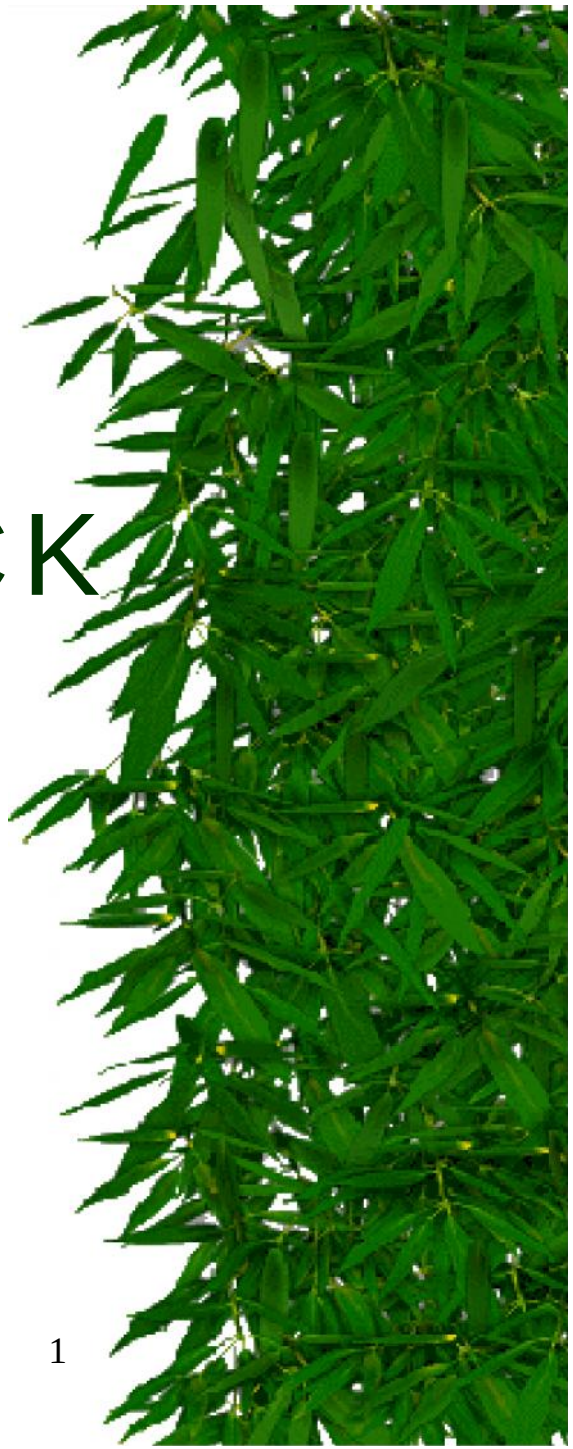
DEVELOPMENTAL ANATOMY OF THE FACE, JAW AND NECK



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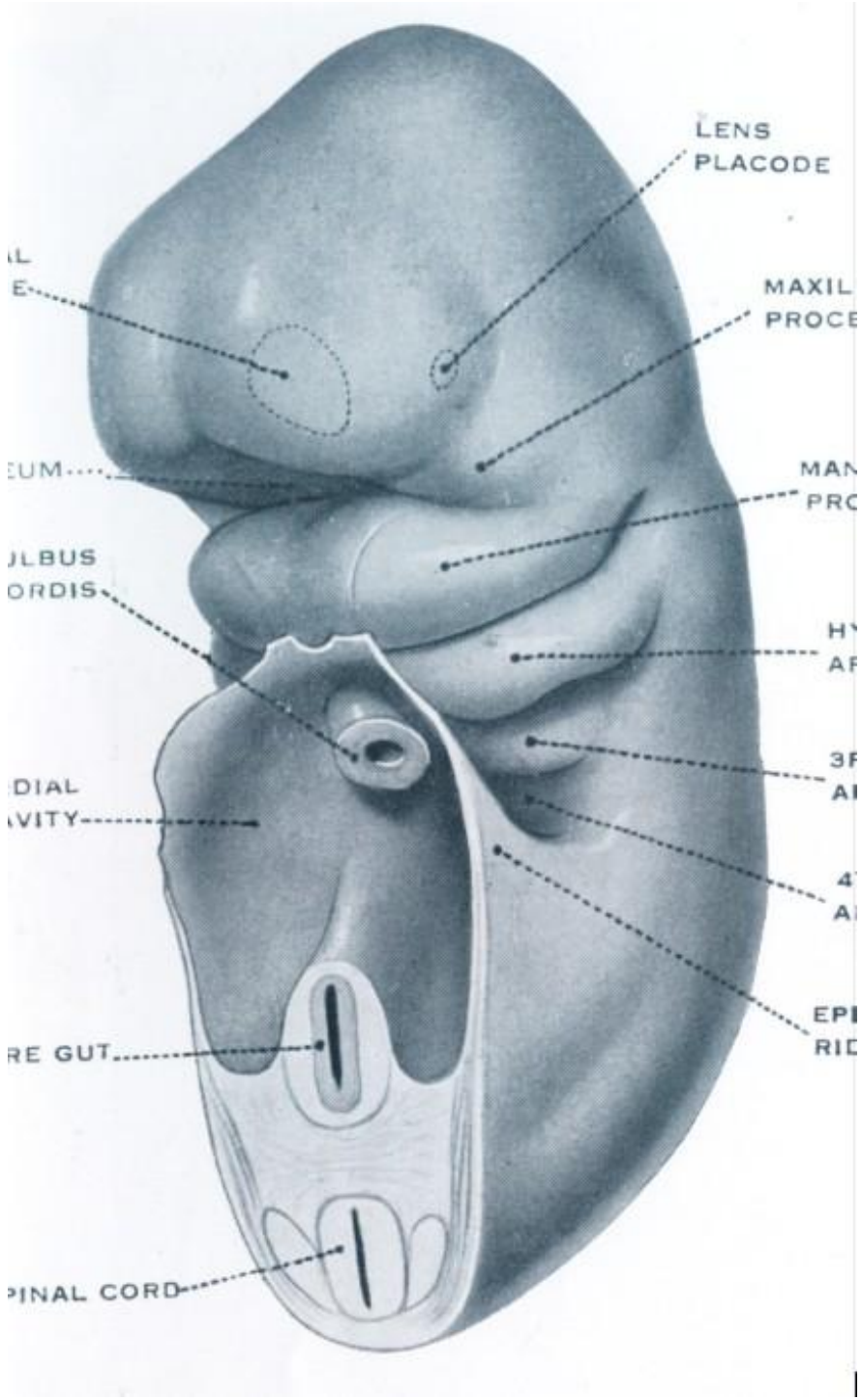
Department of Surgery

By the end of this lecture, you should be able to:

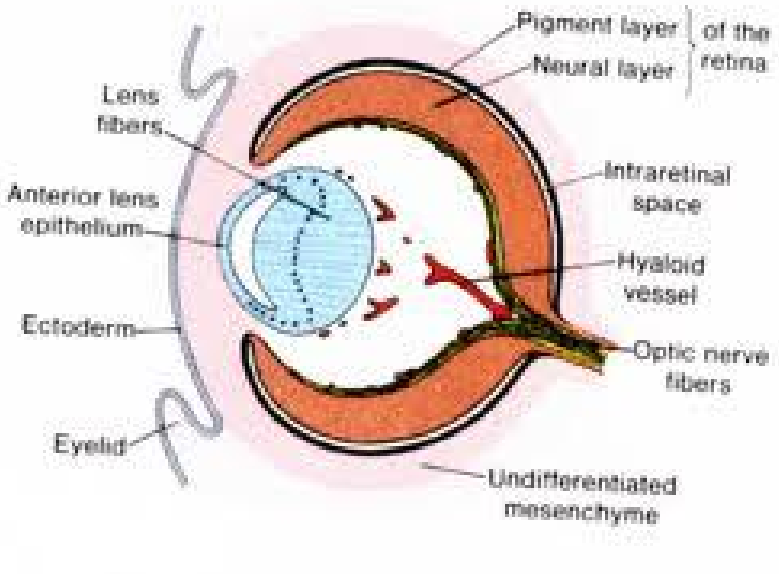
- Discuss the embryology of the face
- Relate congenital anomalies of the face to aberrations of development
- Describe the surgical anatomy of facial structures



