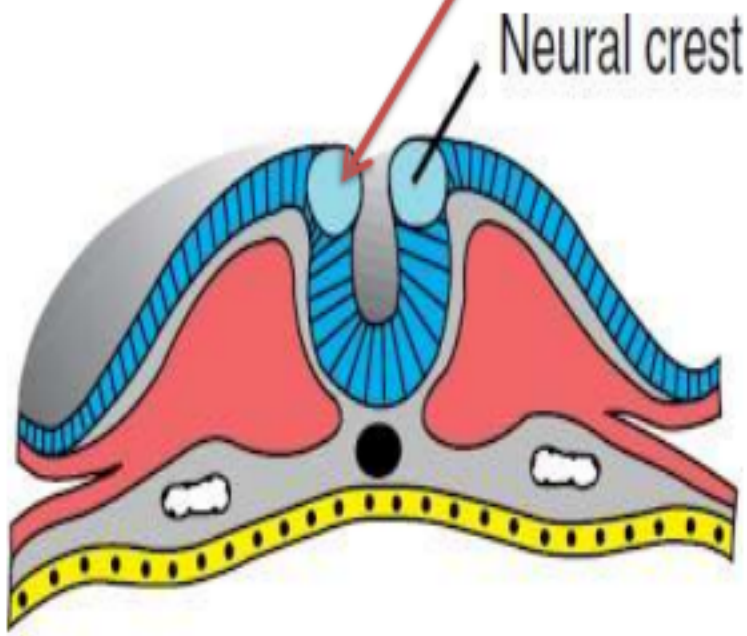
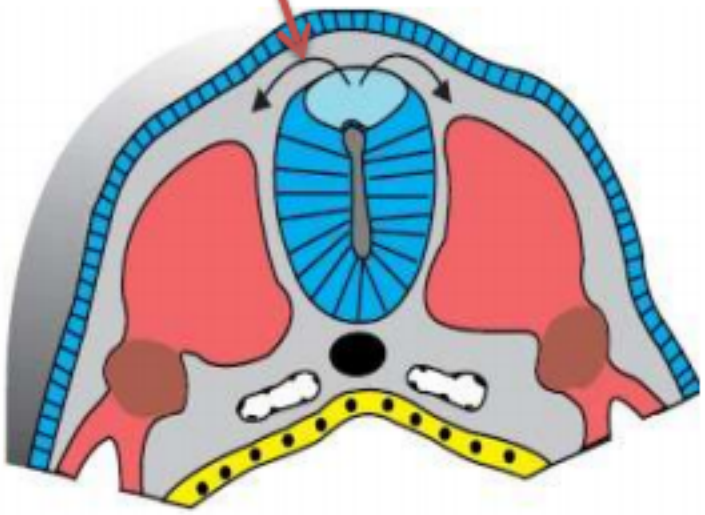
NEURAL CREST

Edited by : Tasneem Jamal

Cells at the lateral border or crest of the neuroectoderm begin to dissociate from their neighbors AND **undergo an epithelial-to-mesenchymal transition as it leaves the neuroectoderm by active migration and displacement to enter the underlying mesoderm**



A



B

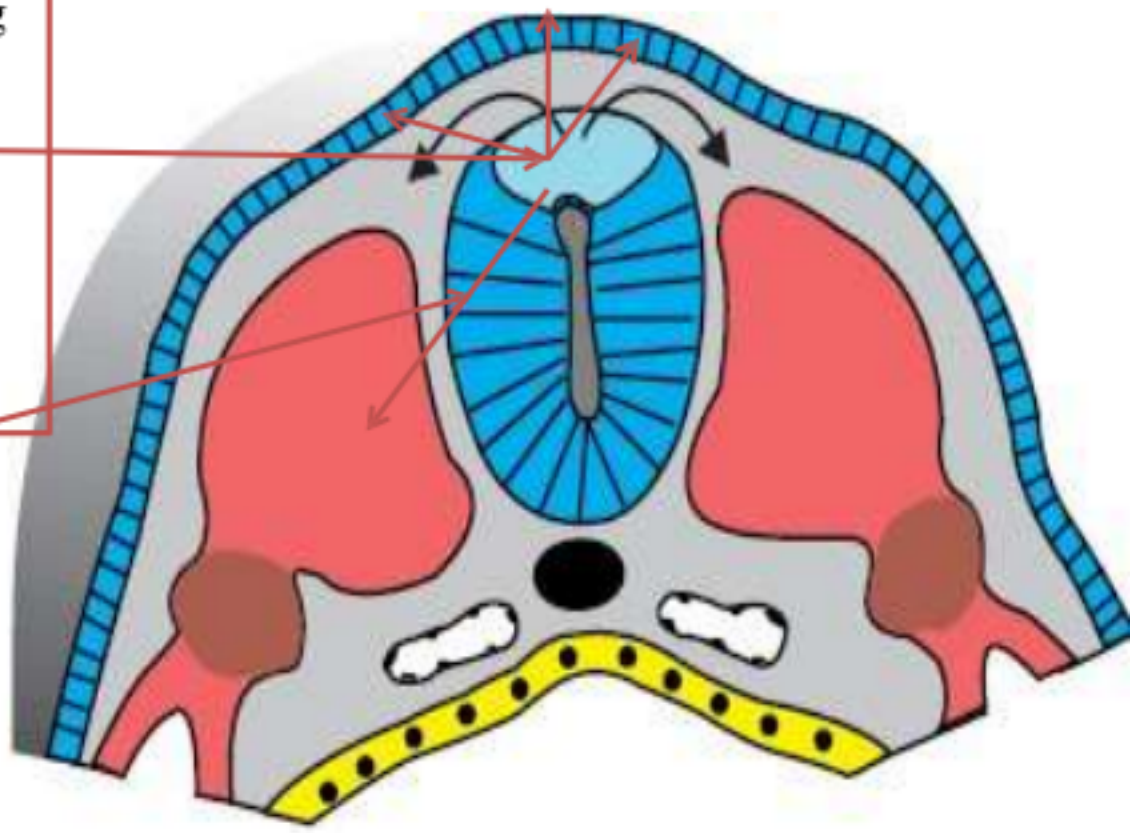
NEURAL CREST cells migrate along one of two pathways:

