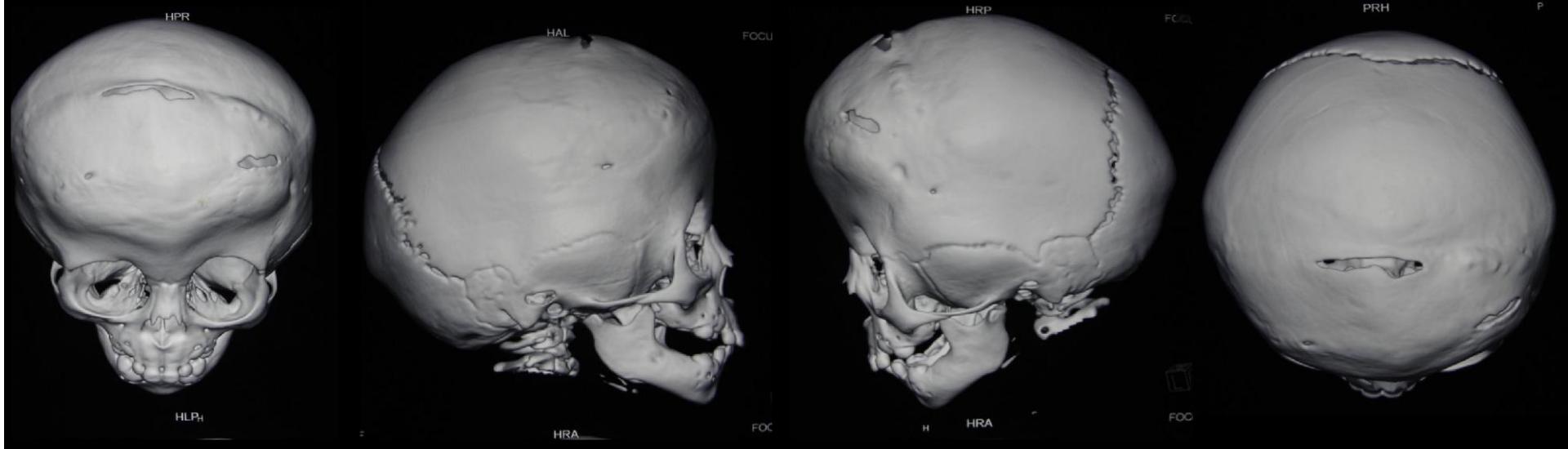
Plagiocephaly/Trigonocephaly/Scaphocephaly/Brachycephaly



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Craniosynostosis

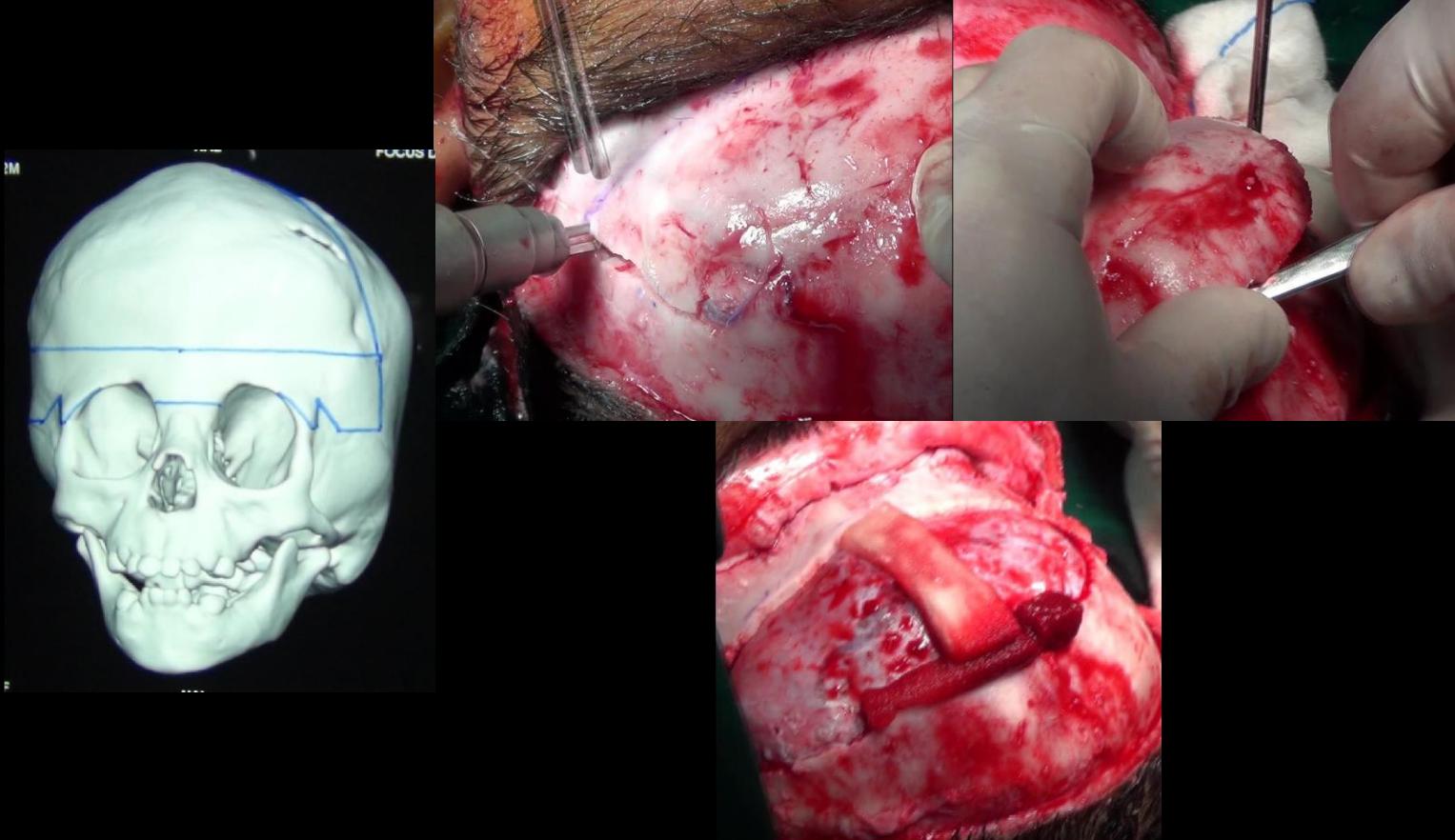
Plagiocephaly/Trigonocephaly/Scaphocephaly/Brachycephaly



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Craniosynostosis

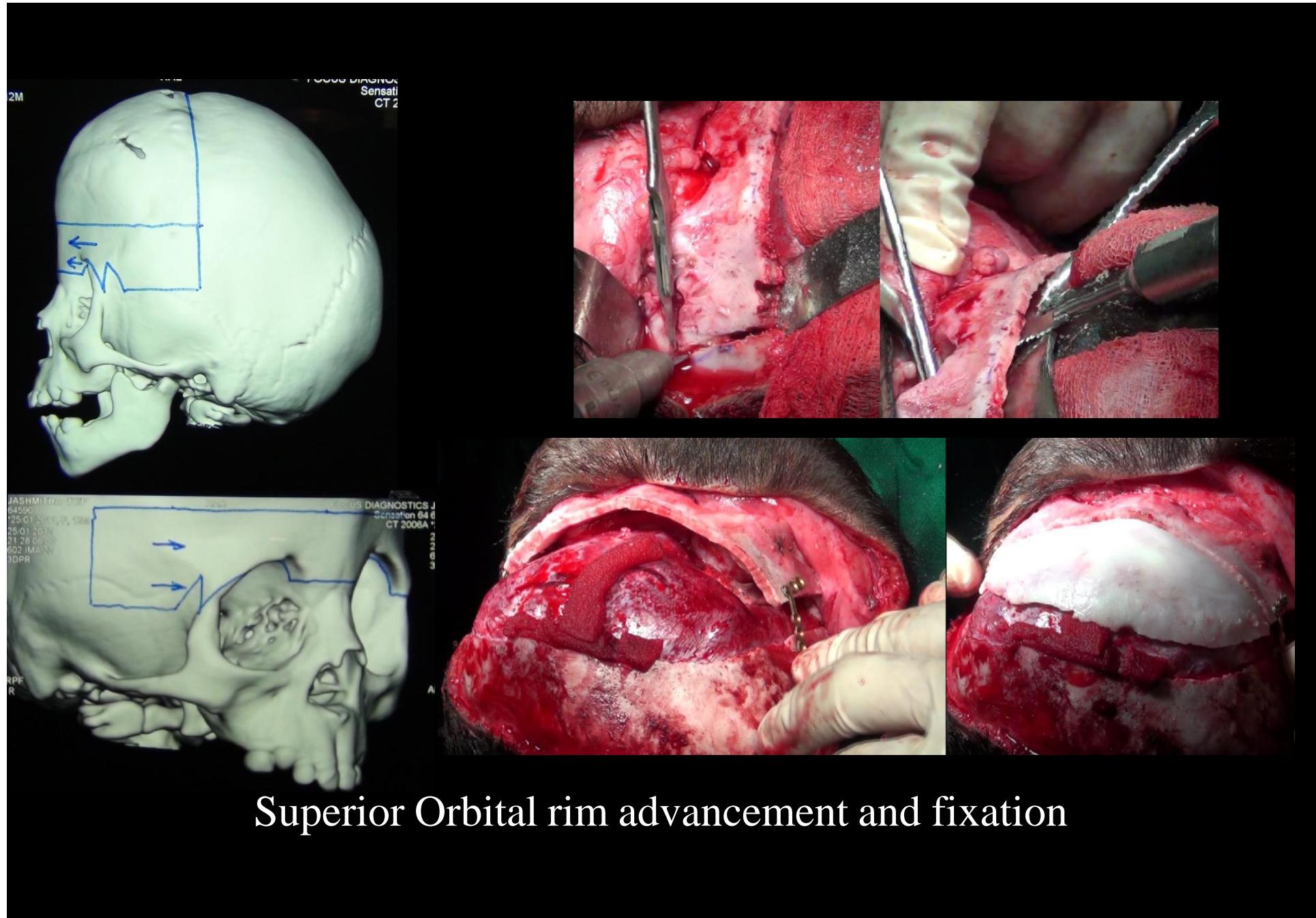
Plagiocephaly/Trigonocephaly/Scaphocephaly/Brachycephaly



Raising Frontal Flap



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Superior Orbital rim advancement and fixation