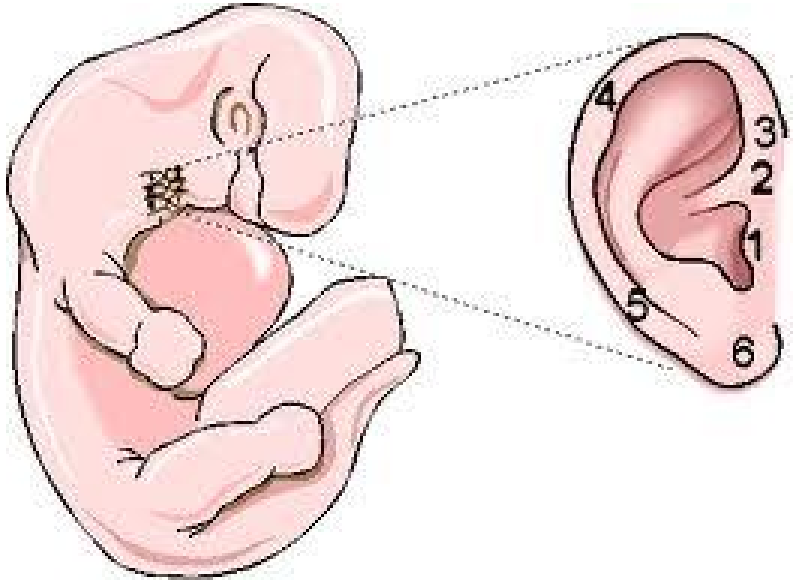
Six mm embryo

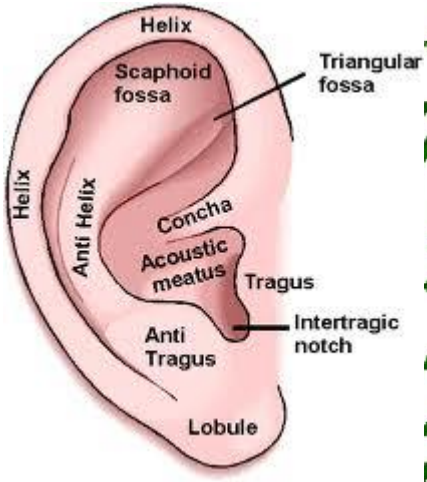
Eyes

- Optic vesicles grow out as diverticula from forebrain
- Connect with lens pit and lens vesicle from ectoderm
- Optic cup develops into retina
- Ectoderm:
  - Lacrimal gland develops from ectoderm
  - Also epithelium of corneo-conjuctivae
  - Naso-lacrimal duct – thickening of ectoderm in nasomaxillary groove.
- Eyelids – small fold of skin. Fuse at 3rd month until 6th



External ears





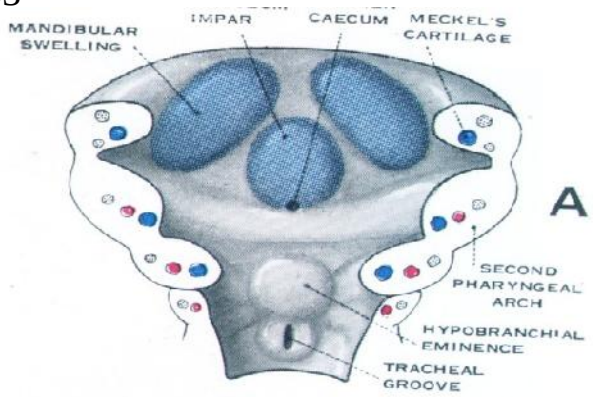
External meatus – derived from dorsal end of first bronchial groove

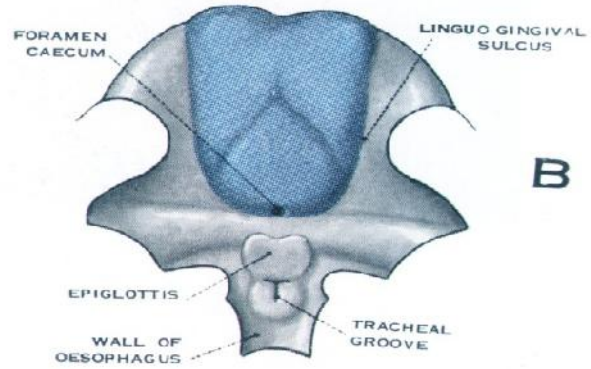
Auricle develops – 6 hillocks around margins of first branchial groove at (4mm embryo) mesenchyme of second branchial arch

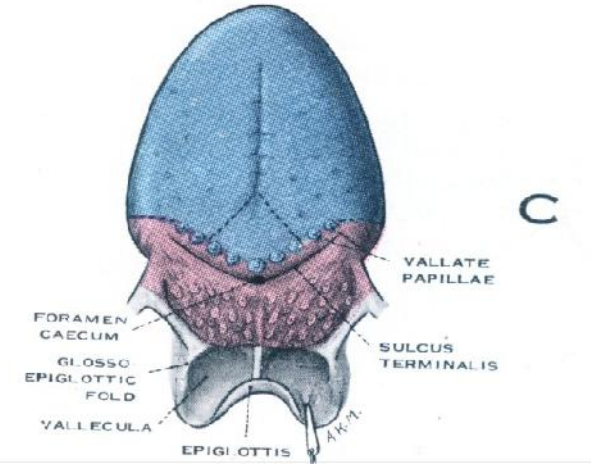
Lateral derivatives of pharyngeal pouches

Pharyngeal grooves and pouches (opening into pharynx) separate the pharyngeal arches

Pouch	Dorsal diverticulum	Ventral diverticulum
1st	Eustachian tube, middle ear Mastoid, antrum	
2nd	Middle ear.	Tonsillar crypts, Supratonsilar fossa
3rd	Inferior parathyroid	Thymus
4th	Superior parathyroid	
5th		Ultimobranchial body