1)a dorsal pathway through the dermis, where they will enter the ectoderm to form

melanocytes

In the skin and hair follicles

2)a ventral pathway through the anterior half of each somite to become **sensory ganglia, sympathetic and enteric neurons , Schwann cells, and cells of the adrenal medulla**



B

Neural crest cells

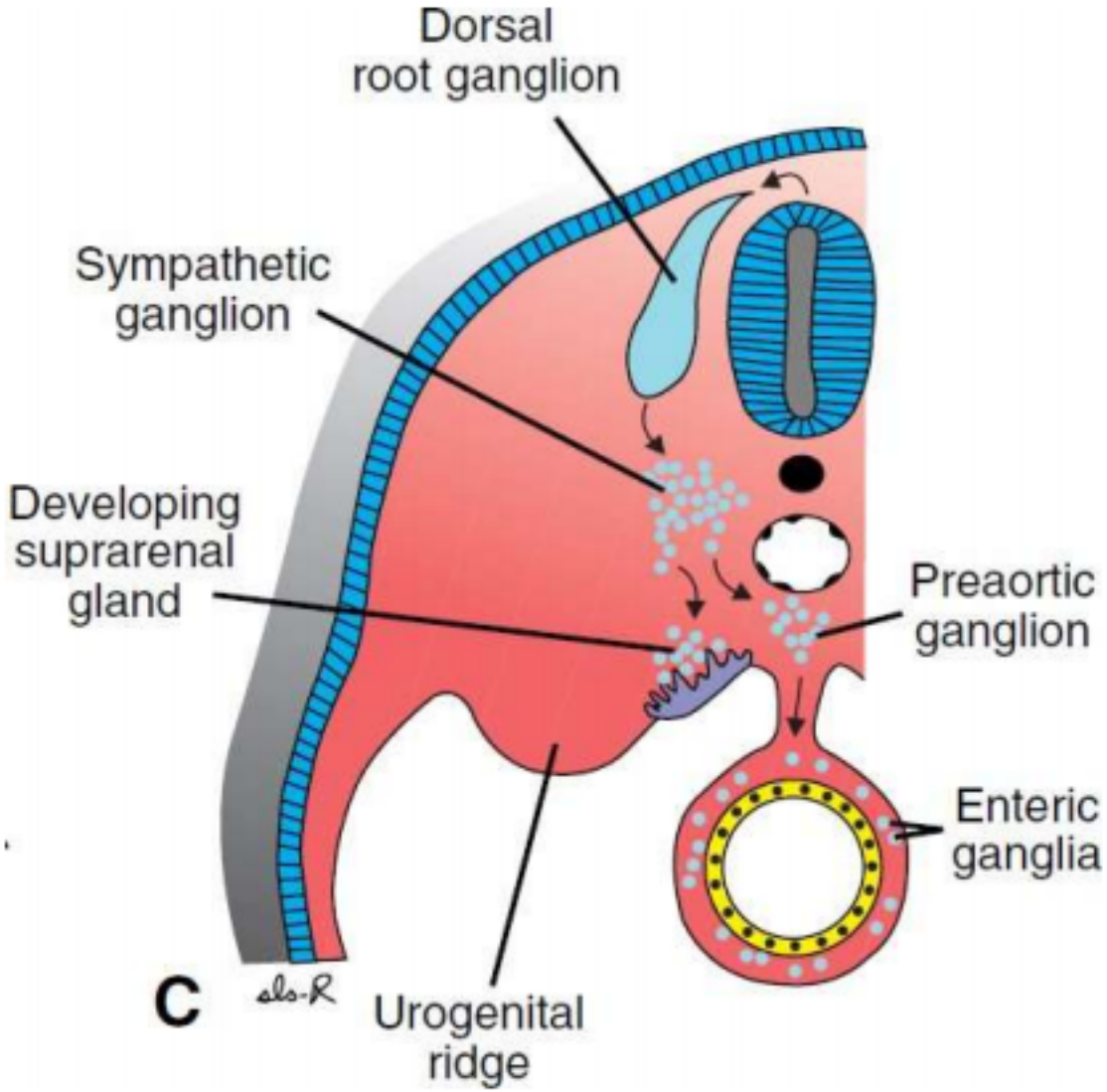
also

form and migrate from

cranial neural folds,

leaving the neural tube before closure in this region These cells contribute to the