Craniosynostosis

Plagiocephaly/Trigonocephaly/Scaphocephaly/Brachycephaly



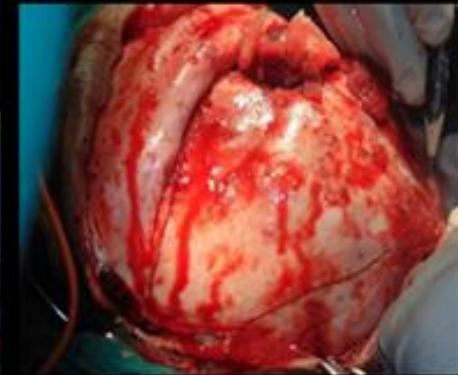
CRANIOSYNOSTOSIS (TURRICEPHALY) POSTERIOR CRANIAL VAULT DISTRACTION



INCISION MARKING



OSTEOTOMY



DISTRACTOR PLACEMENT



PRE-OP



POST-DISTRACTION



PRE-OP



POST-DISTRACTION



PRE-OP



POST DISTRACTOR
REMOVAL



PRE-OP



POST DISTRACTOR
REMOVAL

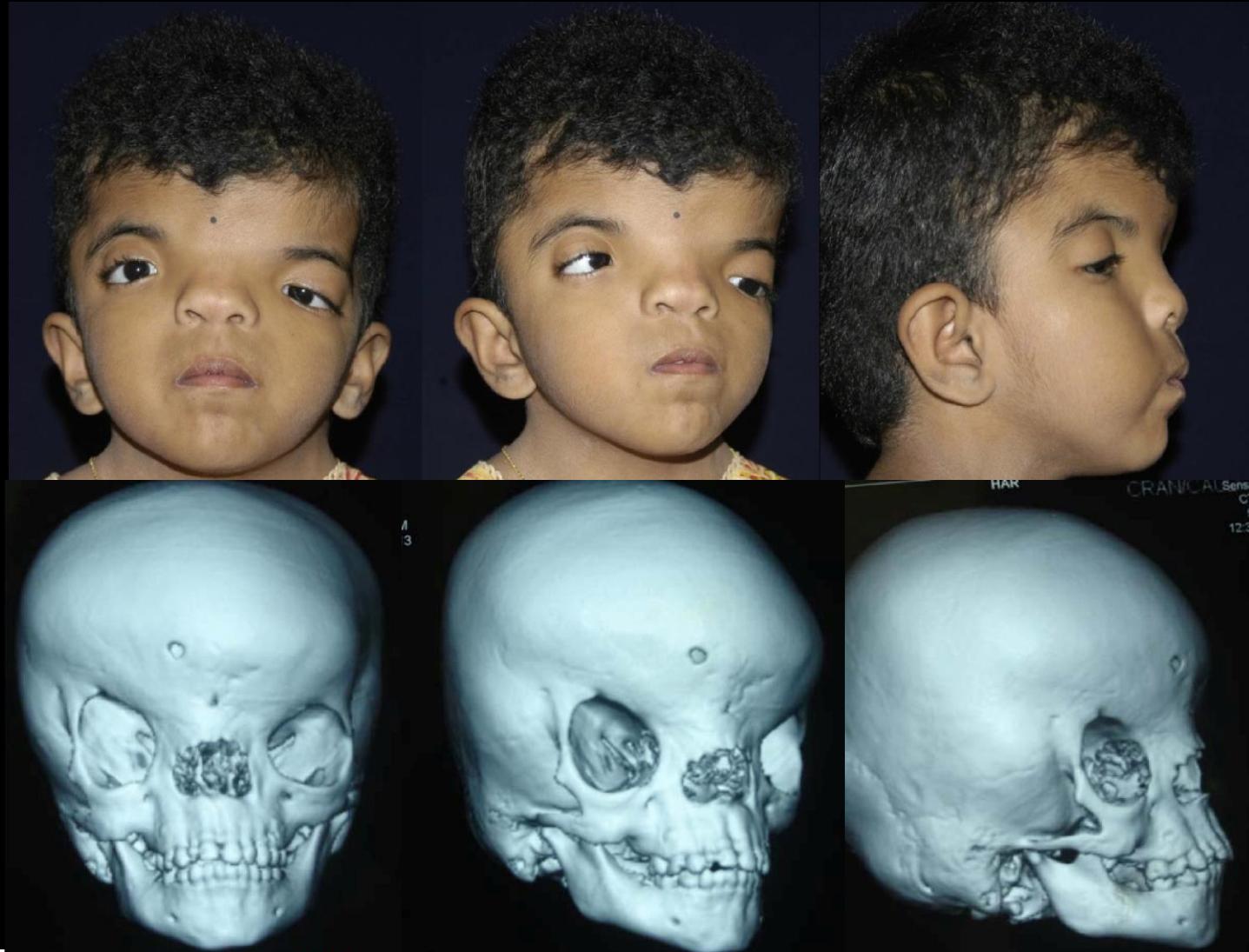


LATEST POST OP



Craniofacial Dysostosis

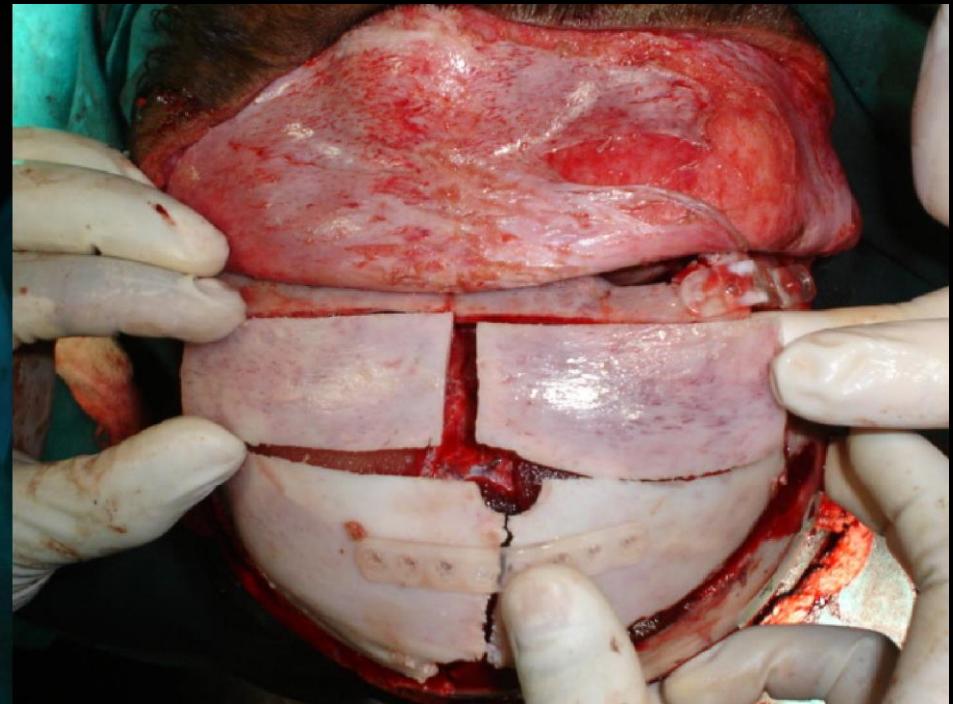
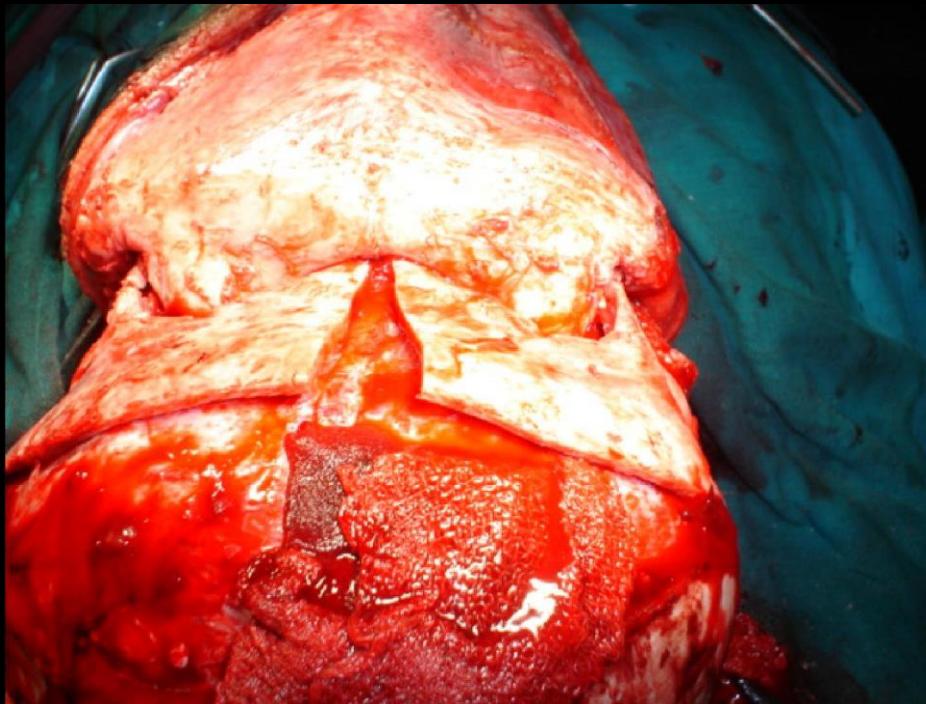
Pfeiffer Syndrome



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Craniofacial Dysostosis

Pfeiffer Syndrome



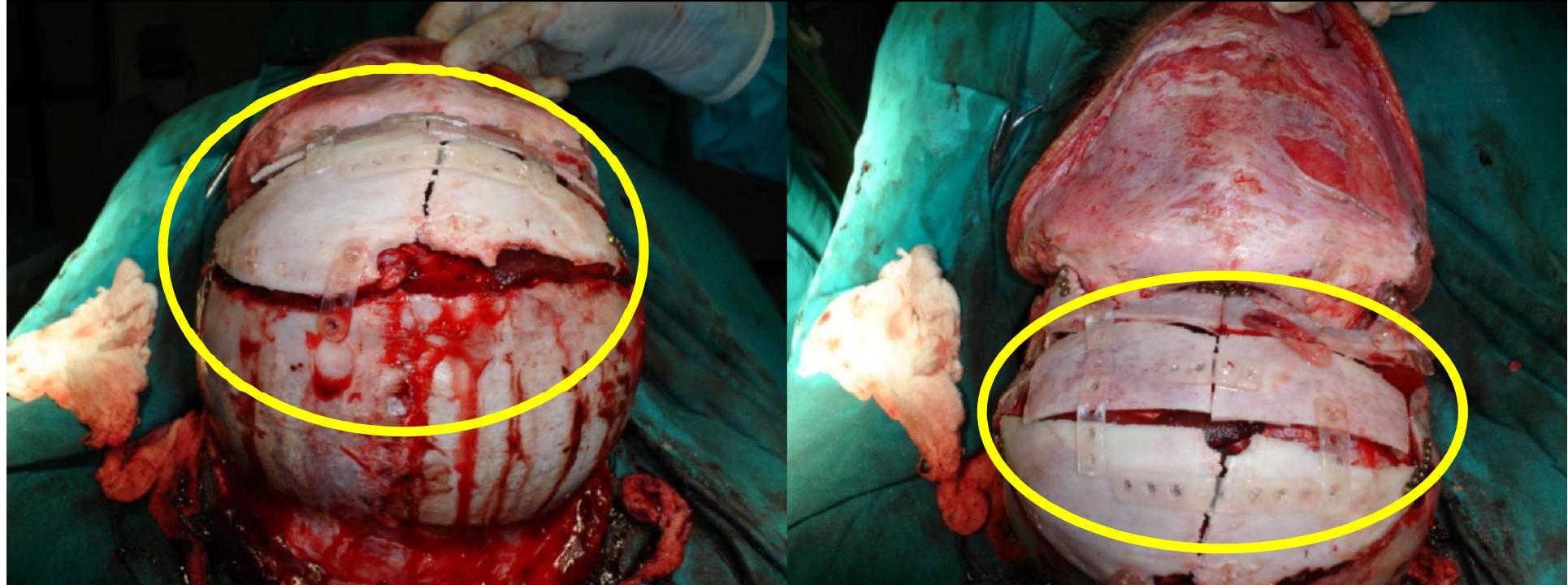
Facial Bipartition

A monobloc osteotomy with the orbits and midface in one unit is done. When the defects are amenable, the monobloc is partitioned at the midline



Craniofacial Dysostosis

Pfeiffer Syndrome



Fixation

In children fixation is done with bioresorbable bone plates



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Craniofacial Dysostosis

Pfeiffer Syndrome



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Craniofacial Dysostosis

Crouzon Syndrome

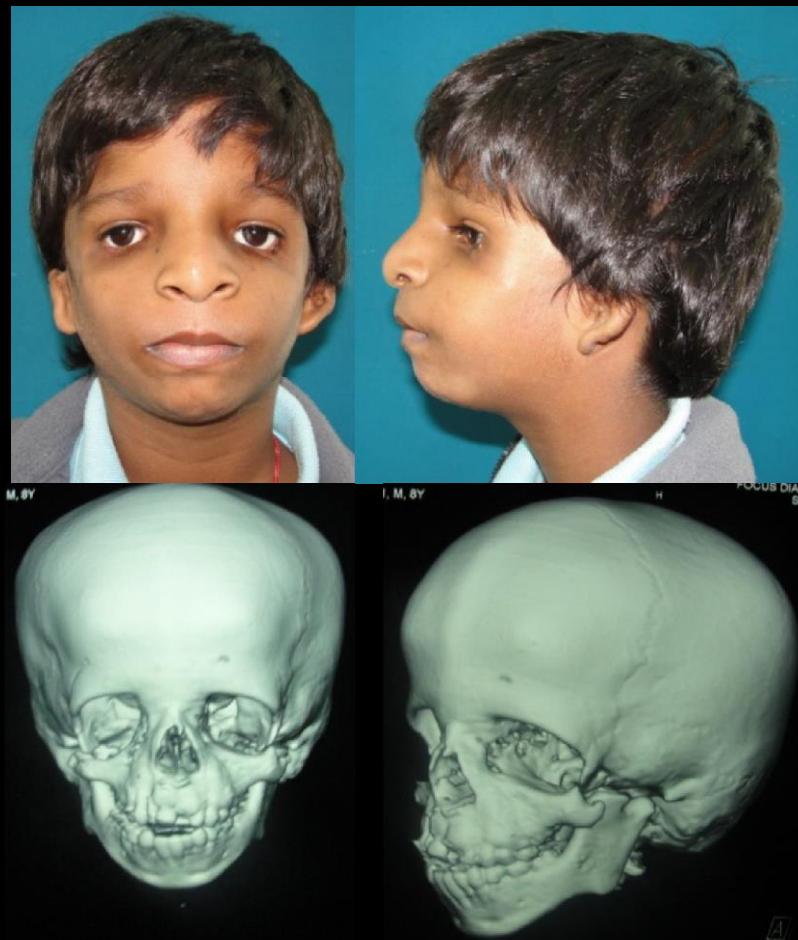


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Craniofacial Syndromes and Anomalies

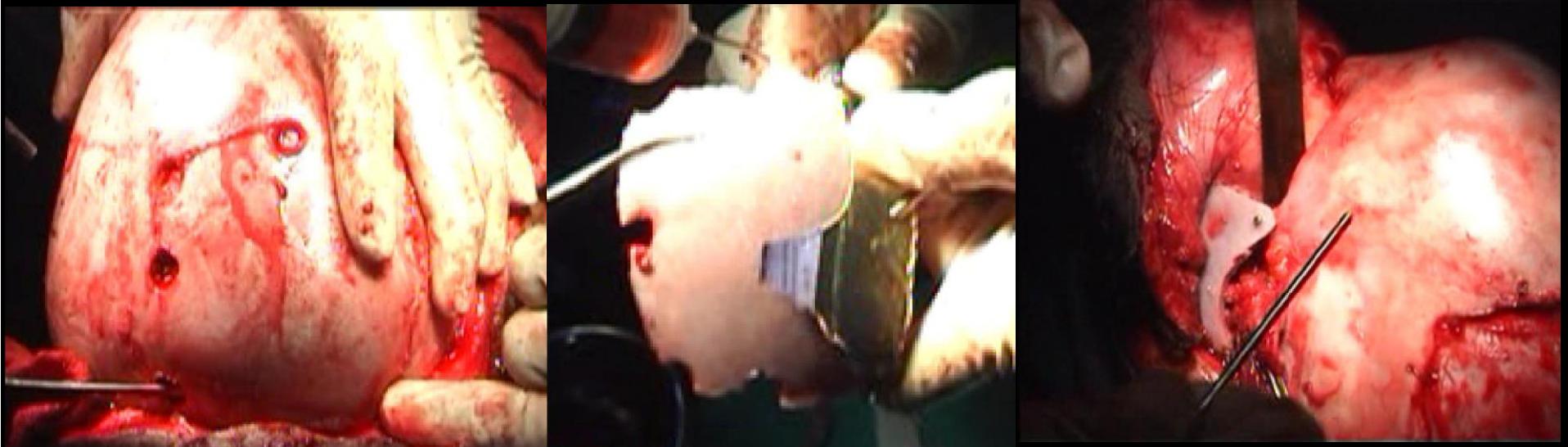
Treacher Collins Syndrome

Treacher Collins Syndrome



Craniofacial Syndromes and Anomalies

Treacher Collins Syndrome



Full thickness calvarial bone grafts
Bilateral lateral canthopexy



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Craniofacial Syndromes and Anomalies

Treacher Collins Syndrome

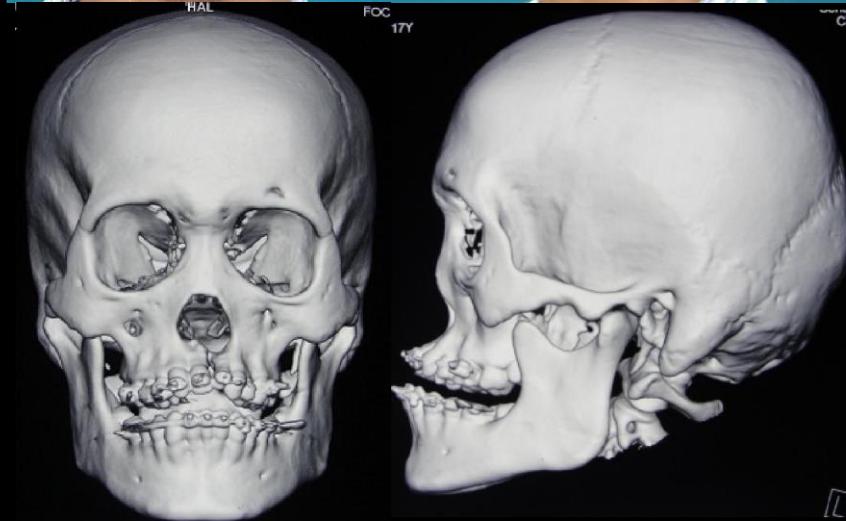


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Craniofacial Syndromes and Anomalies

Binder Syndrome

Binder Syndrome

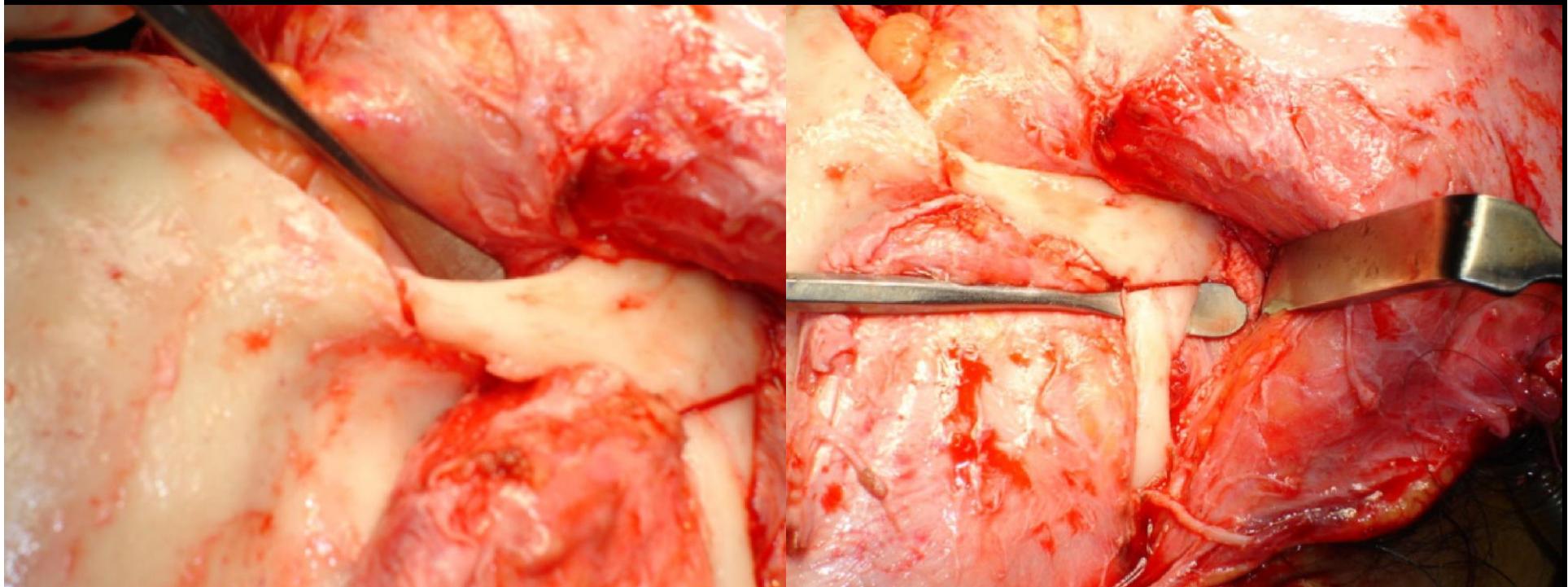


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Performing a LeFort III Osteotomy