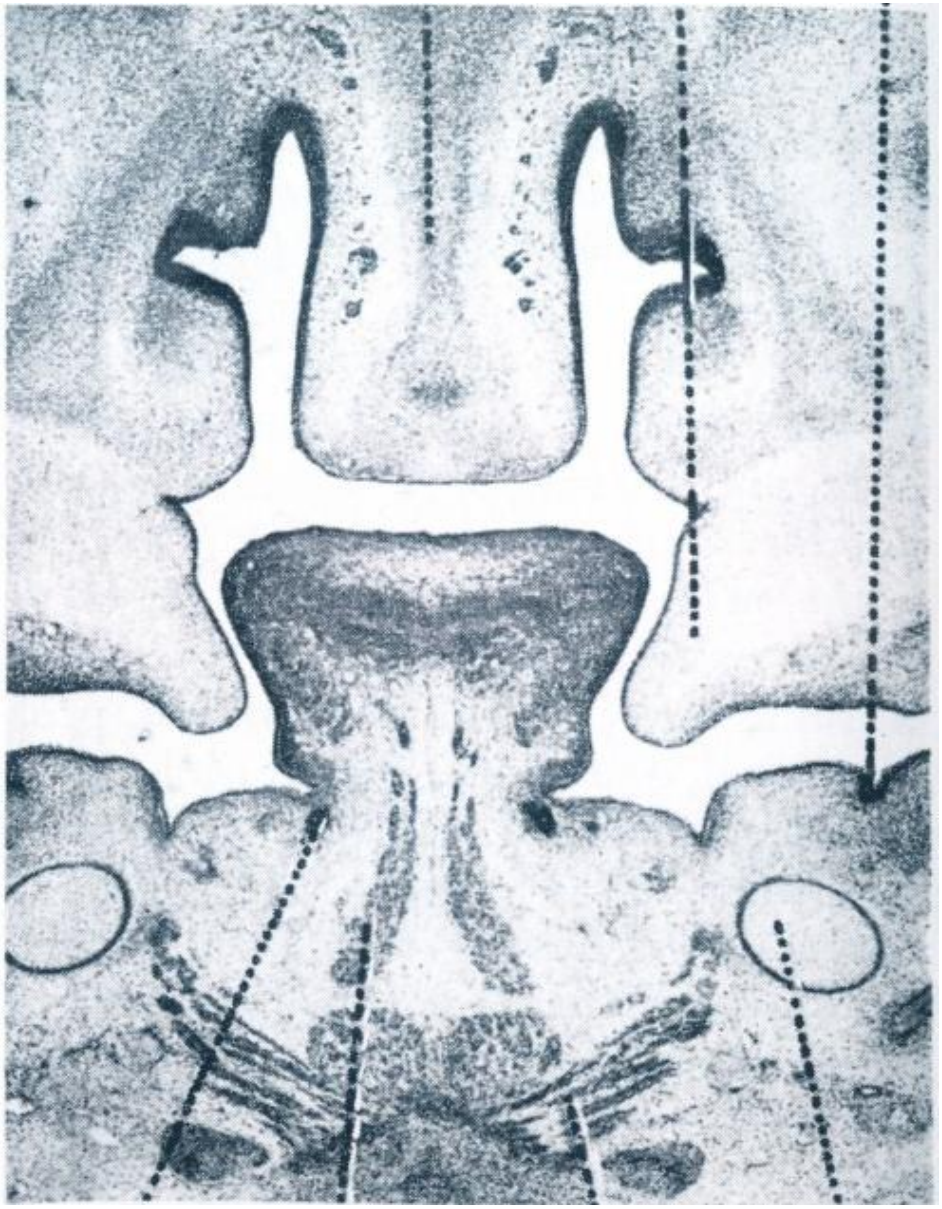


Ventral derivatives of pharyngeal pouches

Development of the Tongue

Tongue – tuberculum impar, lateral rudiments. Foramen caecum. Copula of His.

Last 3-4 occipital myotomes. Thyroid gland – thyroglossal duct.
Larynx, tracheal airway

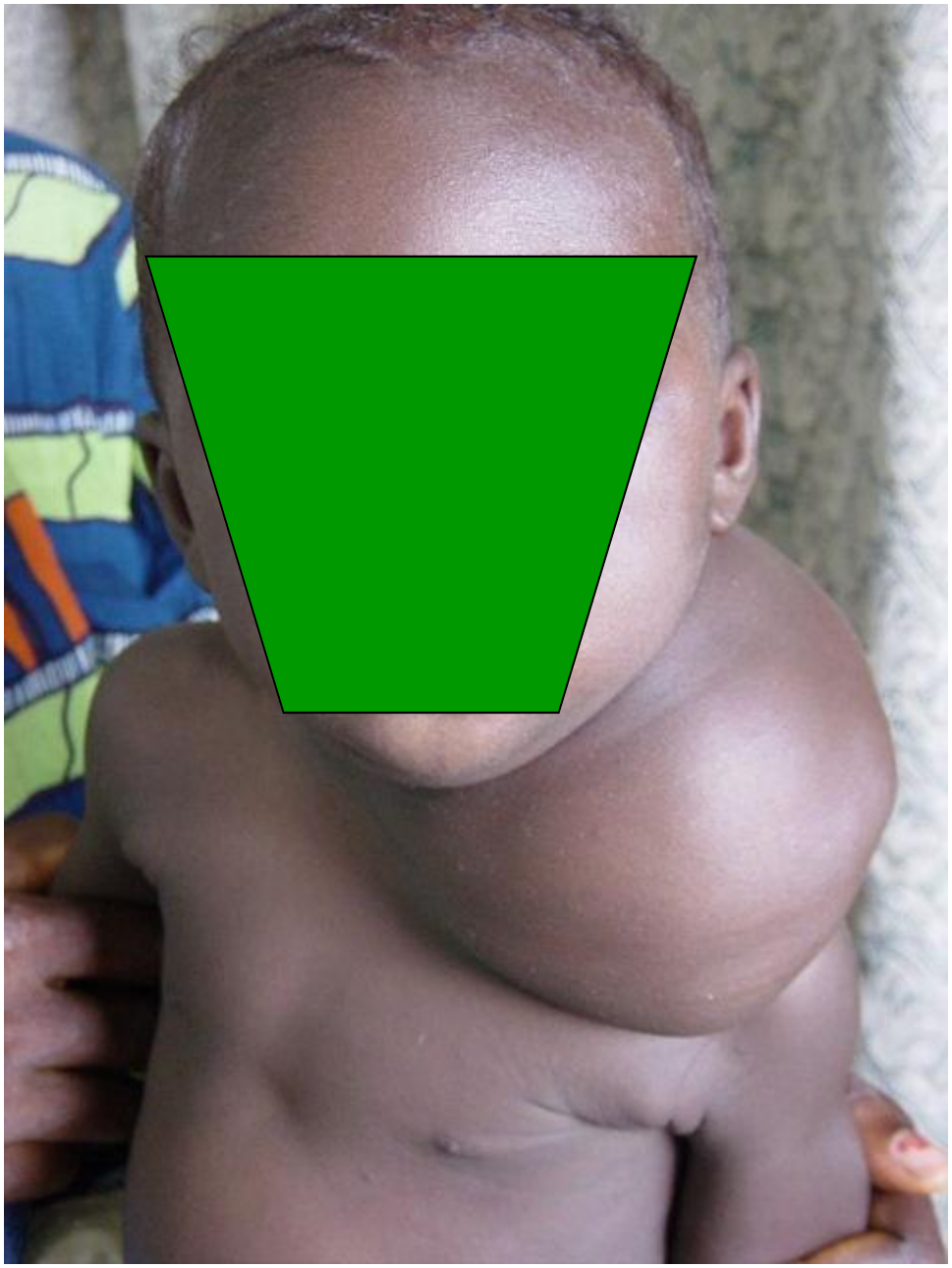


20 mm embryo

Thyroglossal cyst

Derivatives of the arches

Arch	Skeleton	Muscle (mesoderm)	Artery	Nerve	Endoderm
1st Mandibular	Maxilla, palate Mandible (Meckel's cartilage disappears) Incus, Maleus	Muscles of mastication (masseter, temporalis, pterygoids), mylohoid, tensor palati tympani, digastric (anterior belly)	Internal Maxillary (1st aortic arch)	(Mandibular branch of Trigeninal)	Mucosa of anterior of tongue
2nd Hyoid	Stapes, stytoid process, Lesser cornu, upper part of hyoid body (Reichert's Cartilage)	Stapedius, stylohyoid, digastric (posterior belly). Muscles of facial expression, buccinator, platysma	2nd aortic arch (mainly rudimentary as stapedial art. ?facial artery	Facial nerve	
3rd Thyro-hoid	Greater cornu lower part of hyoid body	Stylopharyngeus	Part of internal carotid	Glossopharyngeal	Mucosa of posterior 1/3 of tongue, anterior surface of epiglotis, valleculae
4th	Thyroid cartilage, arytenoid, corniculate and cuneiform cartilages	Cricothyroid		Superior laryngeal	
5th	?cricoid (may be a modified tracheal ring).	Remaining laryngeal muscles		Recurrent Laryngeal	



Cystic hygroma

Classification of craniofacial anomalies

- **Clefts**
- **Synostosis**
- **Hypoplasias**

Clefts

- ✓ Failure of mesodermal merging.
- ✖ Failure of fusion of facial processes

Incidence:

1:600-1400

1:1100-2800 (Nigeria)