craniofacial skeleton as well as neurons for cranial ganglia



Neural Crest Derivatives

What is their contribution to the development of the head

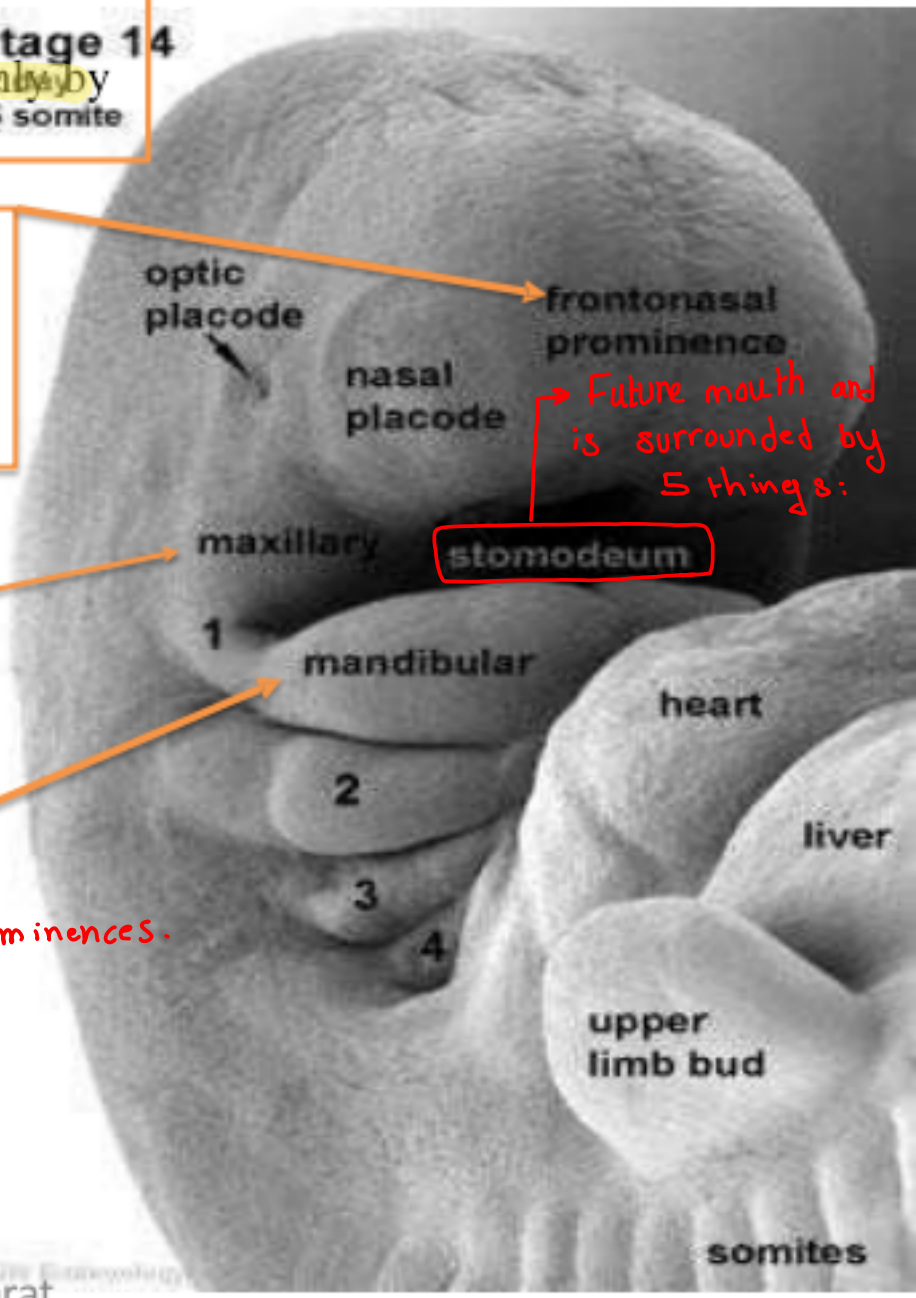
1 Connective tissue and ***bones of the face and skull***

2 Dermis in face and neck

Exam material starts from here

neural crest migrate into the arches

At the end of the fourth week,
facial prominences consisting primarily of *neural crest-derived mesenchyme* and formed mainly by the first pair of pharyngeal arches



① **The frontonasal prominence**
formed by proliferation of mesenchyme ventral to the brain vesicles, constitutes the upper border of the stomodeum

→ from the first arch

② **MAXILLARY prominences**
can be distinguished lateral to the stomodeum

→ from the first arch

③ **MANDIBULAR prominences**
can be distinguished caudal to the stomodeum

④ ⑤ → Left maxillary and mandibular prominences.

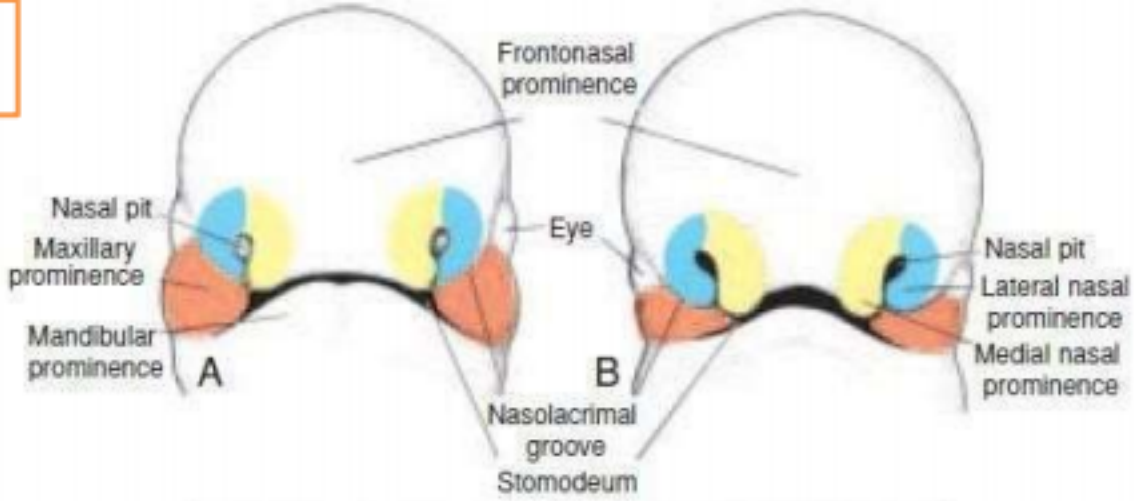
On both sides of the frontonasal prominence, local thickenings of the surface ectoderm, the **nasal placodes**

During the fifth week, the nasal placodes invaginate to form

NASALPITS

In so doing, they create a ridge of tissue that surrounds each pit and forms THE **NASAL PROMINENCES**