Frontozygomatic suture osteotomy and dysjunction of zygomatic arch is done

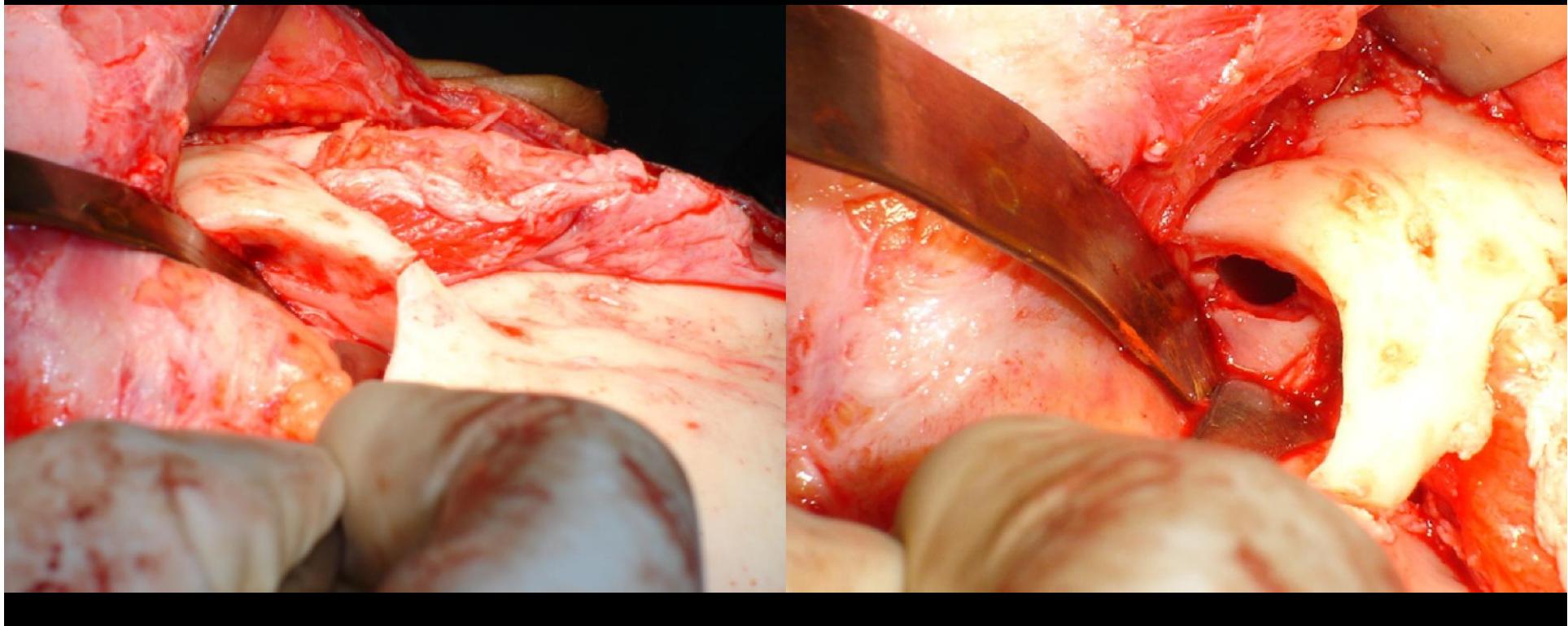
Orbital osteotomy along the lateral aspect of the internal orbit is done



Performing a LeFort III Osteotomy

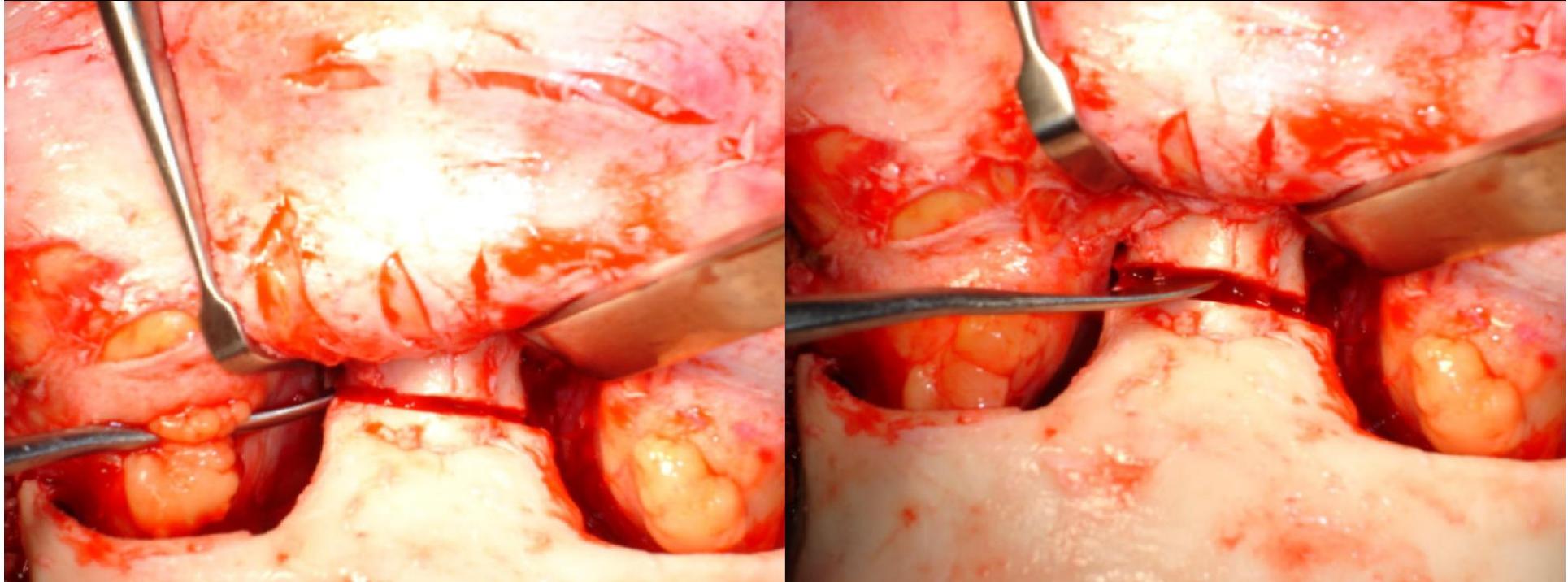
The osteotomy is continued along the sphenozygomatic suture line to the inferior orbital fissure.

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



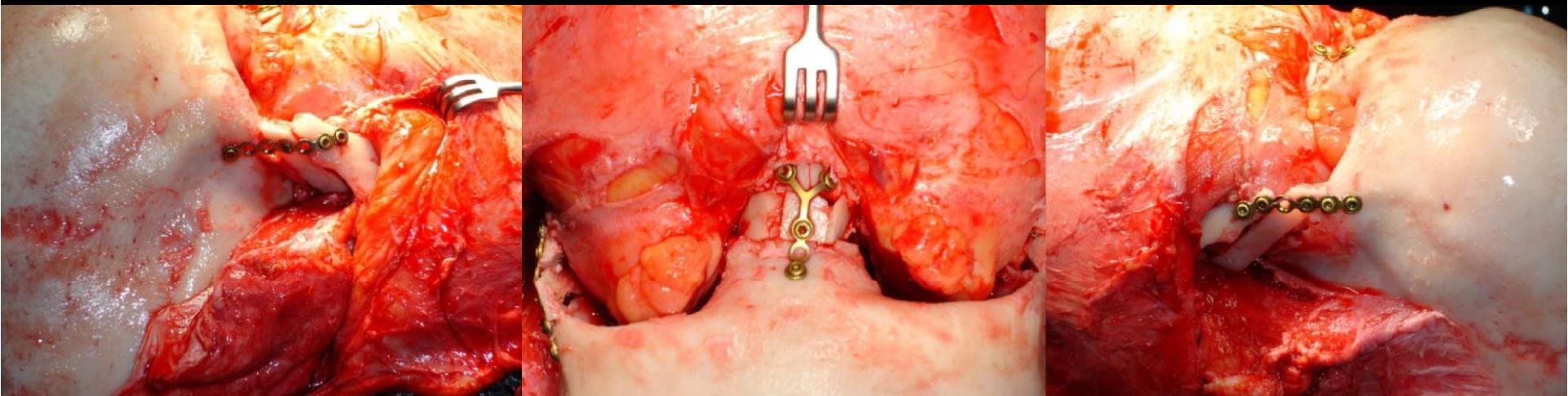
Performing a LeFort III Osteotomy

Calvarial bone graft is harvested

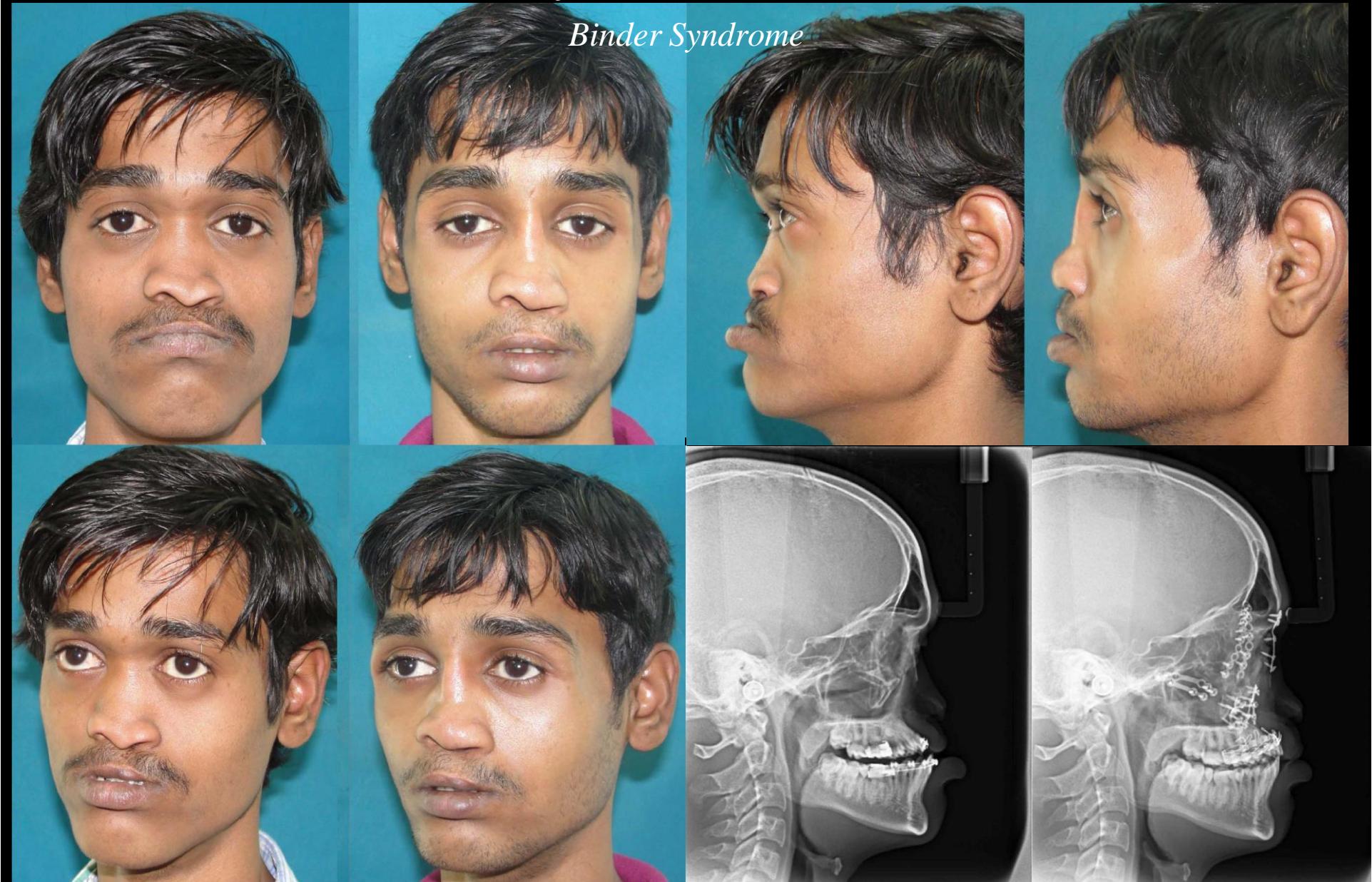


Fixation after performing a LeFort III Osteotomy

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



Craniofacial Syndromes and Anomalies



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Craniofacial Syndromes and Anomalies

Hemifacial Microsomia

Type I



Type II b



Type II a



Type III



Type I HFM



Genioplasty



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Type I HFM



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Type I HFM

Surgery Stage I



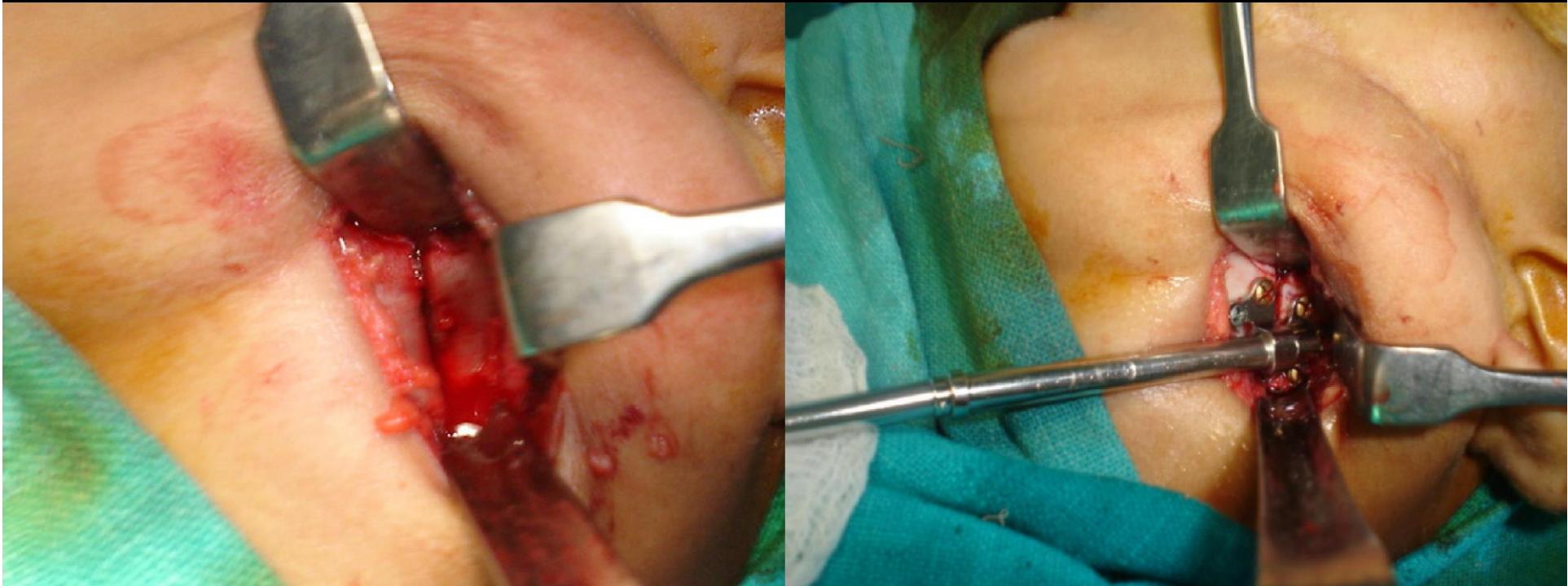
Soft tissue closure



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Type I HFM

Surgery Stage II



Distraction



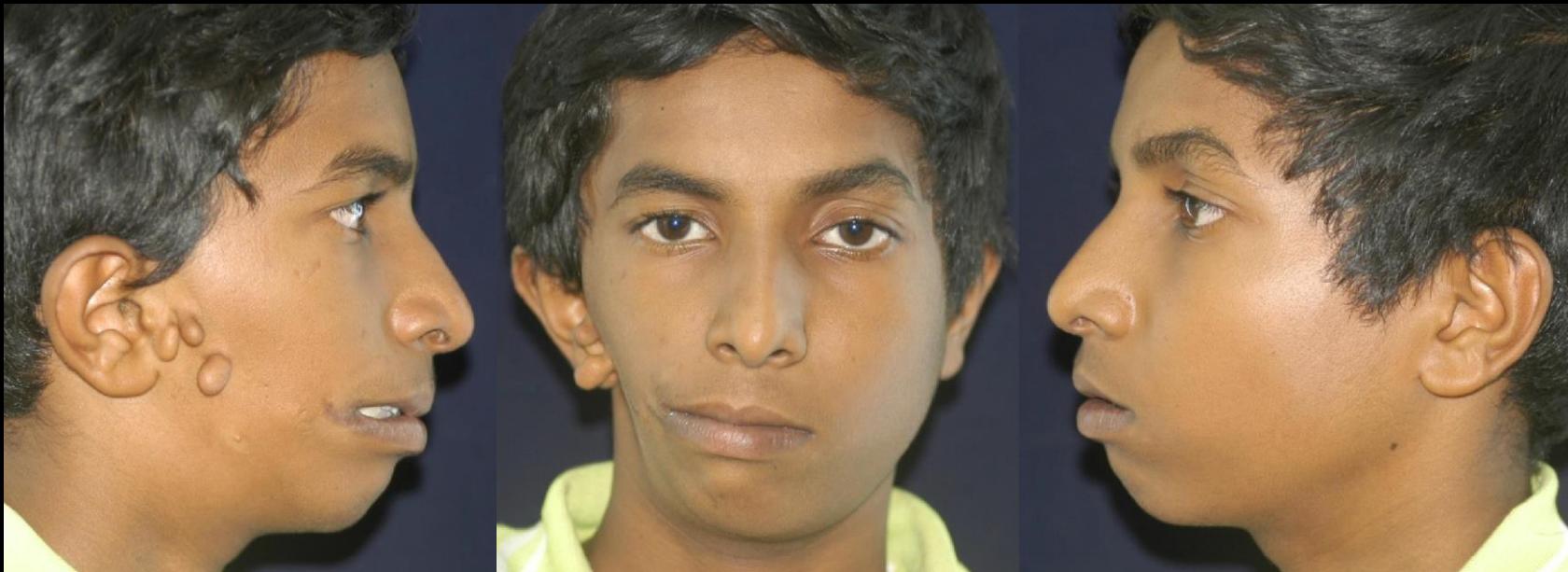
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Type I HFM