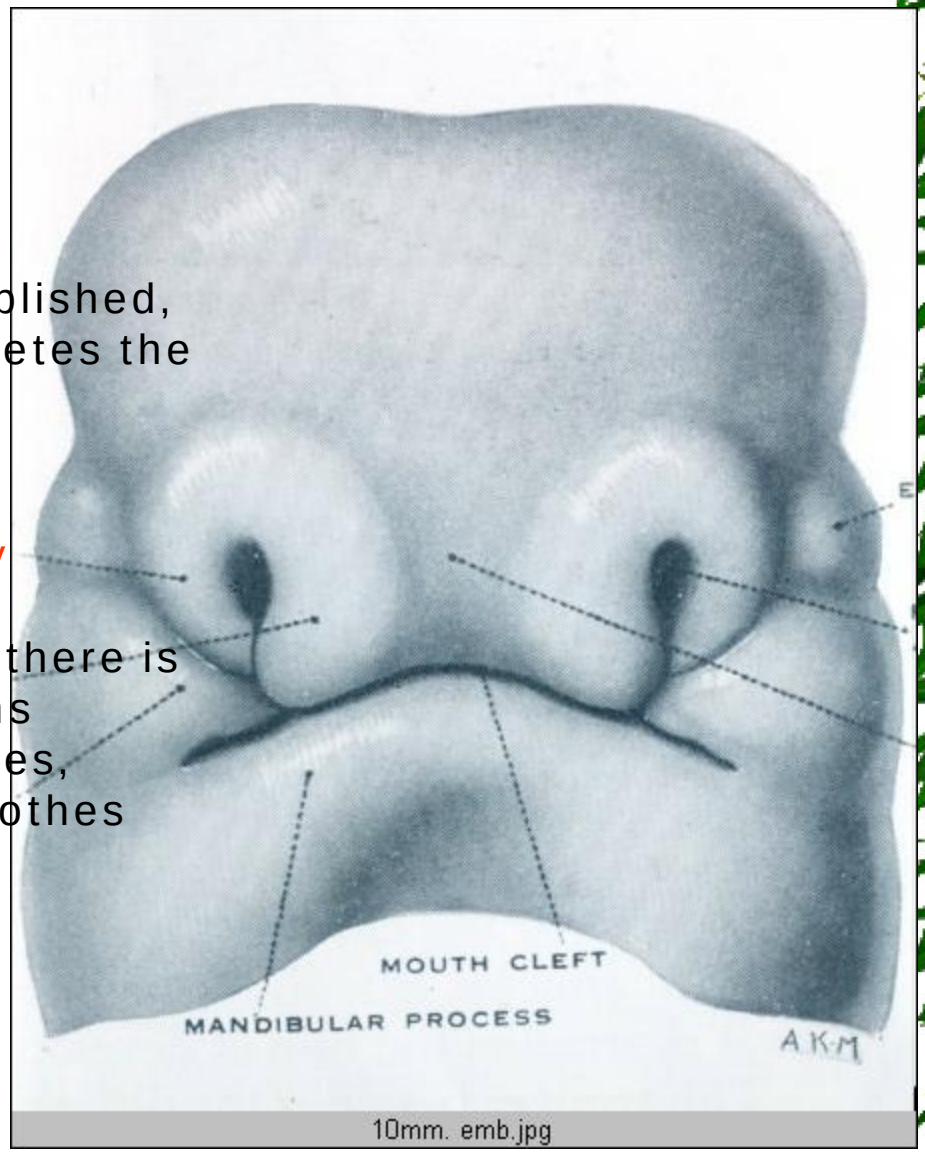
Theories in the formation of clefts

Classical theory (Dursy, His)

Once epithelial contact is established, mesodermal penetration completes the fusion process

Mesodermal penetration theory (Pohlmann, Veau)

No free ends of facial process, there is bilaminar membrane with seams demarcating the major processes, mesoderm penetrates and smoothes out the seams,



Etiological factors

- Radiation: microcephaly
- Infection: toxoplasmosis, rubella, CMV
- Maternal idiosyncracies

  phenylketonuria disorder, diabetes (oculoauriculovertebral OAV spectrum)
- Chemicals: vitamin deficiency states,

  excess Vit A, isotretinoin (clefts, microsomia), thalidomide, diazepam (cleft palate), phenytoin

CLASSIFICATION OF CLEFTS

- American cleft palate association

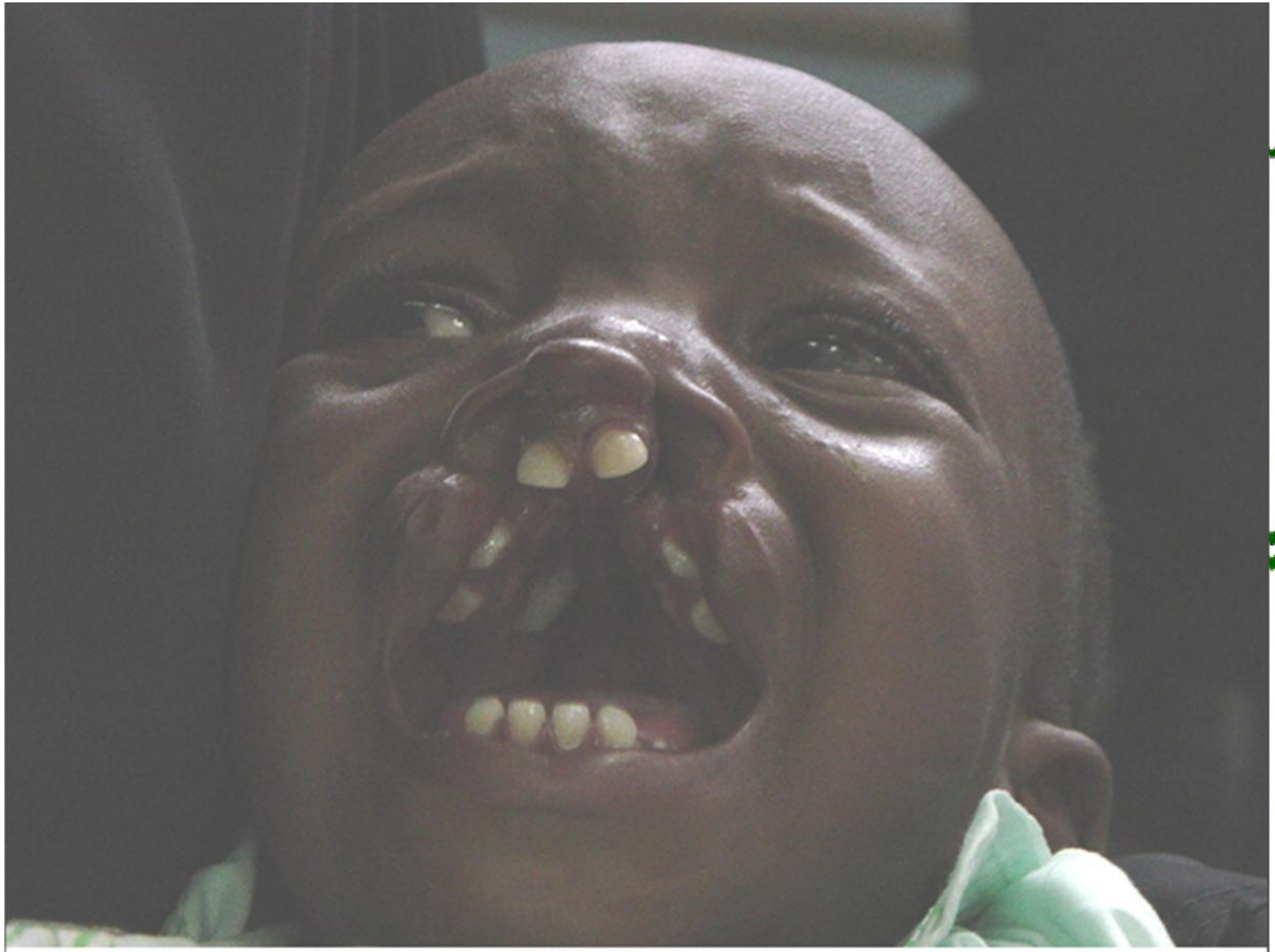
- Tessier

Clefts: types and nomenclature

- **Complete unilateral cleft of primary palate:**
  nose,lip, gingiva, premaxilla