The prominences on the outer edge of the pits are:
THE MEDIAL NASALPROMINENCES
THE LATERAL NASALPROMINENCES



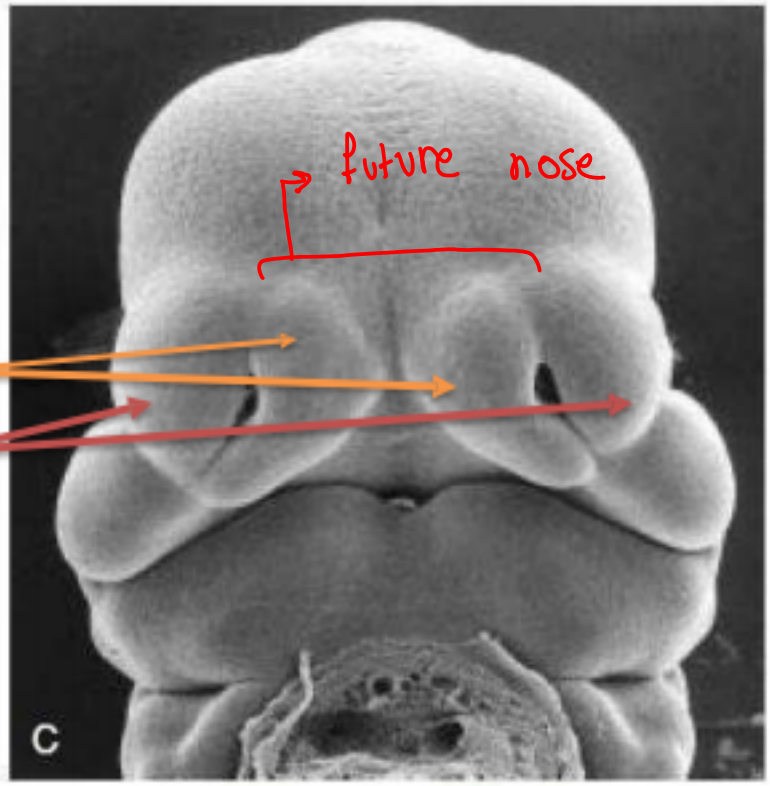


Figure 15.22 Frontal aspect of the face. **A.** 5-week embryo. **B.** 6-week embryo. The nasal prominences are gradually separated from the maxillary prominence by deep furrows. **C.** Scanning electron micrograph of a mouse embryo at a stage similar to that of **B.**

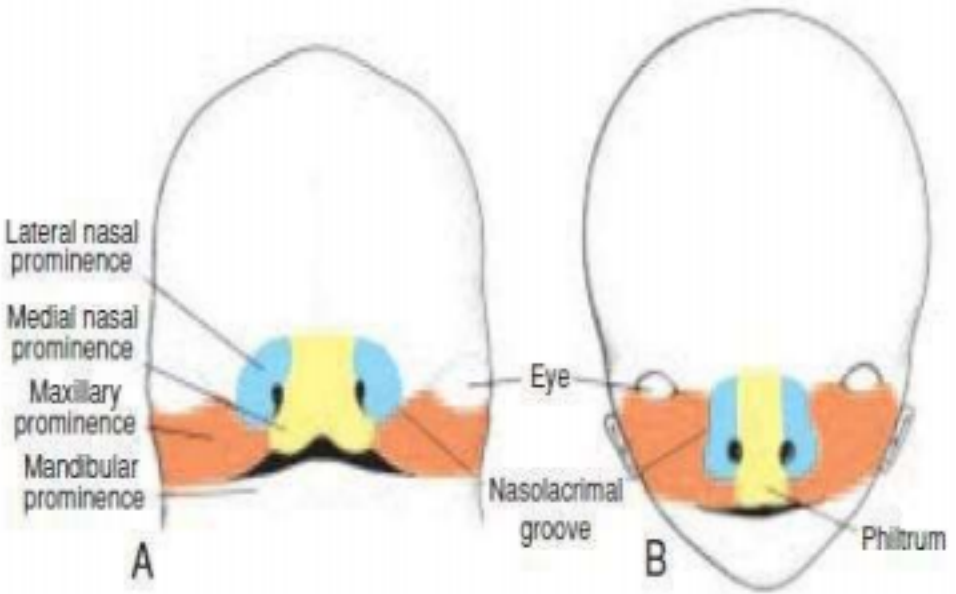
* The Frontonasal prominence has developed into 2 further structures:

2 Nasal placodes

↳ and they have further developed into medial and lateral nasal prominences

During the following 2 weeks,
the **maxillary prominences** continue to increase in size
Simultaneously, they ***grow medially,***
compressing the medialnasal prominences toward the midline

Subsequently the cleft between the medial nasal prominence and the maxillary prominence is lost, and the two fuse