Surgery Stage II



Type II b HFM



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Type II b HFM

Surgery



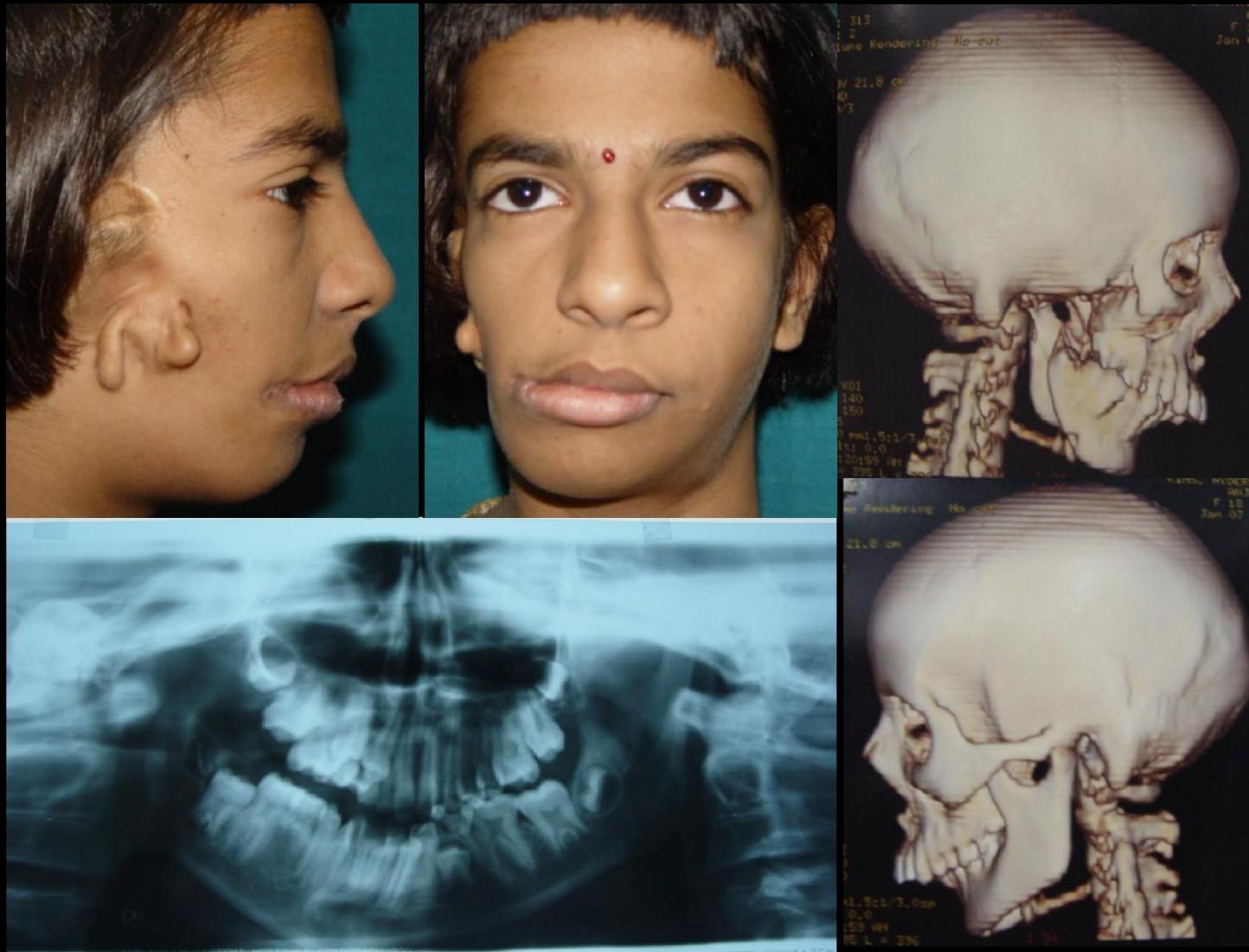
Type II b HFM

Surgery



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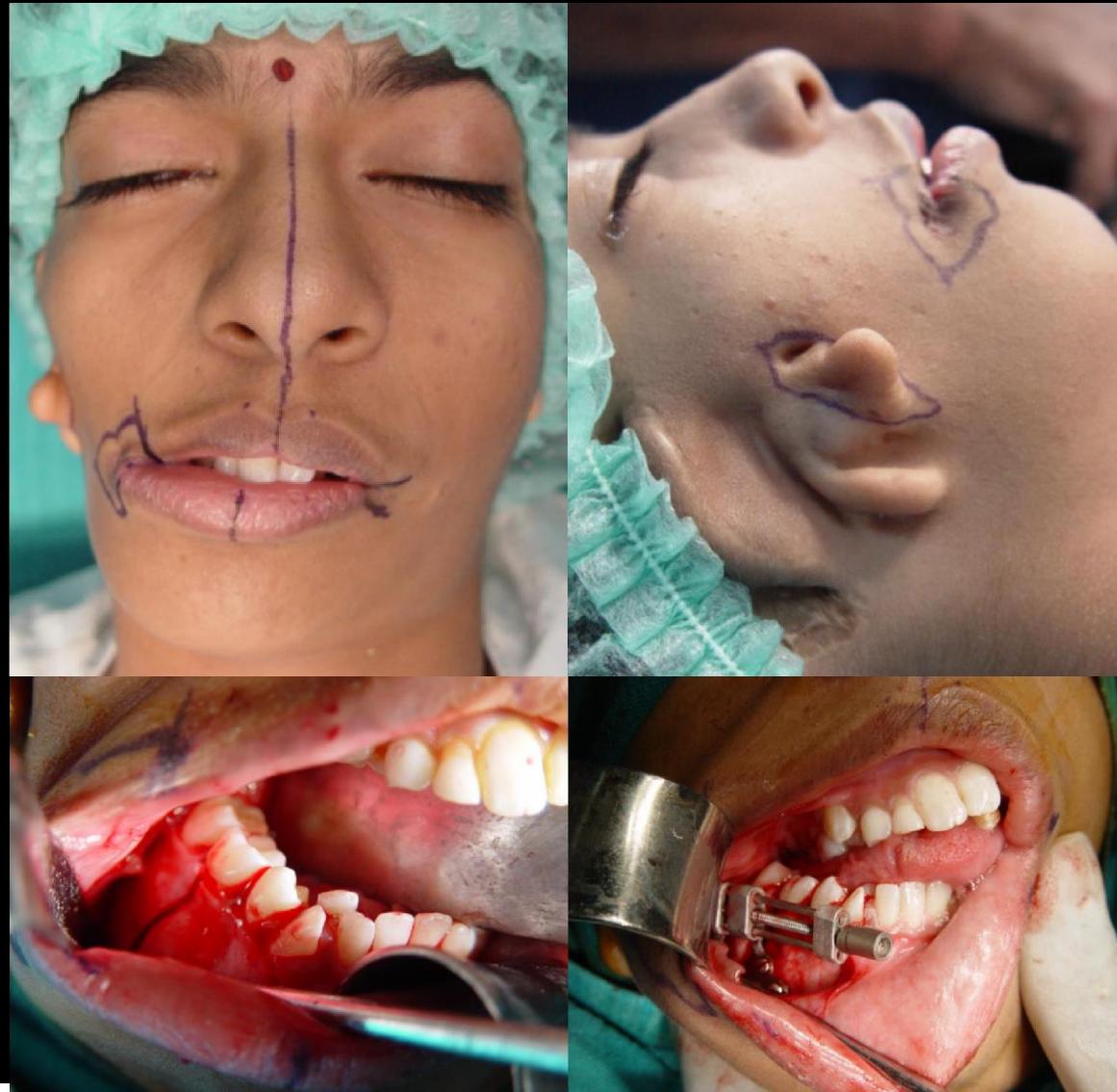
Type III HFM



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Type II b HFM

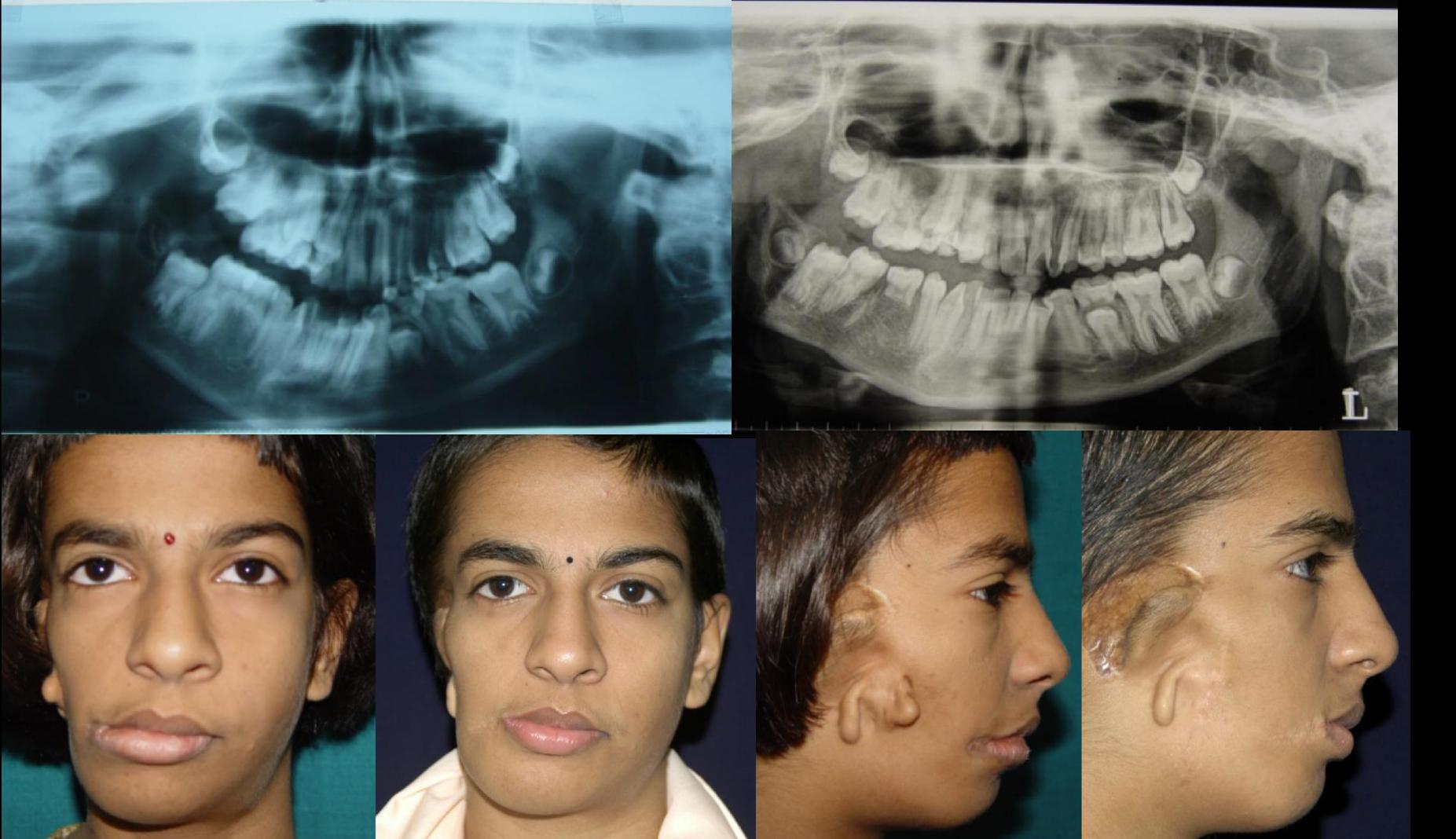
Surgery



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Type II b HFM

Surgery



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Craniofacial Syndromes and Anomalies

Pierre Robin Sequence/Craniofrontonasal Dysplasia

Pierre Robin Sequence



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Craniofacial Syndromes and Anomalies

Pierre Robin Sequence/Craniofrontonasal Dysplasia



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Craniofacial Syndromes and Anomalies

Pierre Robin Sequence/Craniofrontonasal Dysplasia

Pierre Robin Sequence



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Craniofacial Syndromes and Anomalies

Pierre Robin Sequence/Craniofrontonasal Dysplasia

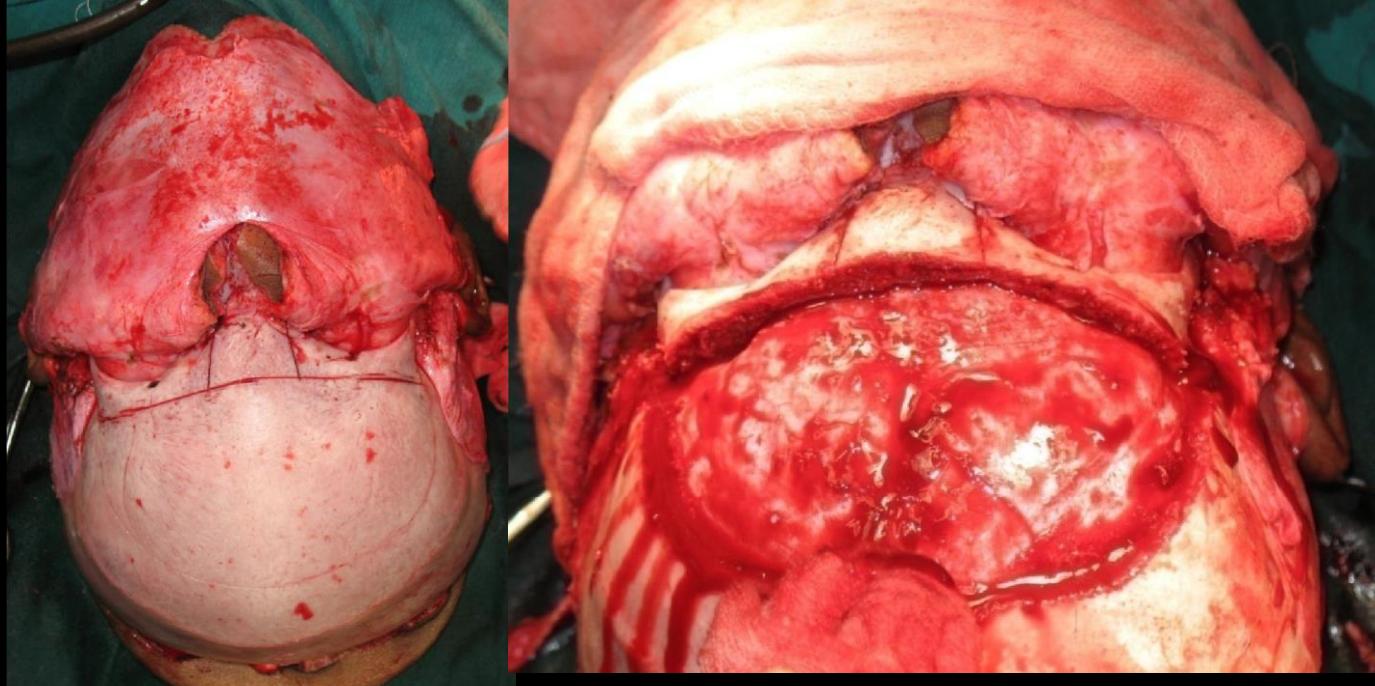
Hypertelorism



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Naso-orbital Complex

Hypertelorism



Transfrontal Craniotomy

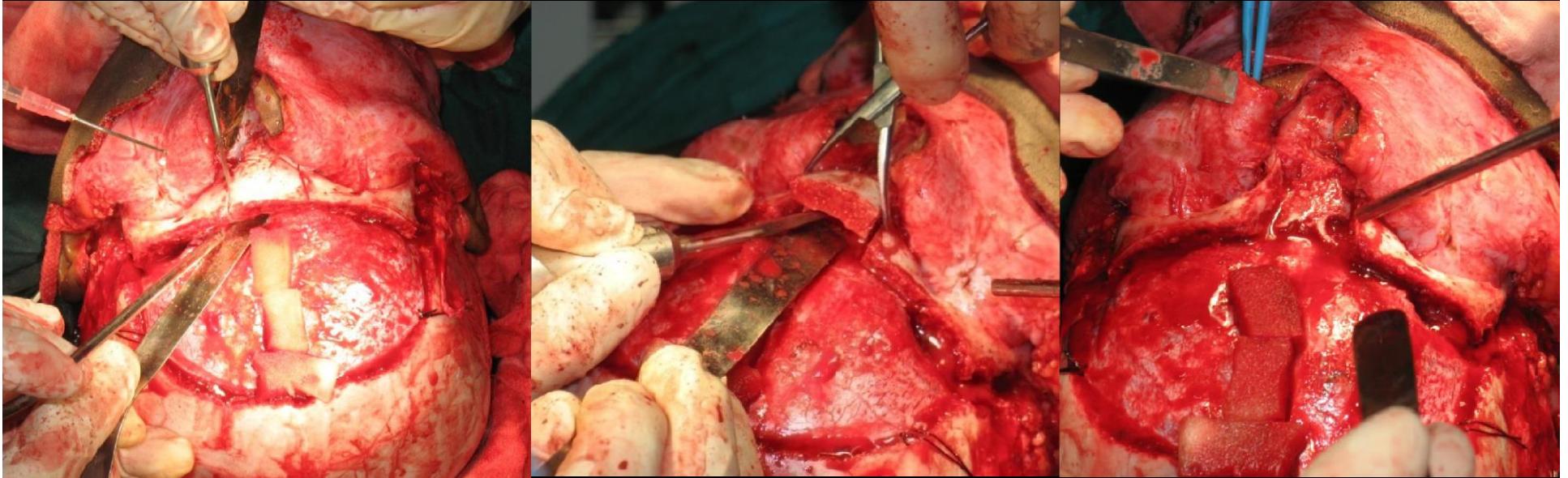
This includes a transfrontal craniotomy with an intervening frontal bar, which is left intact.