Point of division:
Foramen incissura

- **Cleft of secondary palate:** *hard and soft palate,uvula*



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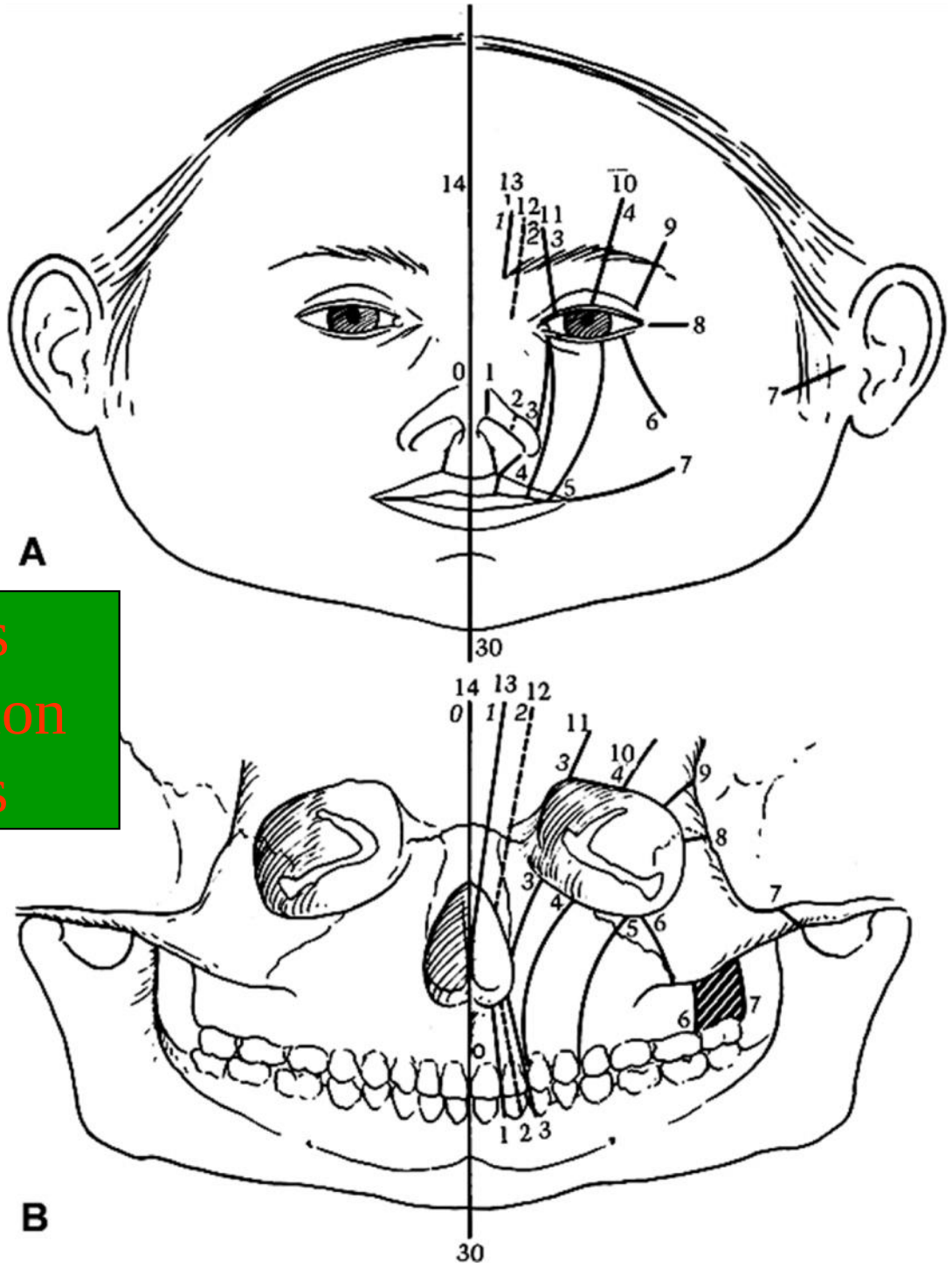
Unoperated cleft lip

Tessier's classification of clefts



Clefts: treatment

Type of cleft	*Timing*	*Method*
Cleft of primary palate	Rule of 10s: Age=10 weeks Wt =10 lb, Hb =10 G/dl	Rotation advancement flap repair (Millard)
Cleft of secondary palate	Age=6 months	• Langenbeck's • Advancement flap • Furlow

Hypoplasia

- Van der Muelen classification

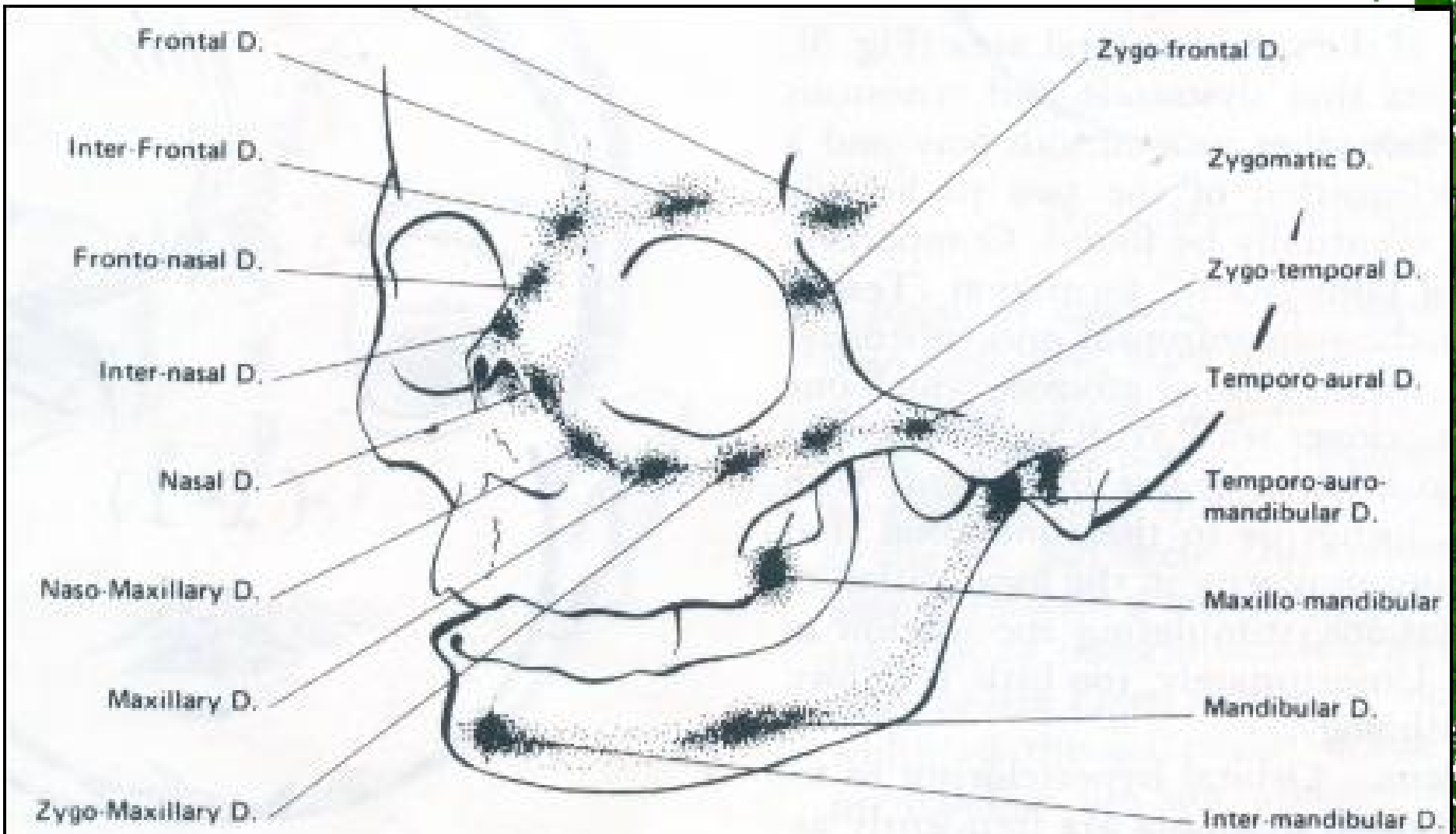


FIG. 2. Craniofacial helix symbolized by letter S.