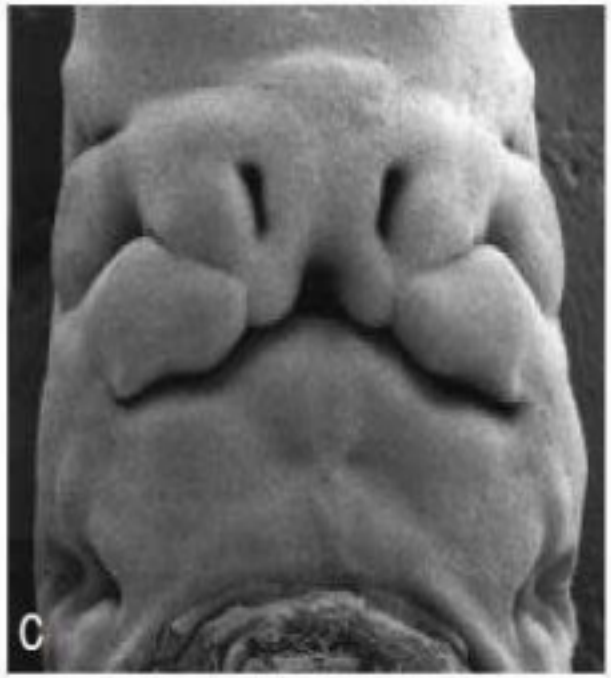


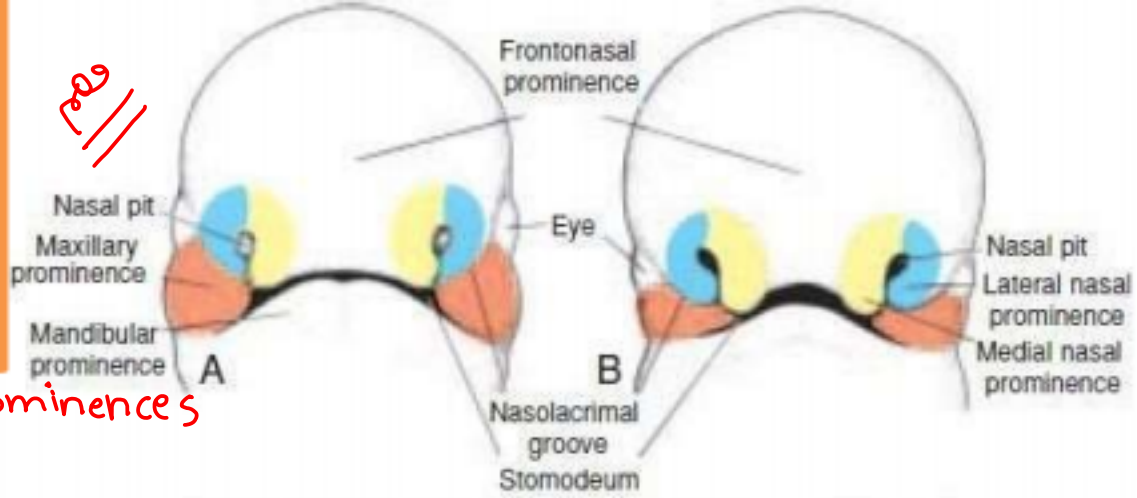
Figure 15.23 Frontal aspect of the face. **A.** 7-week embryo. Maxillary prominences have fused with the medial nasal prominences. **B.** 10-week embryo. **C.** Scanning electron micrograph of a human embryo at a stage similar to that of **A.**

Therefore, the upper lip is formed by
THE TWO MEDIAL NASAL
prominences
And
THE TWO MAXILLARY PROMINENCES

↳ the upper lip is made of 4 prominences

The lateral nasal prominences do not participate in formation of the upper lip

The lower lip and jaw
form from
the mandibular prominences
that merge across
the midline



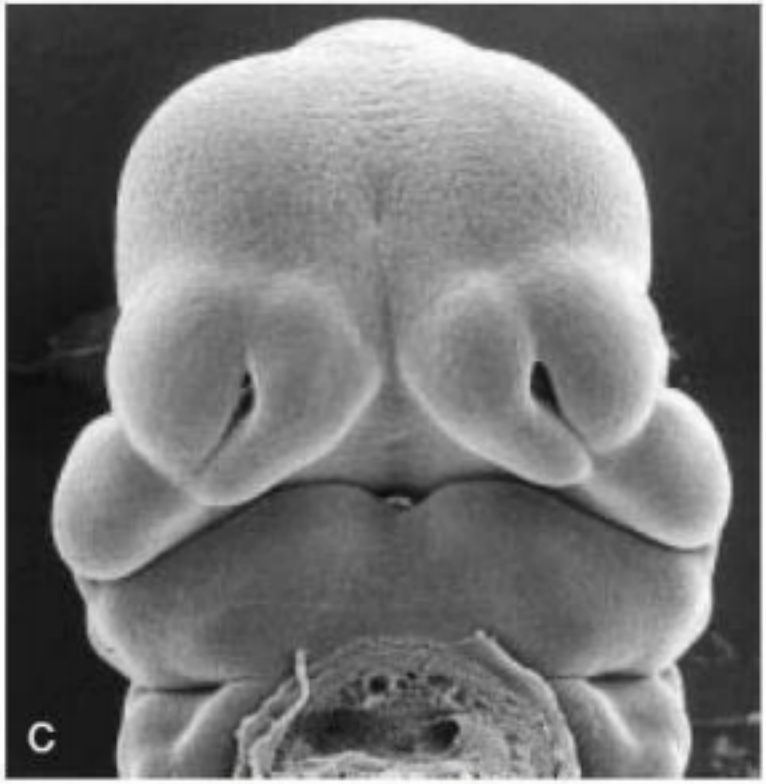
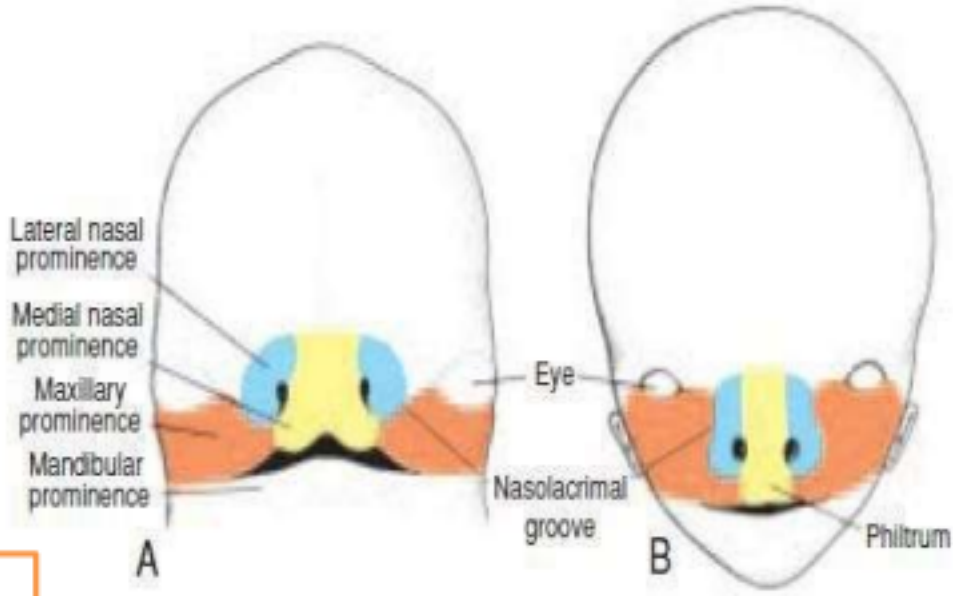