The frontal bar results from parallel osteotomies that are atleast 1 cm from the supraorbital rims and permits orientation of the orbits once they have been mobilized



Naso-orbital Complex

Hypertelorism



Orbital roof osteotomy

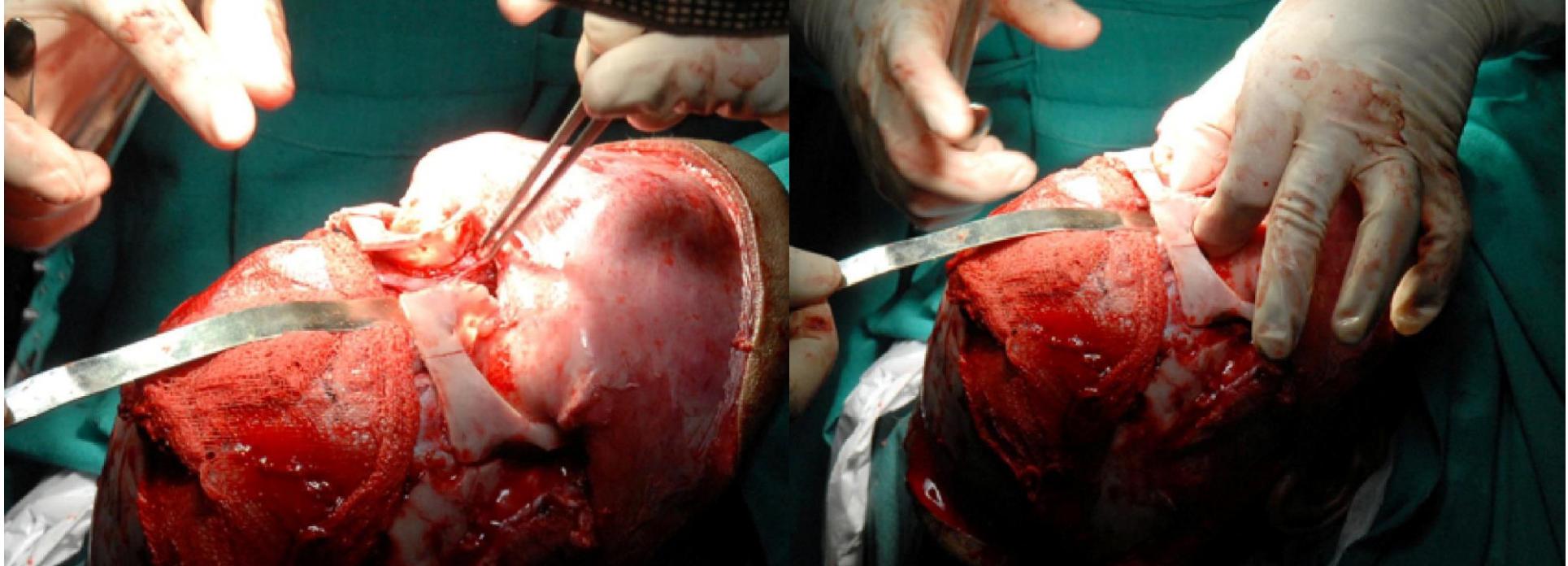
The bony cuts of the orbital roofs are performed with intracranial visualization

Orbital approximation

A central block of bone is removed between the orbits to allow their approximation in a medial direction.



Naso-orbital Complex Hypertelorism



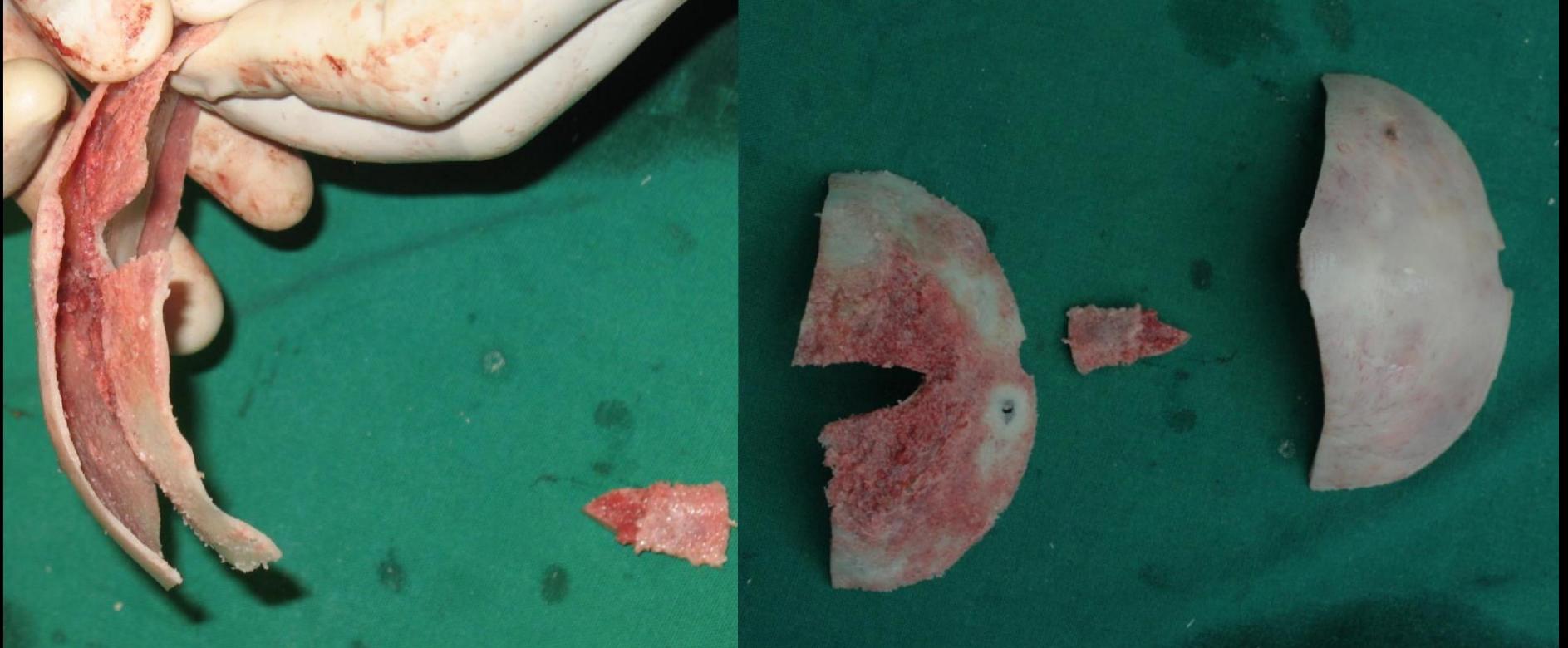
Finishing osteotomy

Finally, a wedge of bone is removed from either side of piriform fossa so that the nasal airways are not constricted when the orbits are moved medially. If the osteotomies have been performed to their full depth, the orbits can be approximated by finger pressure alone



Naso-orbital Complex

Hypertelorism



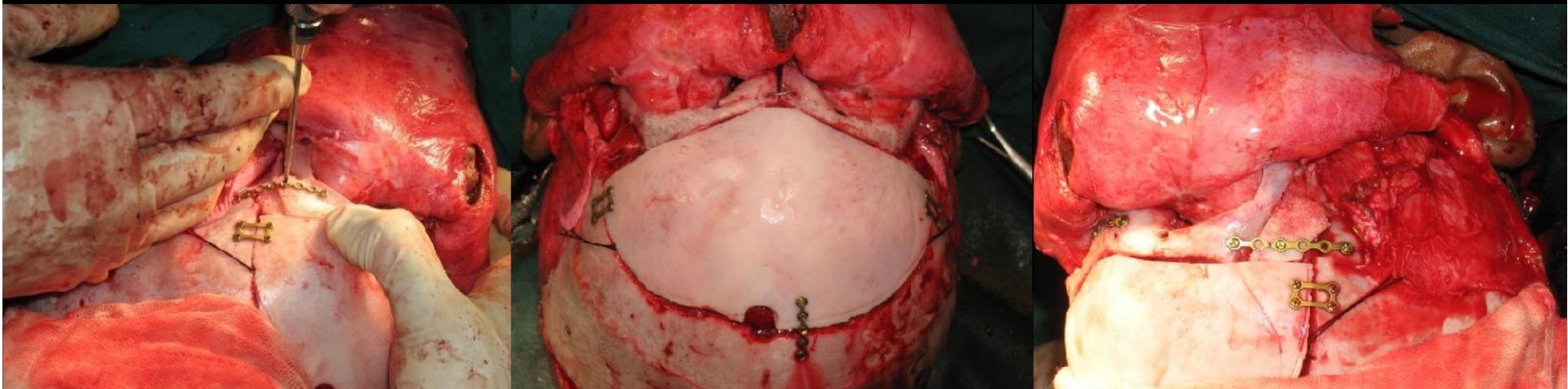
Fixation and bone grafting

Bone graft material harvested from the calvarium can be split into two cortices and one cortex can be used to graft bone in the defects and the other can be used to close the original defect



Naso-orbital Complex

Hypertelorism



Fixation and bone grafting

The orbits are positioned and held in place with wires or micro-or miniplates.

Bone graft material harvested from the clavarium, iliac crest, or rib is then used to fill in the resulting gap defects at the lateral orbital walls and zygomatic areas



Treatment

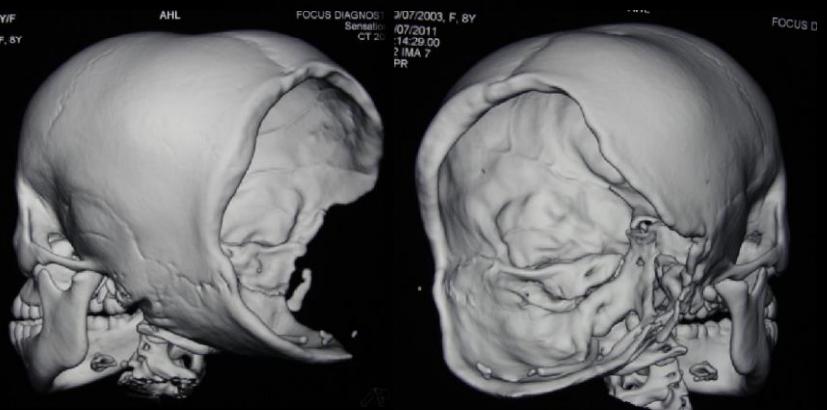
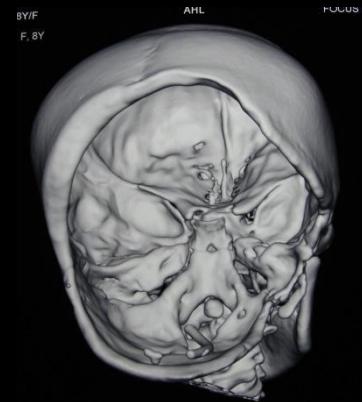
Hypertelorism



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Cranial Vault Defects

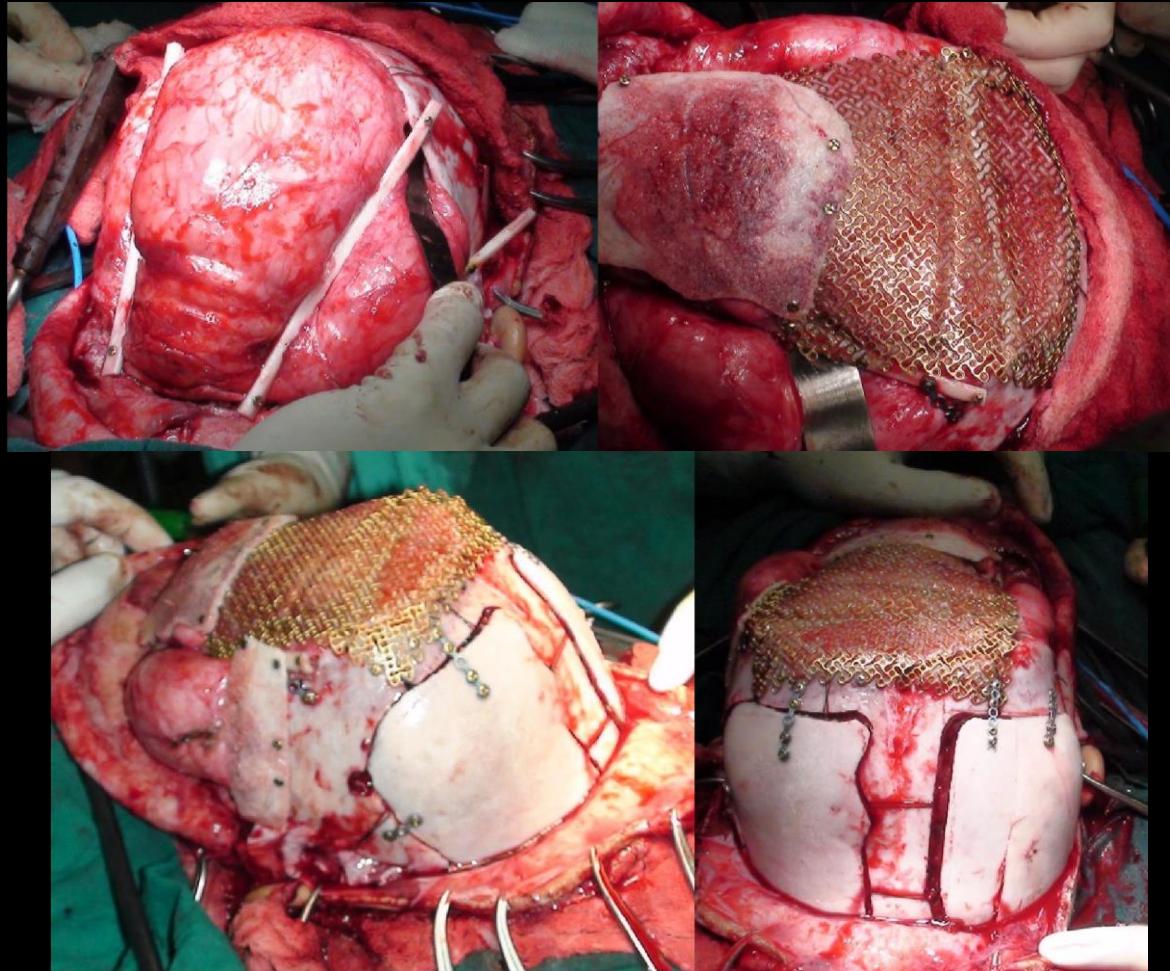
Dandy Walker Syndrome



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Cranial Vault Defects

Dandy Walker Syndrome



Reconstruction of posterior cranial vault with bilateral tibial bone, split calvarium and titanium mesh