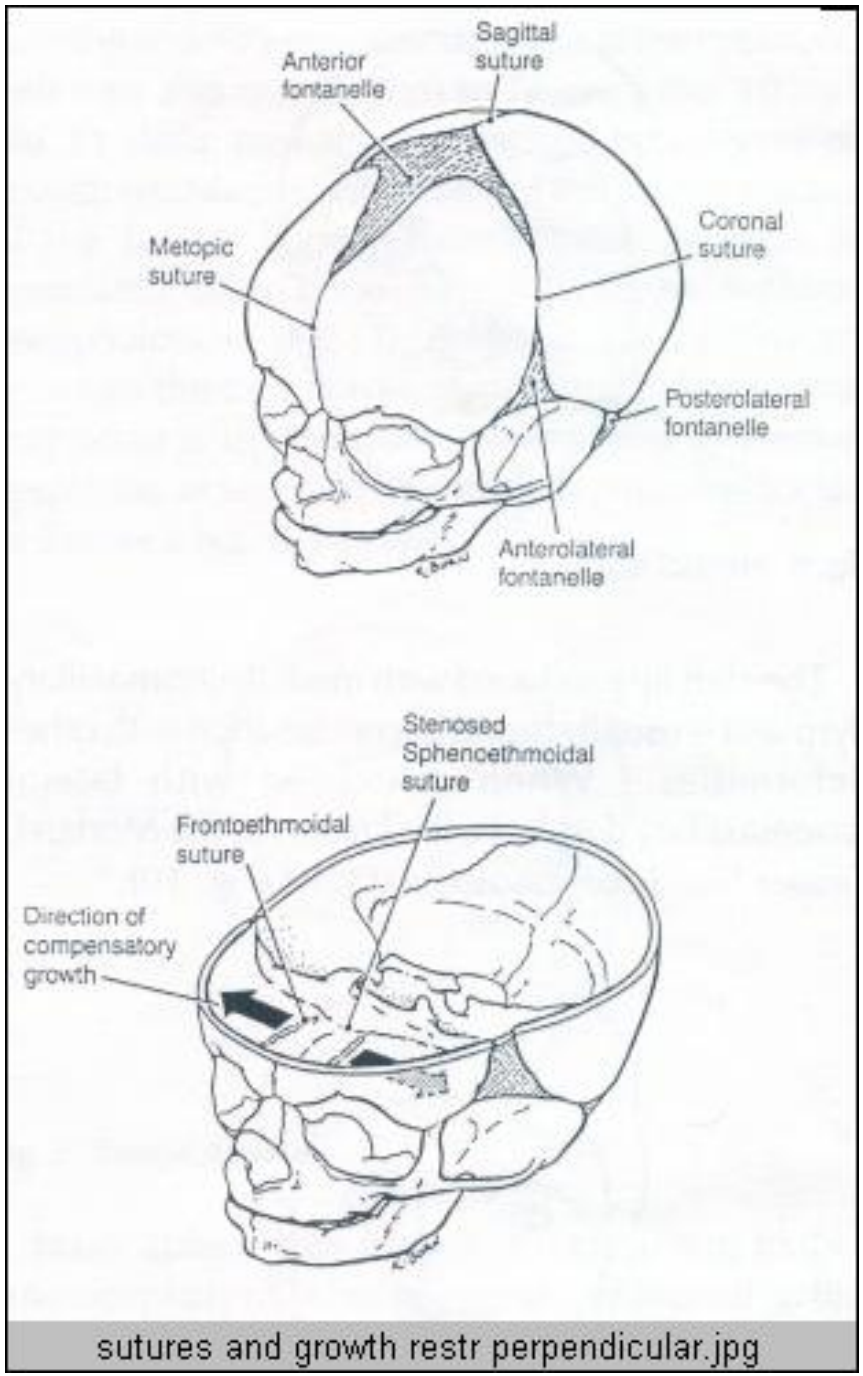
van der muelen's dysplasias.jpg

Frontosphenoidal dysplasia

Frontal dysplasia

Craniosynostosis: pathogenesis

- **Abnormal tensile forces transmitted to the dura from an anomalous cranial base through key ligamentous attachments**
- **Fetal head constraints**
- **Sutural abnormality**
- **Shunt decompression of hydrocephalus**



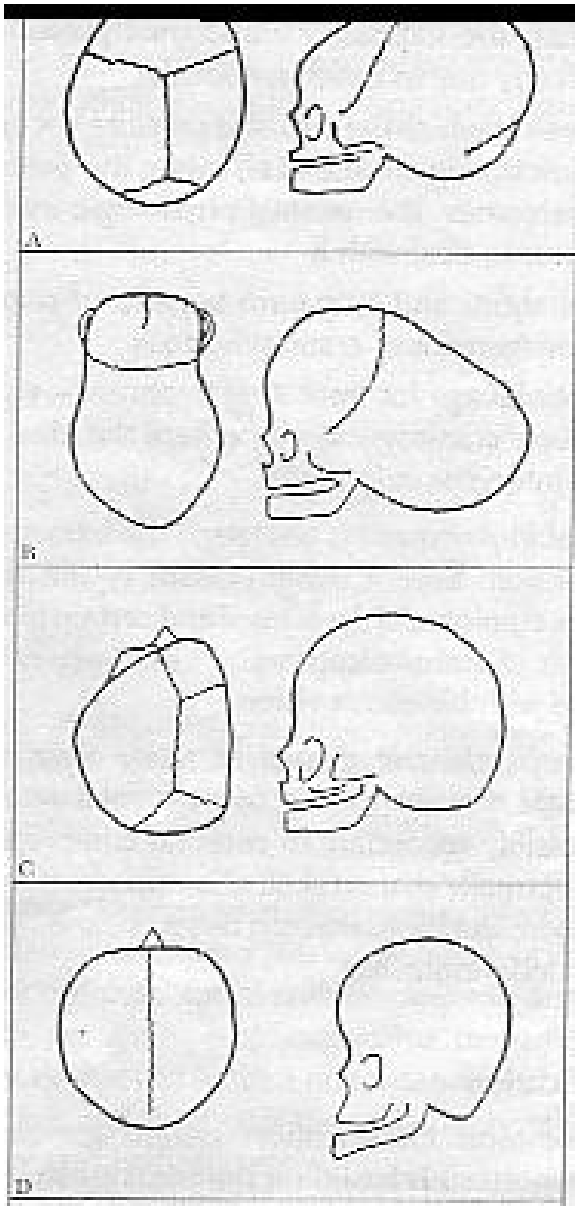
sutures and growth restr perpendicular.jpg

Craniosynostoses

	Skull shape	*Abnormally closed suture*
Trigonocephaly	Triangular	Metopic
Scaphocephaly	Boat shaped	Sagittal
Turricephaly	Skull height	Basal
Oxycephaly	Pointed head	Coronal

Scaphocephaly

Turricephaly

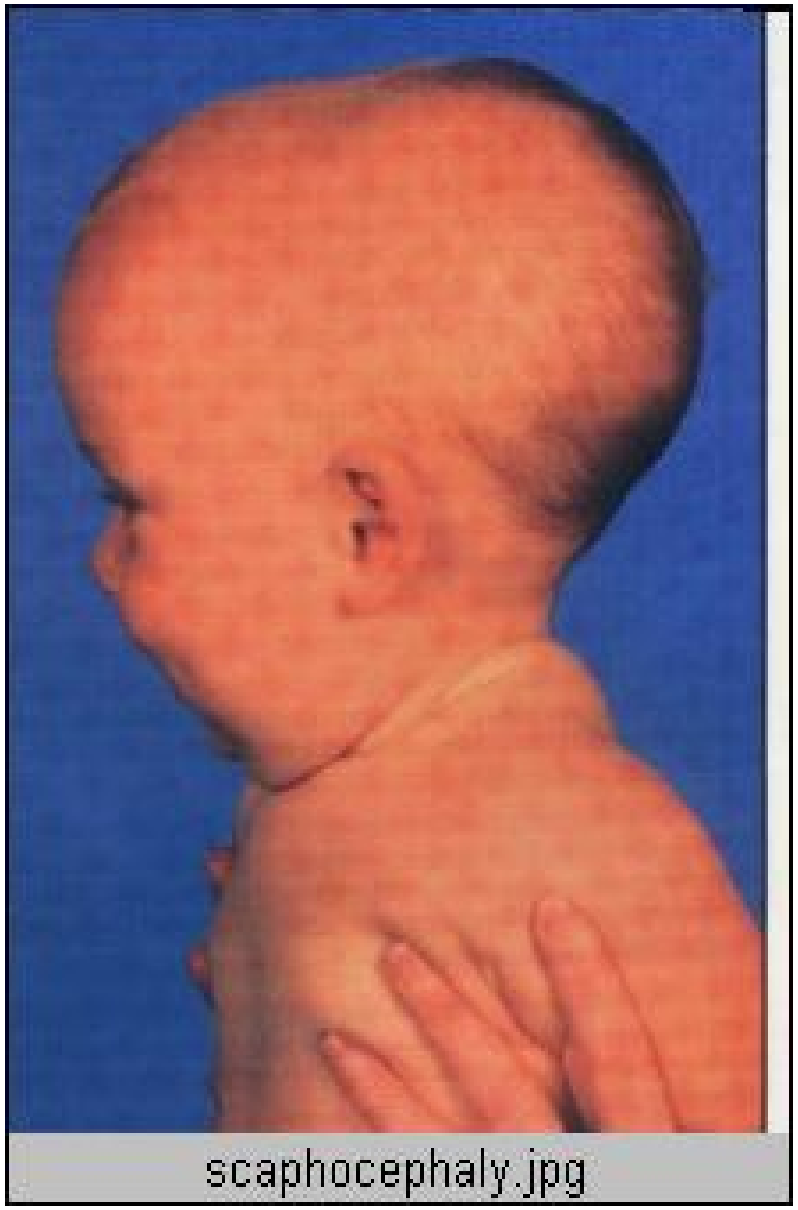


Bilateral coronal synostosis (Crouzon's syndrome)

5a Preoperative skull deformity.