Figure 15.22 Frontal aspect of the face. **A.** 5-week embryo. **B.** 6-week embryo. The nasal prominences are gradually separated from the maxillary prominence by deep furrows. **C.** Scanning electron micrograph of a mouse embryo at a stage similar to that of **B.**

As a result of medial growth of the maxillary prominences
And the two medial nasal prominences merge **not only at the surface but also at a deeper level**
The structure formed by the two merged prominences is
the **INTERMAXILLARY SEGMENT**



It is composed of:

(a) ***a labial component, which forms*** the philtrum of the upper lip

(b) an ***upper jaw component, which carries*** the four incisor teeth

(c) ***a palatal component, which forms the triangular*** primary palate

↳ is made from the intermaxillary segment

The primary palate is part of
INTERMAXILLARY SEGMENT

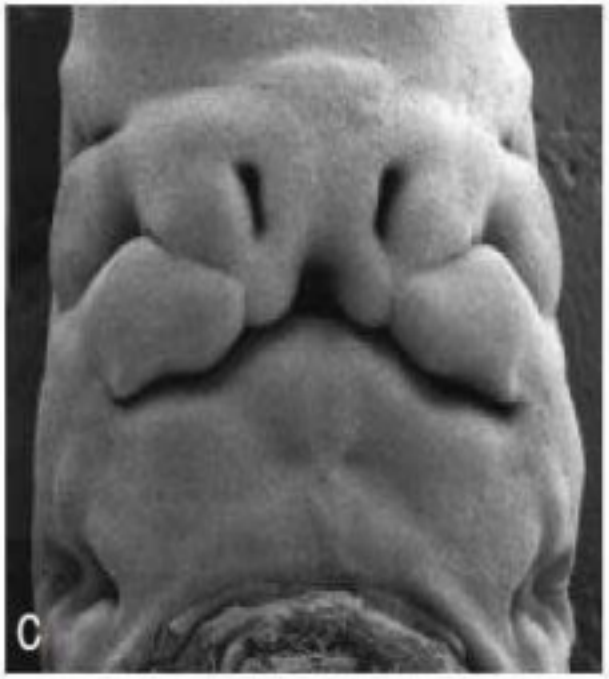


Figure 15.23 Frontal aspect of the face. **A.** 7-week embryo. Maxillary prominence have fused with the medial nasal prominences. **B.** 10-week embryo. **C.** Scanning electro micrograph of a human embryo at a stage similar to that of **A.**

Development of the palate

The primary palate is part of
INTERMAXILLARY SEGMENT

Which is made from the 2 medial nasal prominences

Secondary Palate

Although the primary palate is derived from **the intermaxillary segment** the main part of the definitive palate is formed by two shelflike outgrowths from the maxillary prominences

These outgrowths, the **palatine shelves, appear in the sixth week of development and are directed obliquely** downward on each side of the tongue

In the seventh week, however, the palatine shelves ascend to attain a horizontal position above the tongue and fuse, forming the **secondary palate**

Anteriorly, the shelves fuse with the triangular primary palate, and the **incisive foramen is the midline landmark between the primary and secondary** palates

At the same time as the palatine shelves fuse, the nasal septum grows down and joins with the cephalic aspect of the newly formed palate