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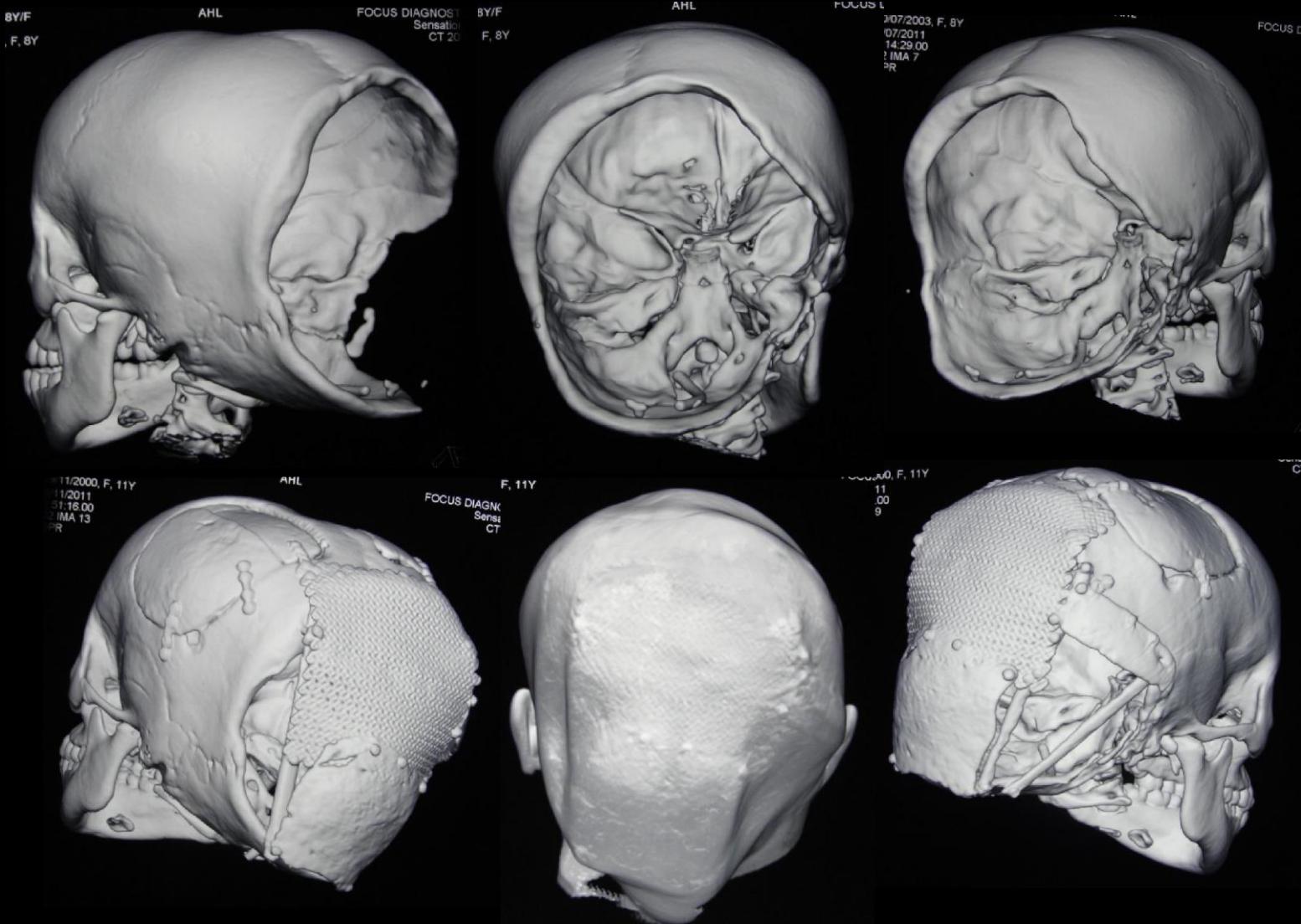
Cranial Vault Defects

Dandy Walker Syndrome



Cranial Vault Defects

Dandy Walker Syndrome



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Craniofacial Syndromes and Anomalies

Craniofacial Clefts



Tessier #0 facial cleft



Craniofacial Syndromes and Anomalies

Craniofacial Clefts



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Craniofacial Syndromes and Anomalies

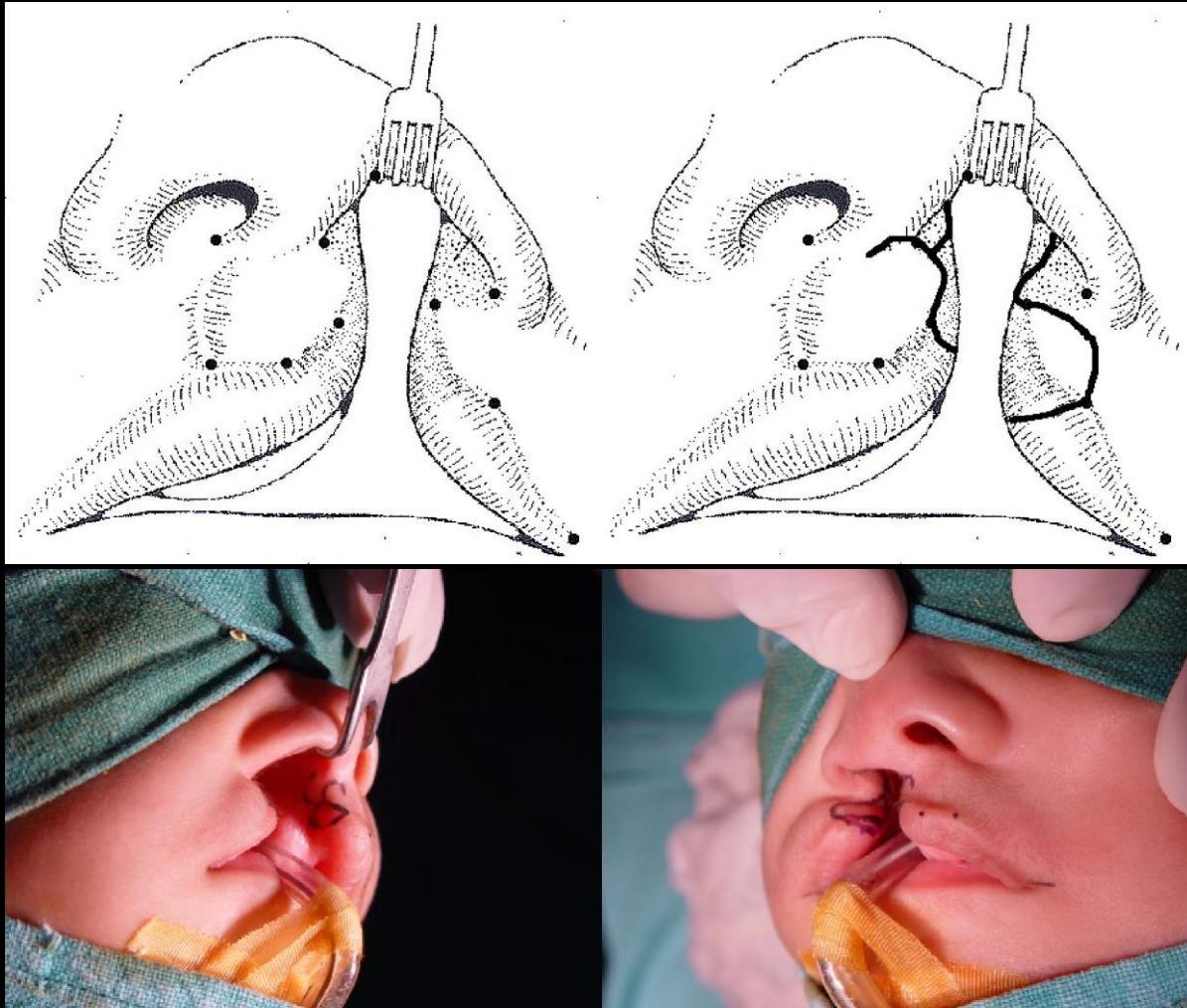
Craniofacial Clefts



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Unilateral 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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Unilateral Cleft Lip Repair



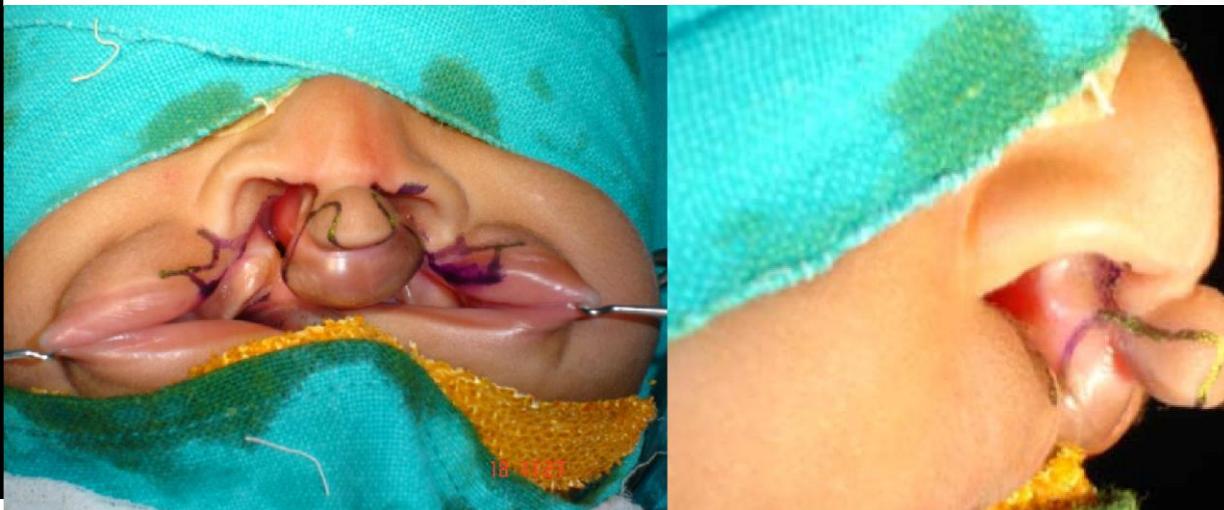
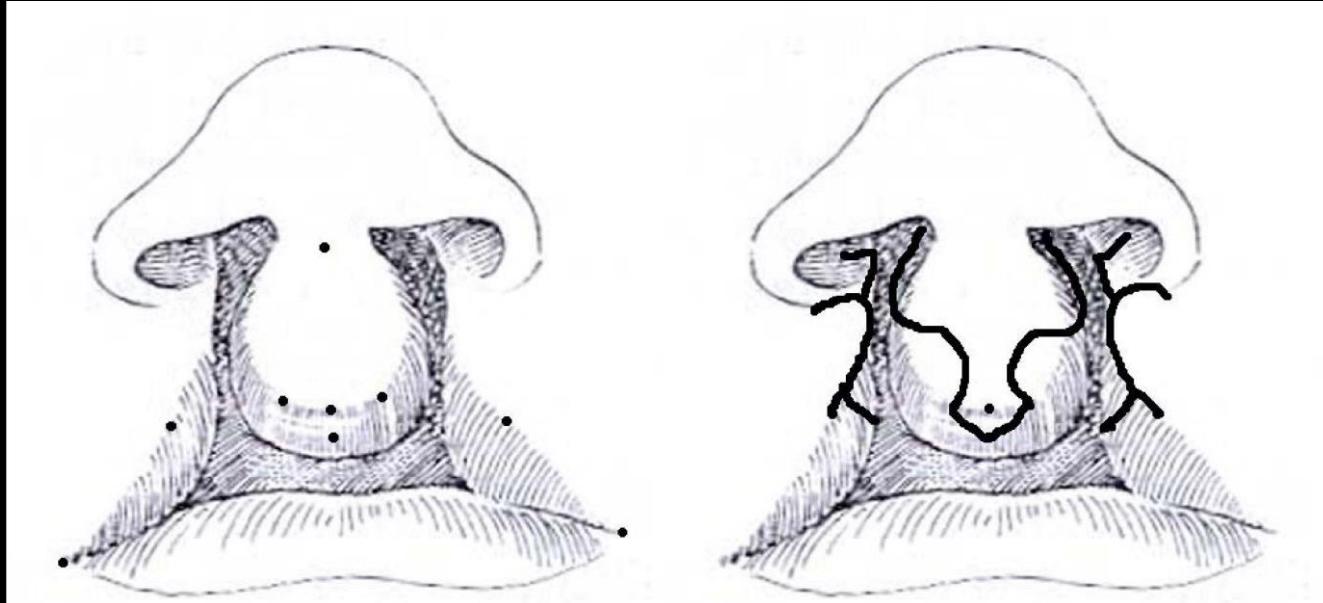
4 years post operatively



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Bilateral Cleft Lip Repair

Incision design for bilateral cleft lip surgery



Bilateral Cleft Lip Repair



Preoperative

5 days postoperatively

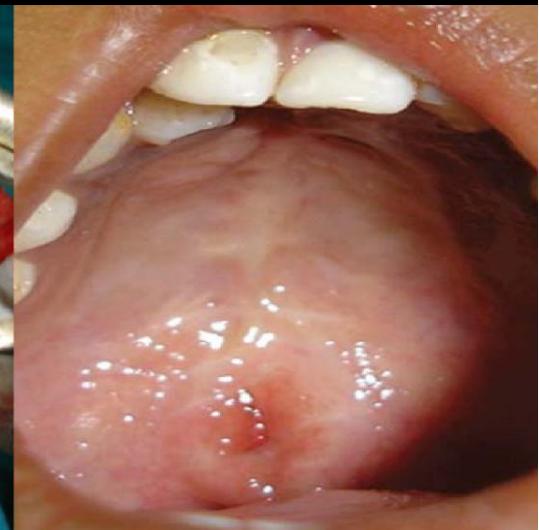
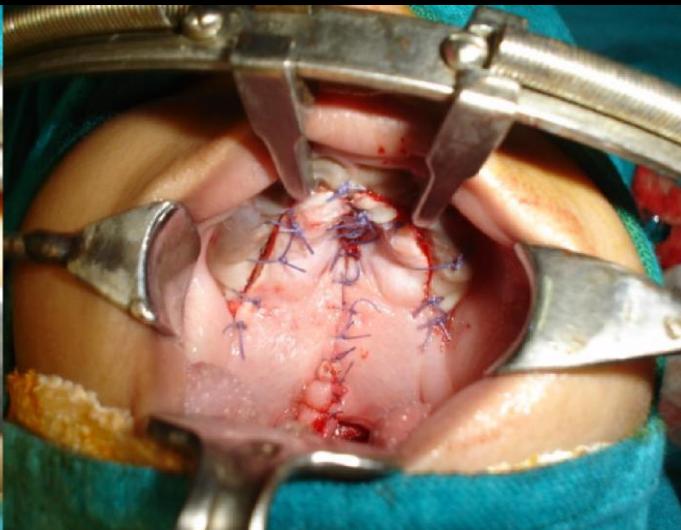
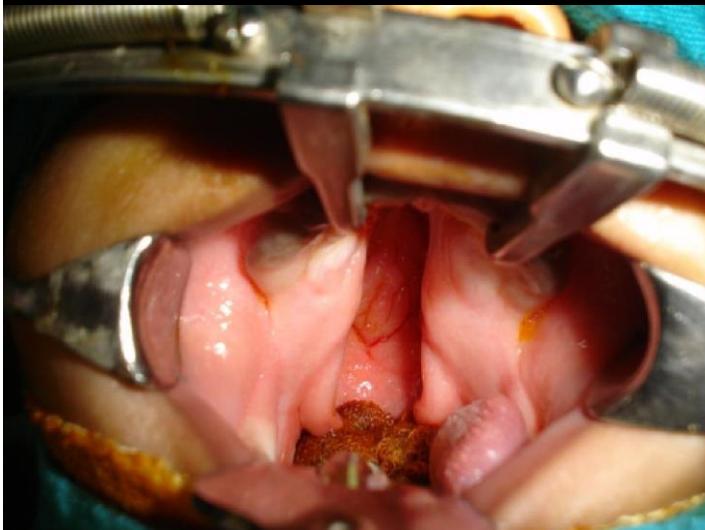
18 months postoperatively

3 years postoperatively



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Cleft Palate Repair



Complete Palate Repair

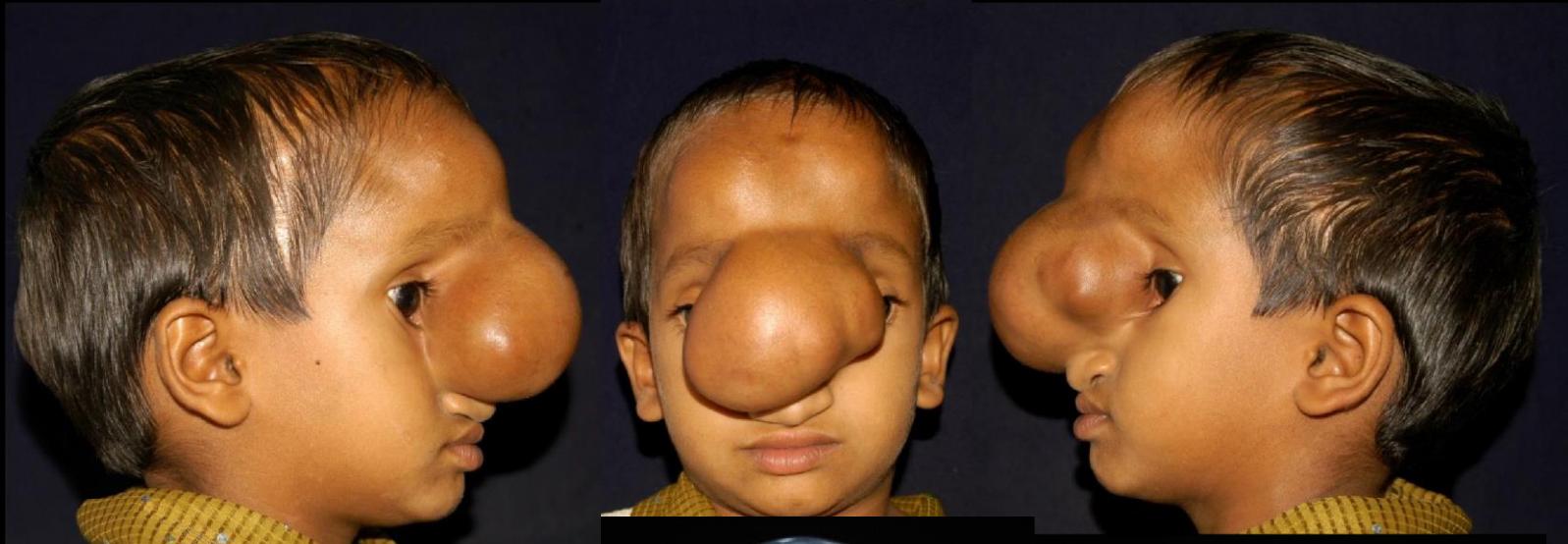
Follow up at age 8
years



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Benign and Malignant Head and Neck Tumors