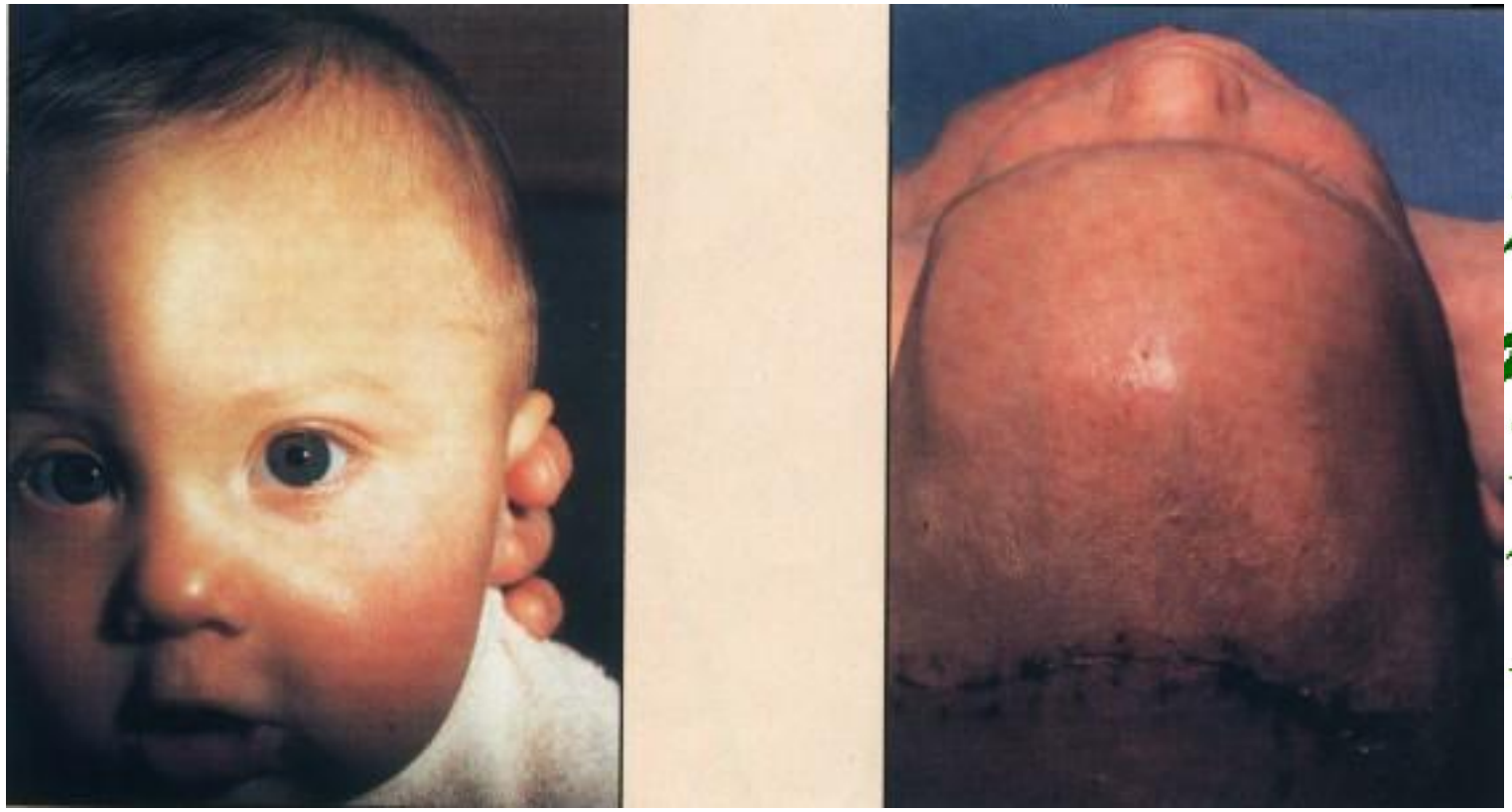
b Postoperative frontal advancement and reshaping.