*secondary palate is made of: maxillary prominences

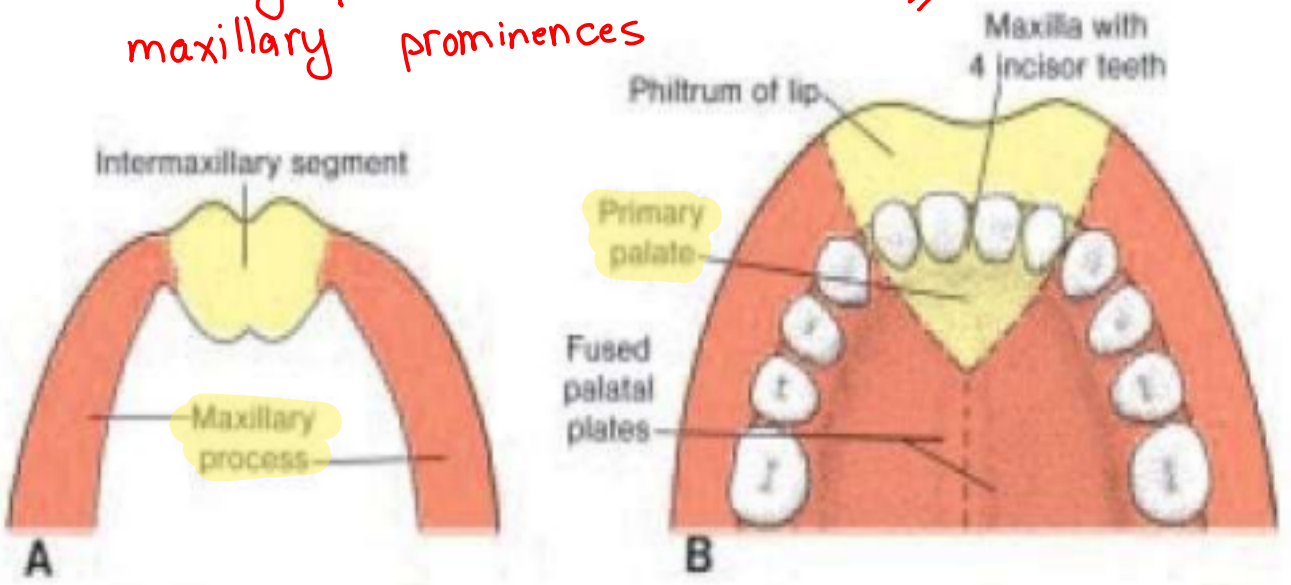


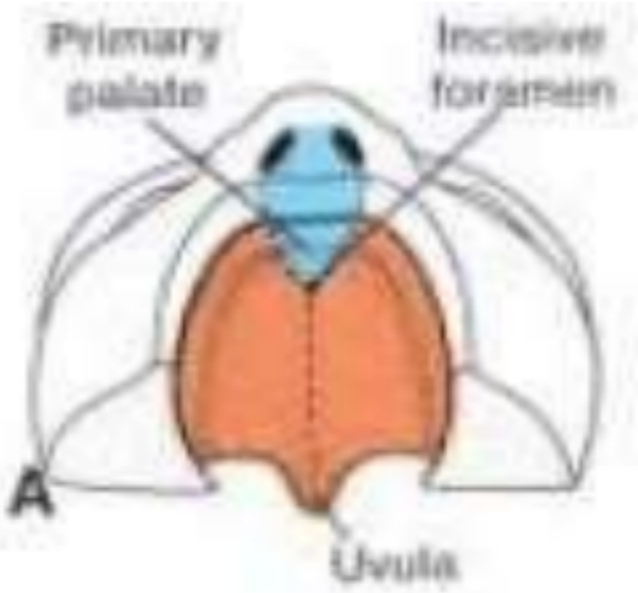
Figure 15.24 A. Intermaxillary segment and maxillary processes. **B.** The intermaxillary segment giving rise to the philtrum of the upper lip, the median part of the maxillary bone with its four incisor teeth, and the triangular primary palate.

Facial Clefts

Cleft lip and cleft palate are common defects that result in abnormal facial appearance and defective speech