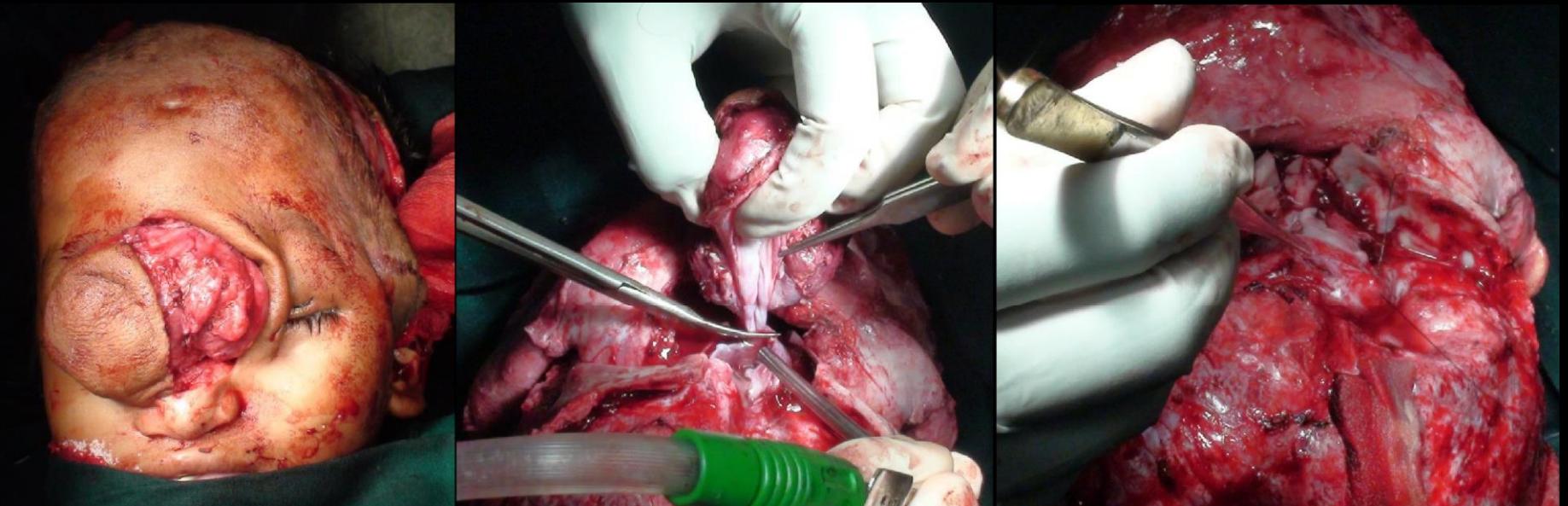
Encephaloceles



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Treatment

Nasal encephalocele



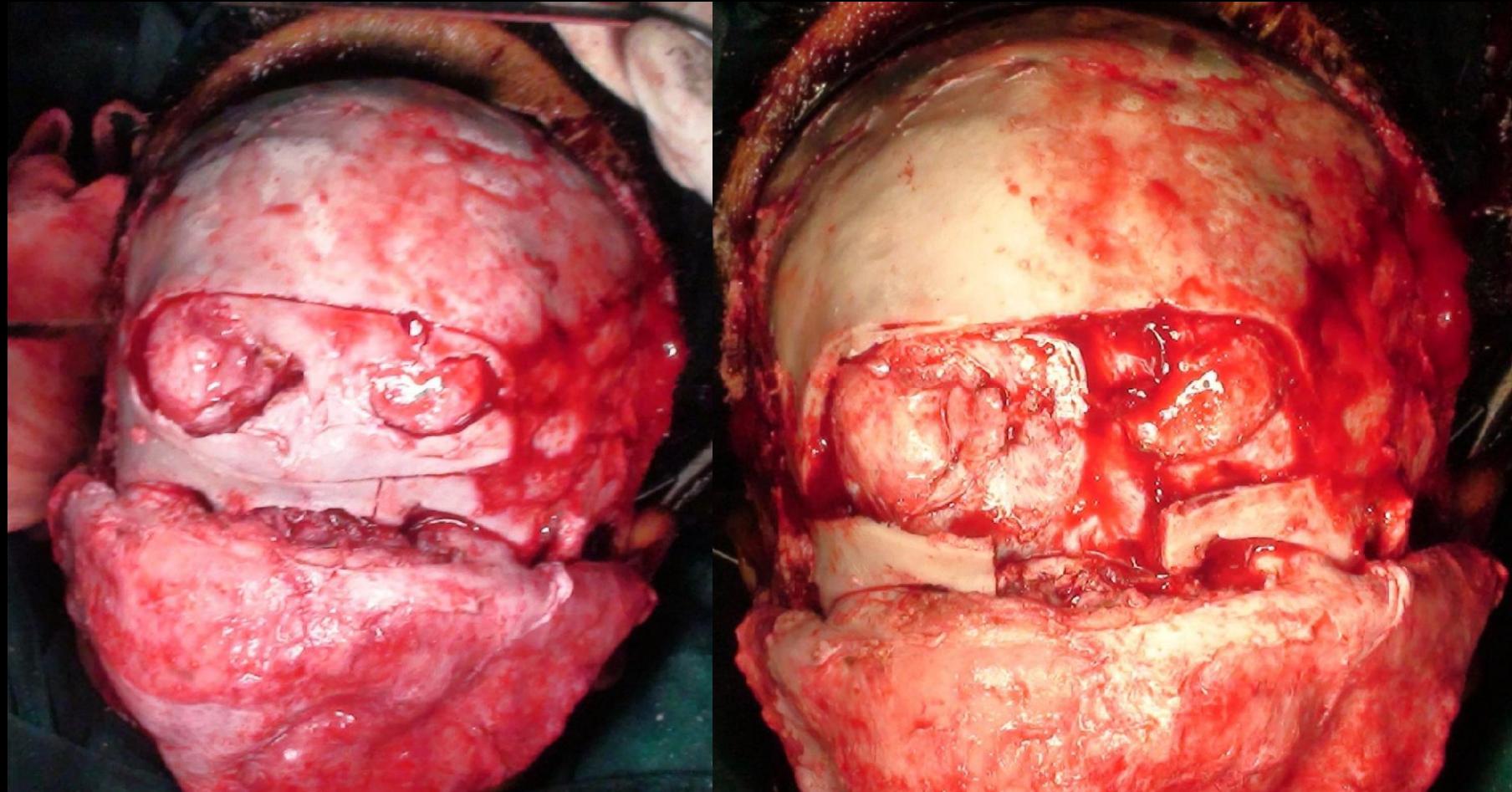
Encephalocele Resection



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Treatment

Nasal encephalocele



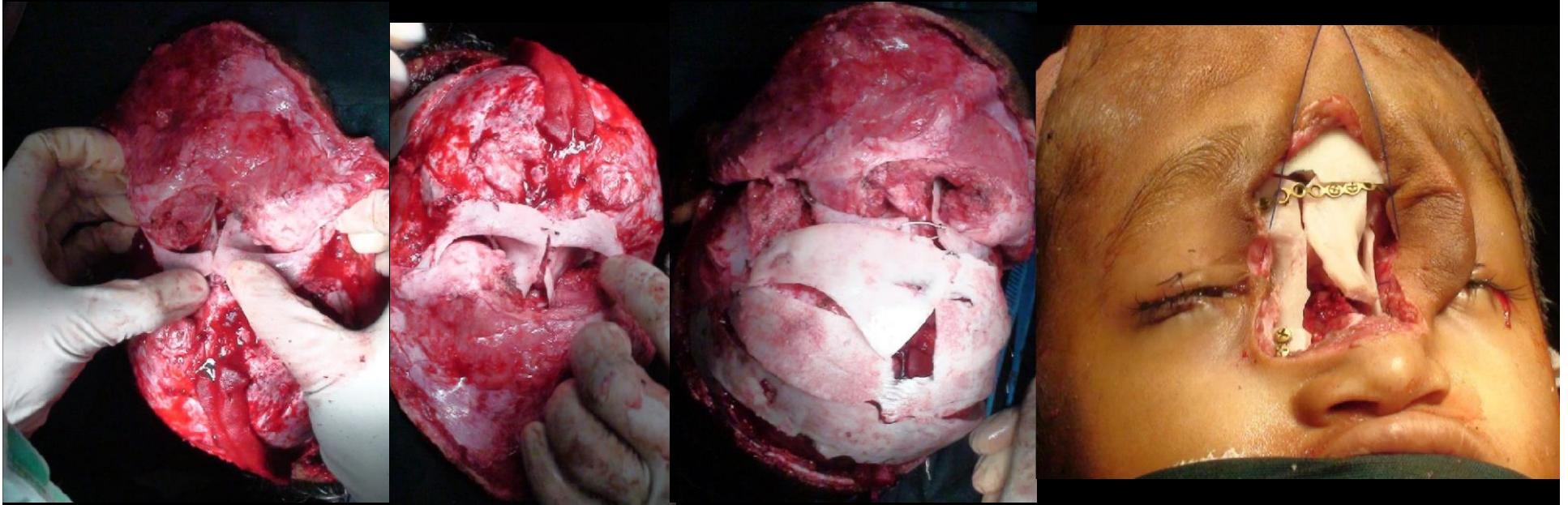
Transfrontal Craniotomy



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Treatment

Nasal encephalocele



Finishing osteotomy, fixation and closure



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Treatment

Nasal encephalocele



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Benign and Malignant Head and Neck Tumors

Hemangiomas/Vascular Malformations

Vascular Malformations

Capillary



Venous



Lymphatic



Arterio-venous



Hemangioma



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Sclerotherapy



- Syrup or Tablet Propranolol: 0.5 -1 mg/kg of body weight in two divided doses for 6 months under strict pediatric supervision
(**Propranolol**, β -blocker, vasoconstrictor, regulating angiogenic pathways inducing apoptosis of vascularized endothelial cells)
- Injection Triamcinolone (Kenocort): One 20 mg /ml vial diluted in 2 ml saline and 1ml lignocaine injected intralesionally, once a month for six months.
(**Triamcinolone**, corticosteroid suppresses vasculogenic capability of multipotent stem cells)
- Contractubex (10% aqueous onion extract, 50 U heparin per gram of gel, 1% allantoin) gel and olive oil: massage on the lesion twice daily till the regression of the lesion.



Surgical Protocol

- Key is Accessibility

Accessible = Surgery

Inaccessible = Embolisation and surgery

- Ligation of all possible blood vessels in the vicinity of the lesion
- Aim of surgery
 - HARMONIC SCALPEL is used to radically excise all affected tissue as remnants of necrotic tissue can form a focus of a granuloma or further infection.
 - Reconstruct what ever possible
 - Post operative maintenance with steroid injections intra-lesionally



Treatment...



High Flow A-V Malformation



Treatment...



Hemangioma

Treatment with full thickness skin graft harvested from right groin

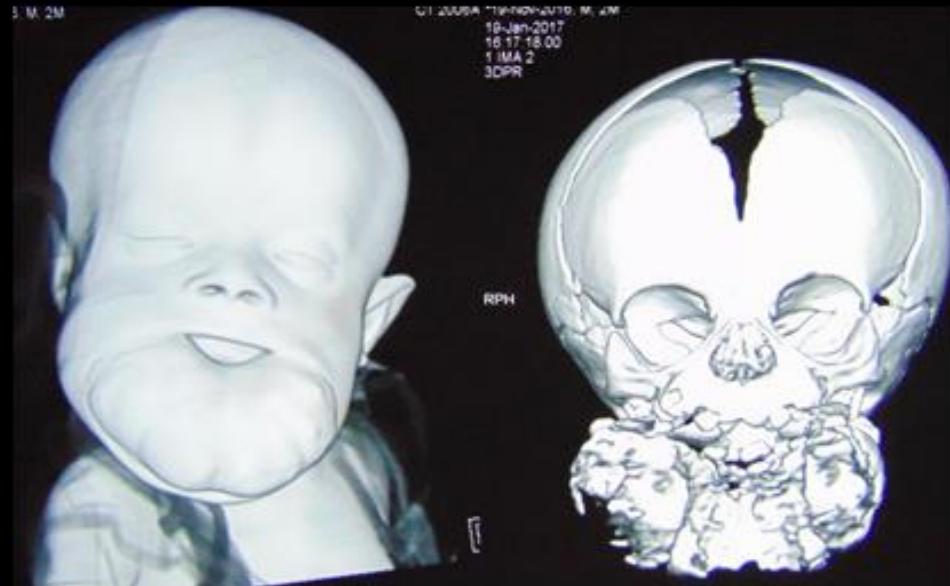


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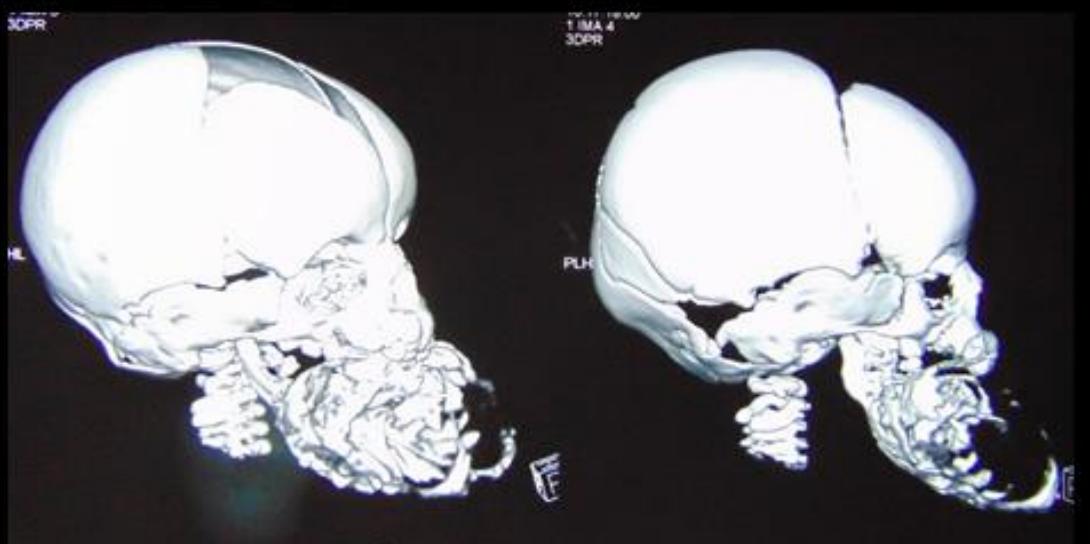
PATHOLOGY