coronal synostosis.jpg



scaphocephaly.jpg

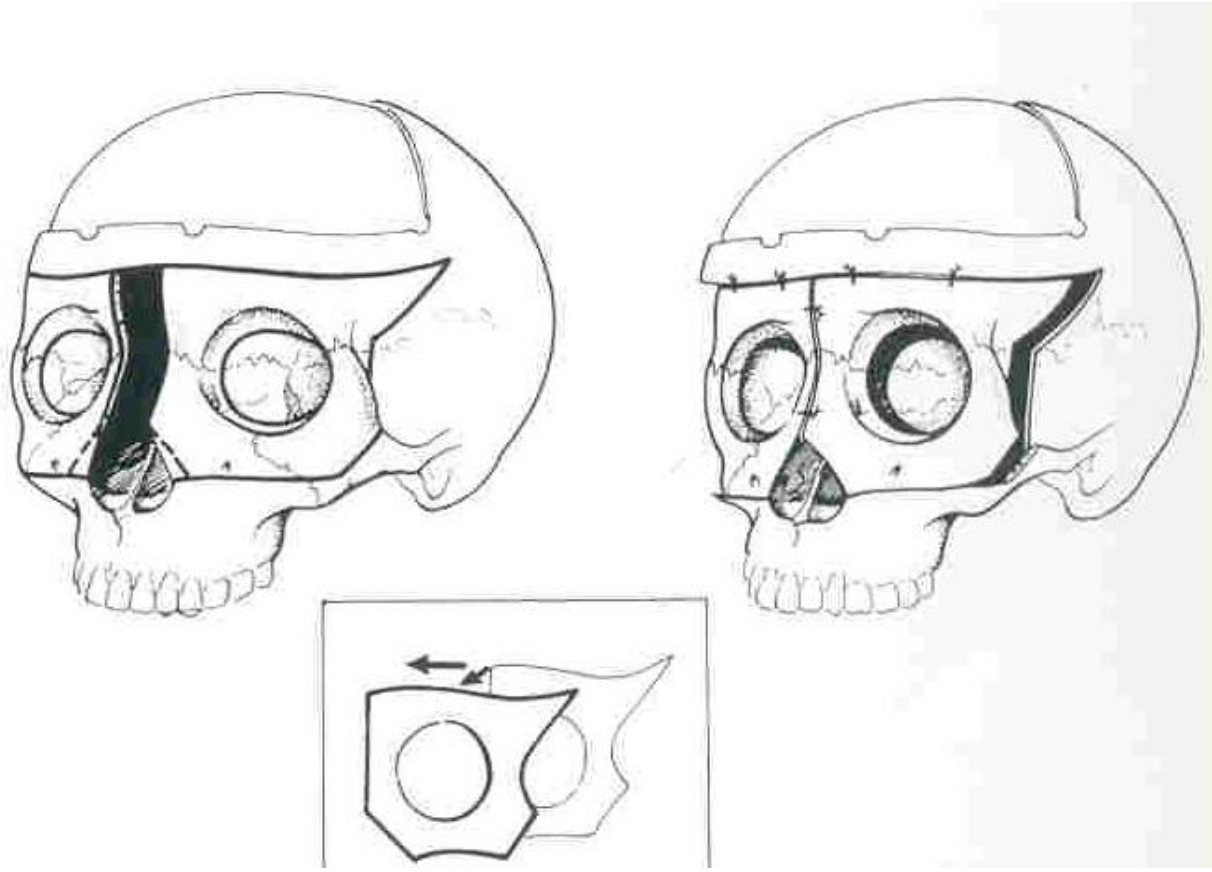
Metopic synostosis



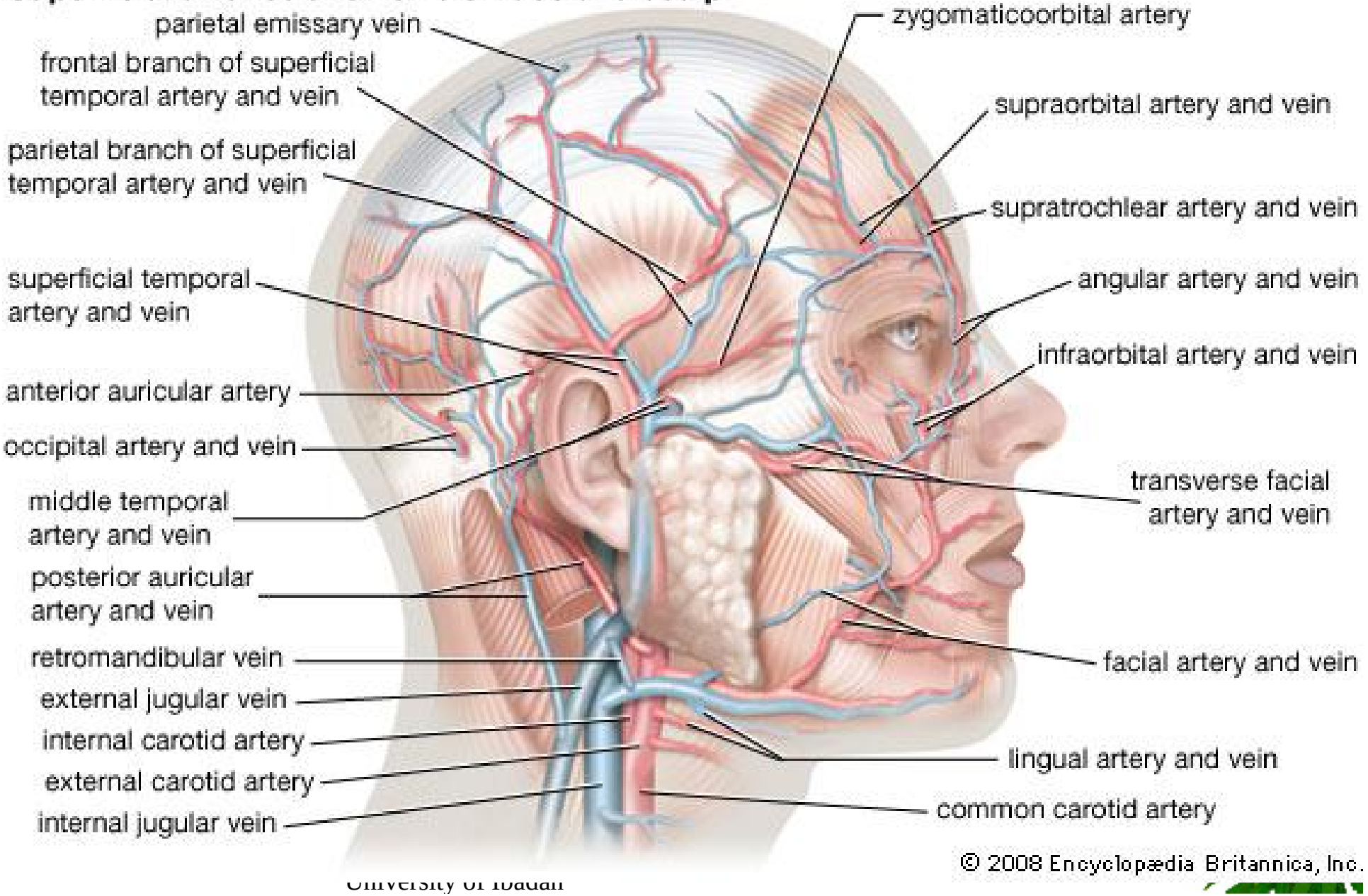
Craniosynostosis: functional problems

- **Intracranial hypertension**
- **Visual impairment**
- **Neuropsychiatric disorders**

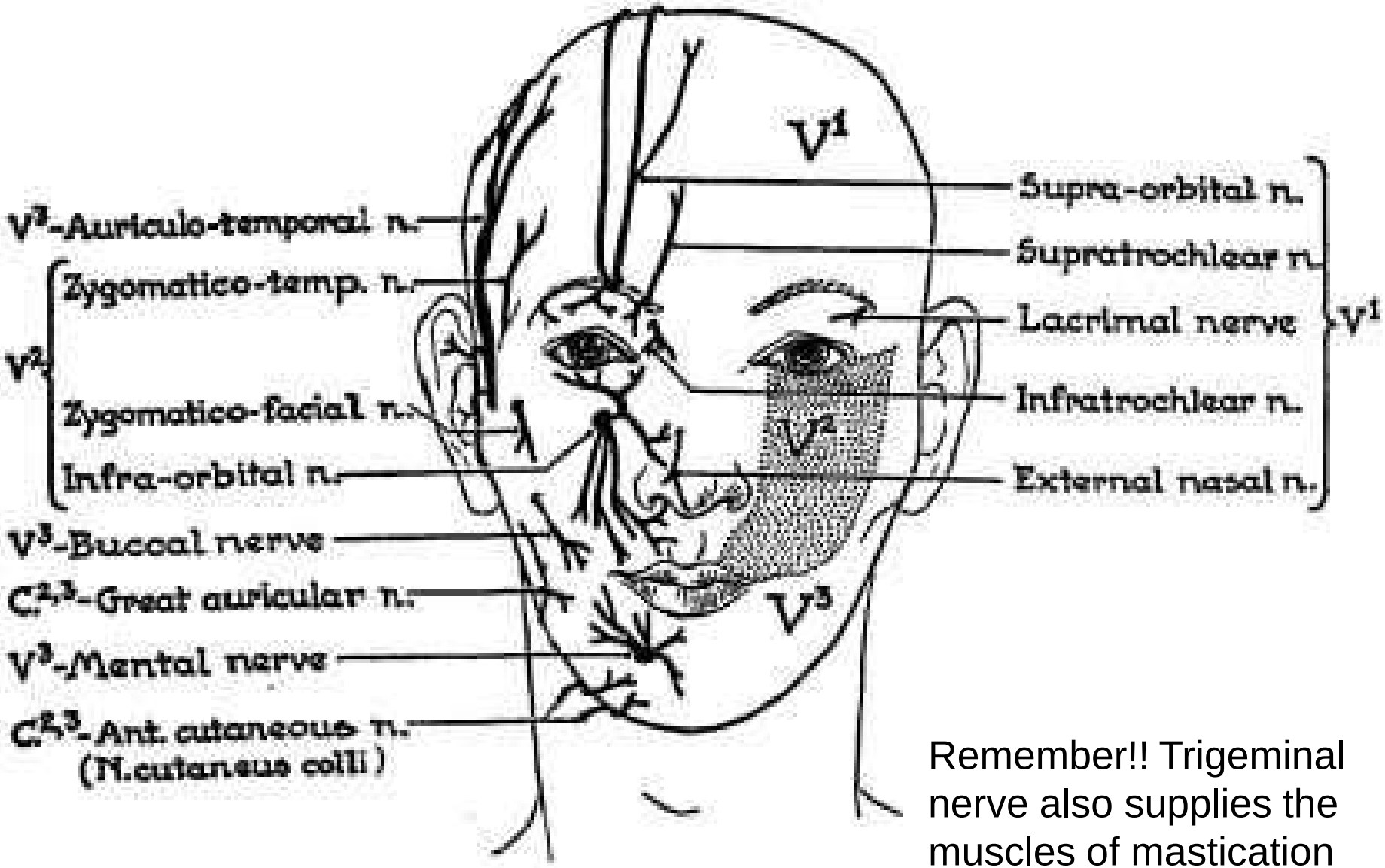
Medialization of the two orbits using original Tessier procedure



Superficial arteries and veins of face and scalp



The face: sensory nerve supply



Remember!! Trigeminal nerve also supplies the muscles of mastication