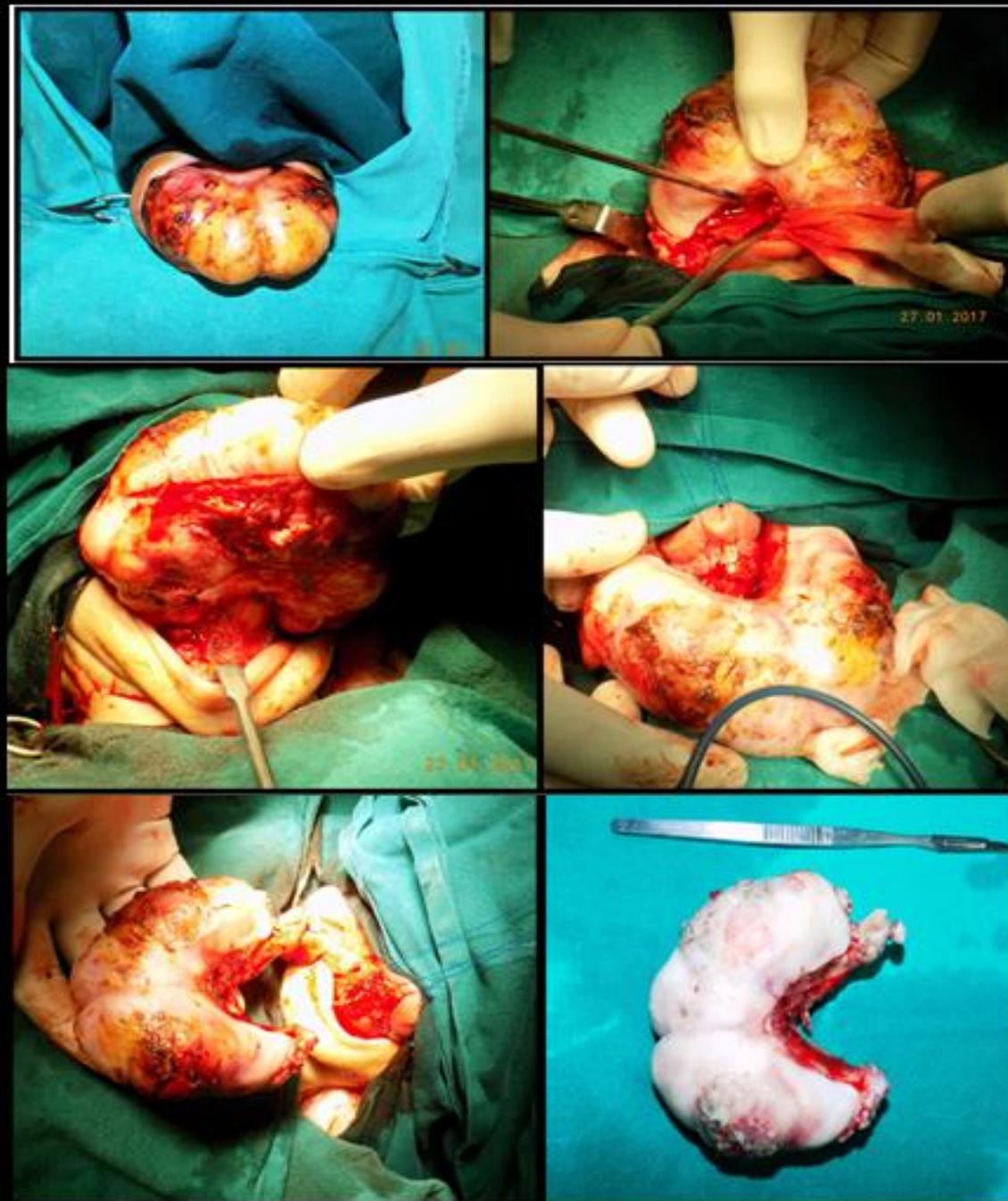
PRE OP

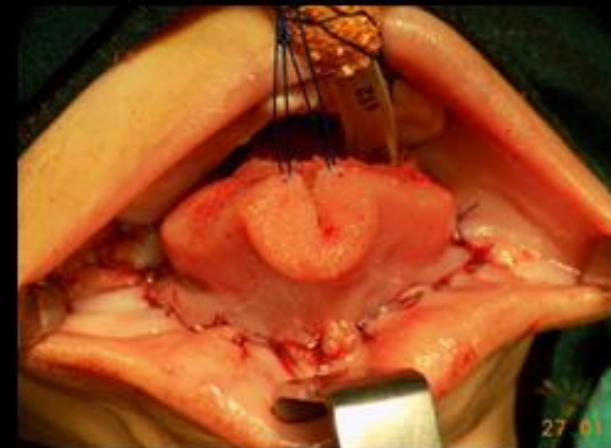
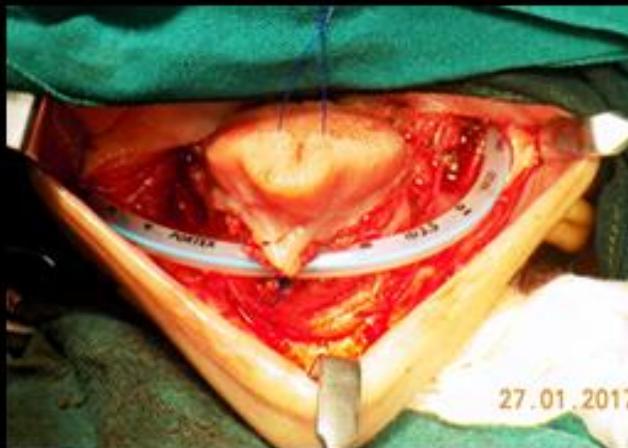


PRE OP SCANS



INTRAOP





POST OP 7 DAYS



PRESENT POST OP



Craniofacial Tumors

Plexiform Neurofibroma and benign tumors



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Craniofacial Tumors

Plexiform Neurofibroma and benign tumors



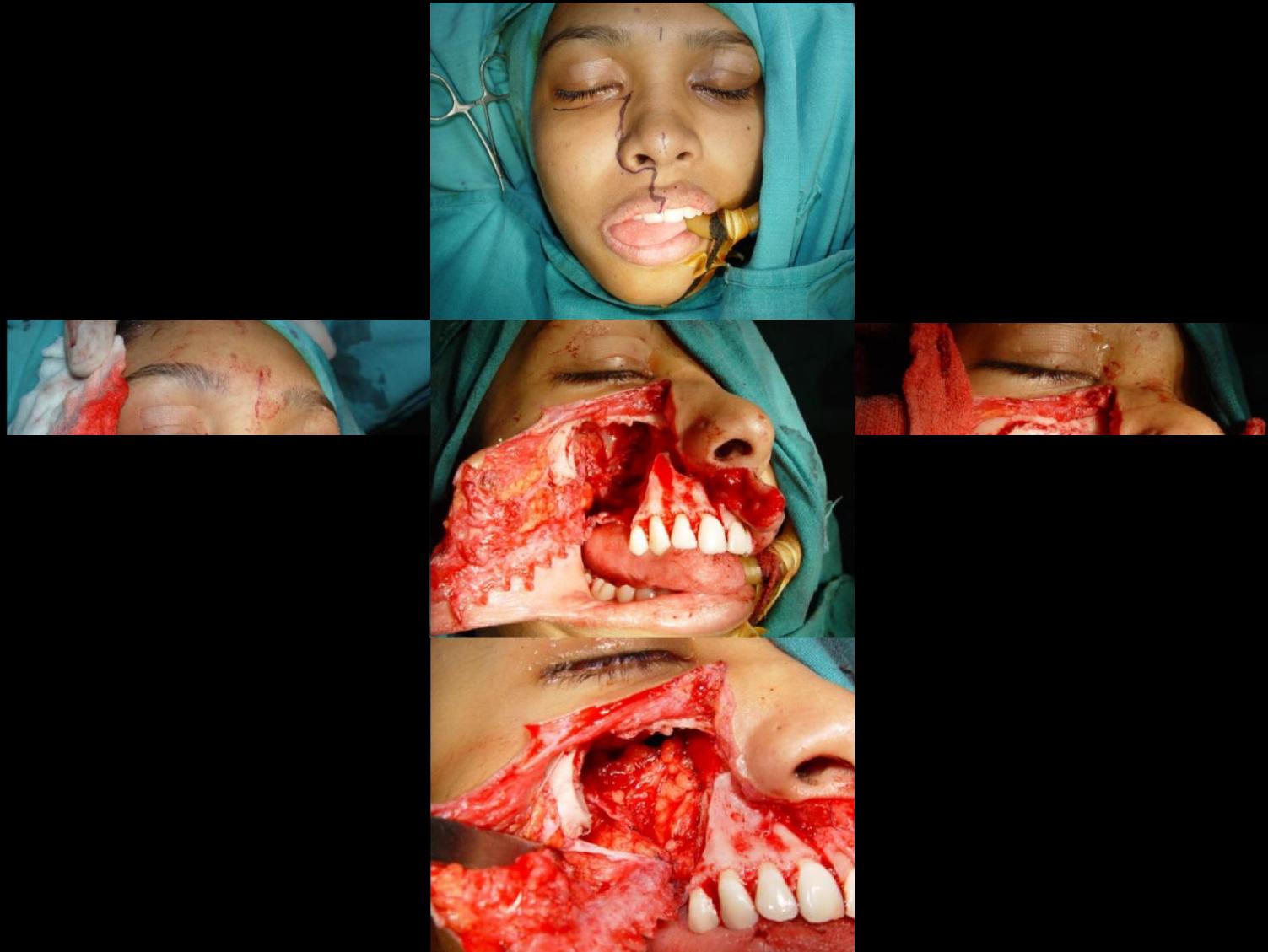
Craniofacial Tumors

Sarcoma and other malignancies



Craniofacial Tumors

Sarcoma and other malignancies



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Benign and Malignant Head and Neck Tumors

Sarcoma and other malignancies



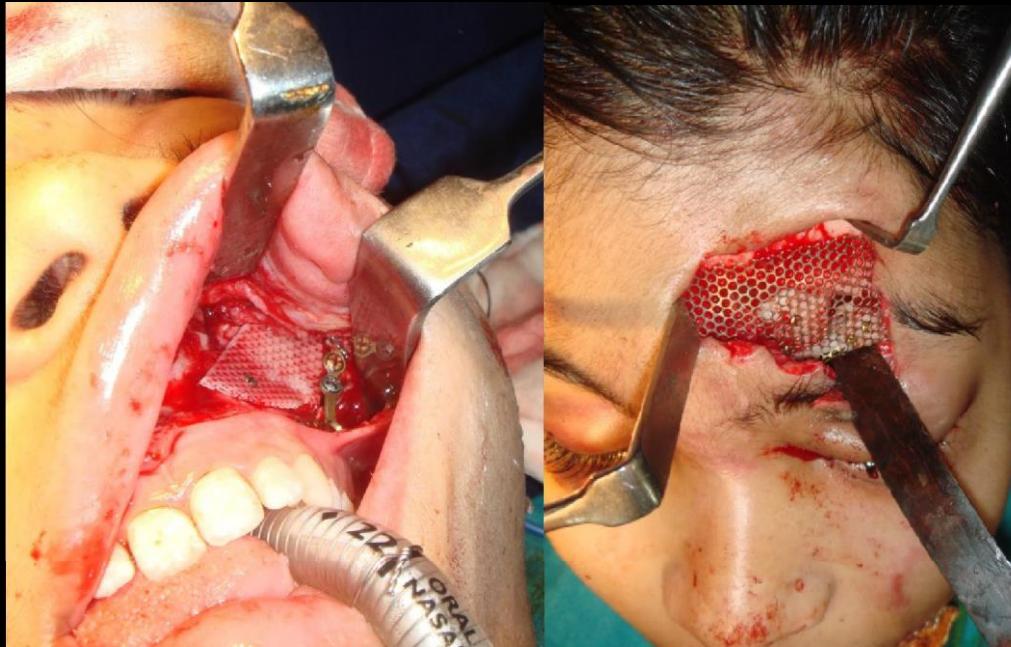
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Craniomaxillofacial Trauma



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Craniomaxillofacial Trauma



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Craniomaxillofacial Trauma



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Non-syndromic Orthognathic Deformities



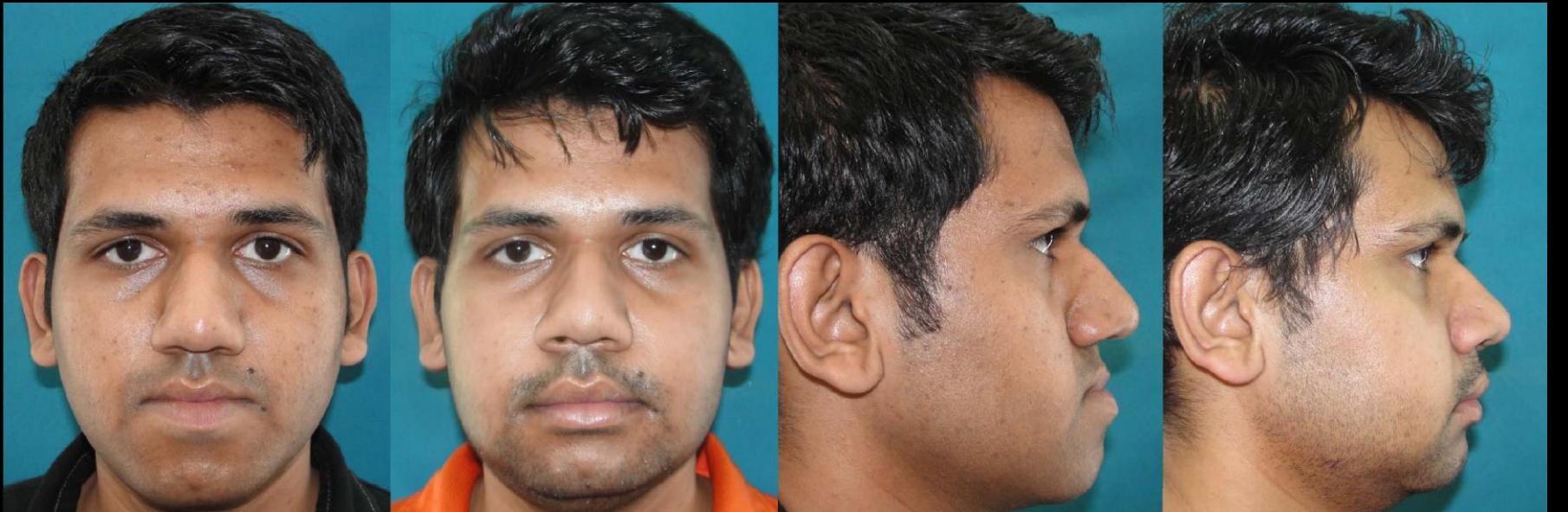
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High LeFort I Osteotomy with Rhinoplasty



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LeFort I + Bilateral Saggital Split Osteotomy

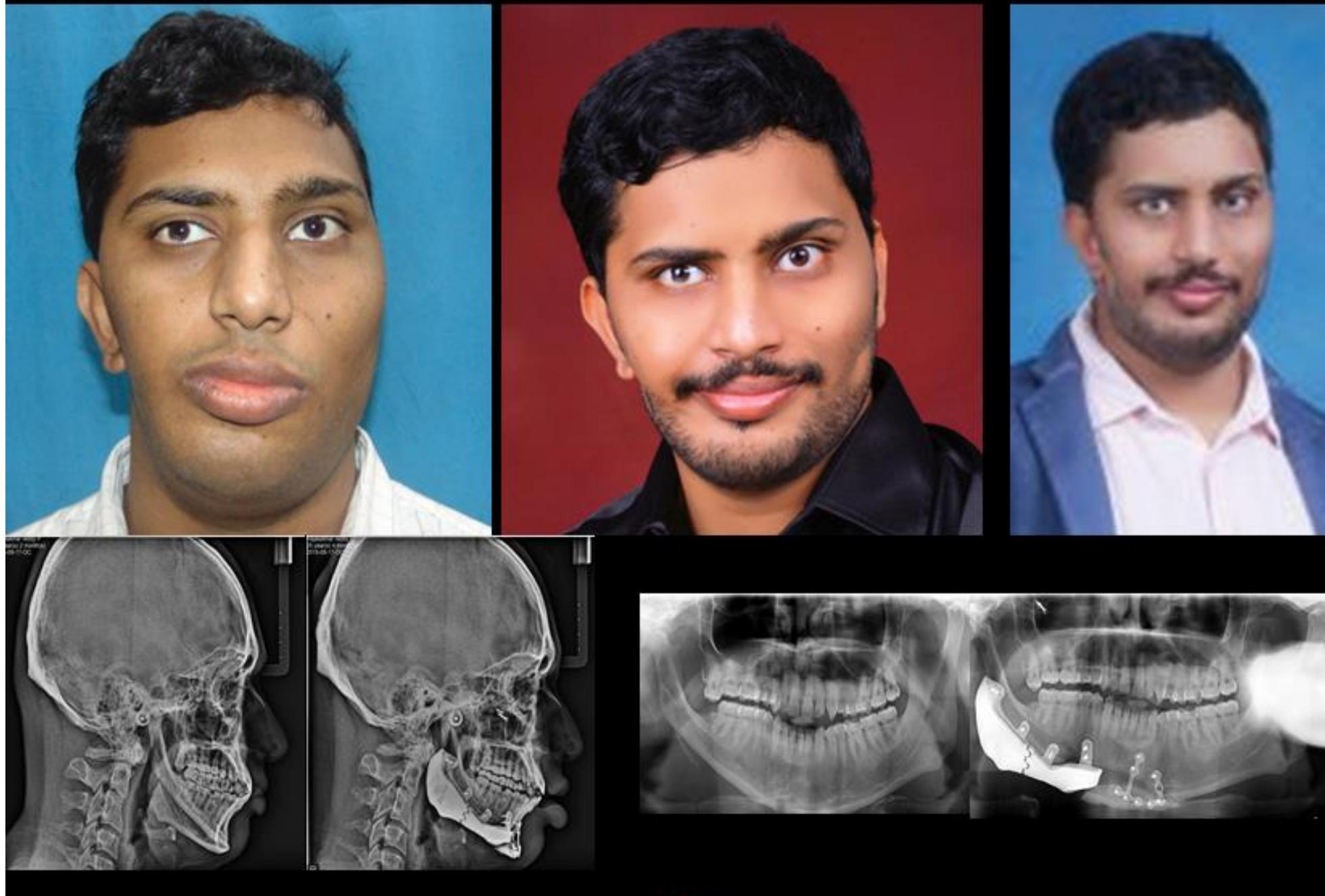


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PLANNING SURGERY



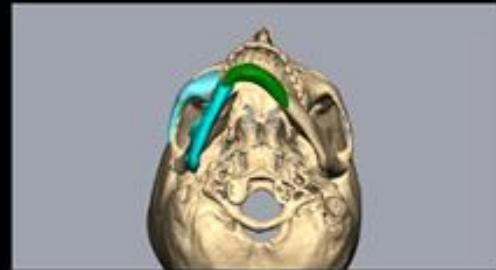
Facial Asymmetry Correction



GSR Hospital



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Bring the Smile Back



Thank You



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