1.Cleft lip

2.Cleft palate

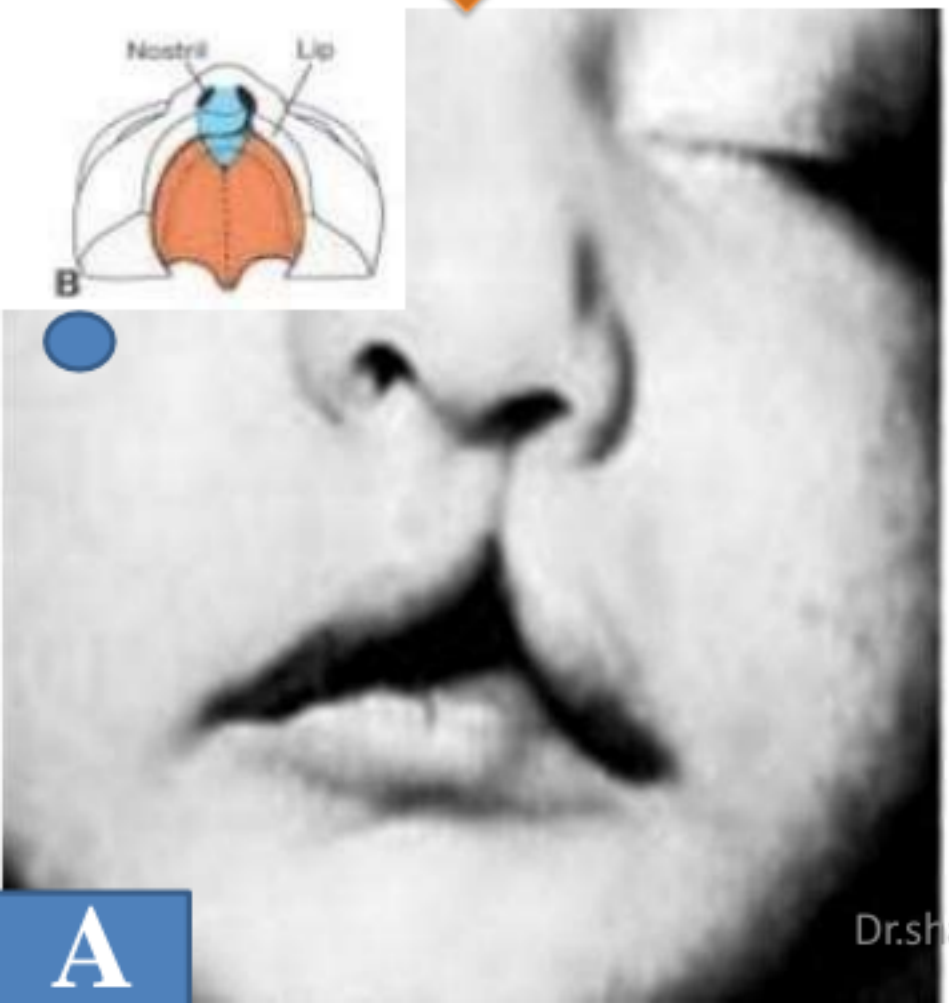


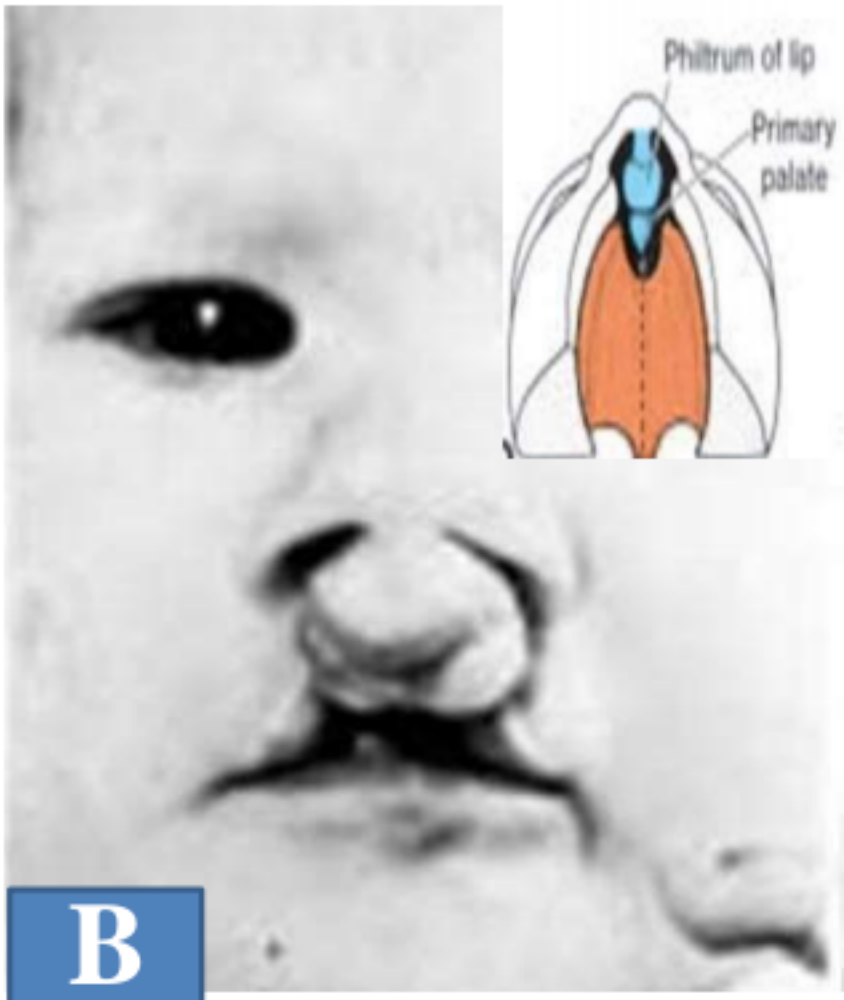
A. Normal

Cleft lip

A. Unilateral cleft lip: results from failure of the maxillary prominence to merge with medial nasal prominence on the effected side

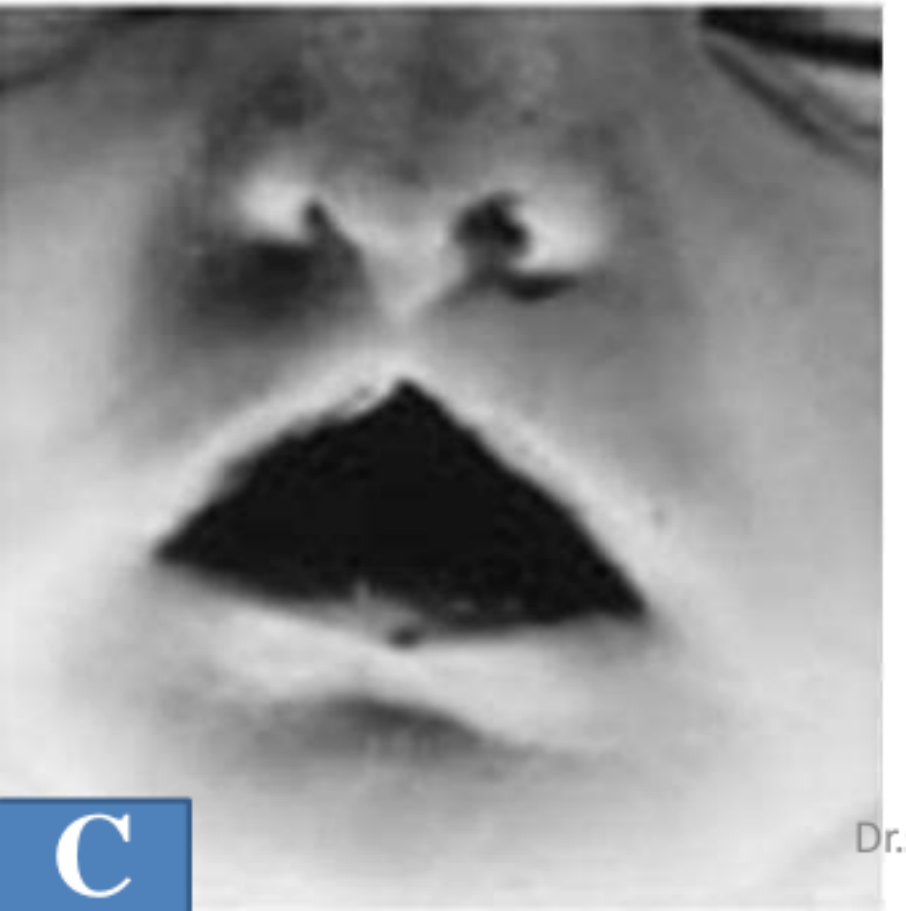
B. Bilateral cleft lip: results from failure of the maxillary prominences to merge with medial nasal prominence on both sides





C. Median cleft lip results from failure of the medial nasal prominences to merge and form the intermaxillary segment

D.Oblique facial cleft: failure of fusion between the maxillary prominence and the lateral nasal prominence .The nasolacrimal duct persist opened , usually associated with cleft lip on the same side



Cleft palate

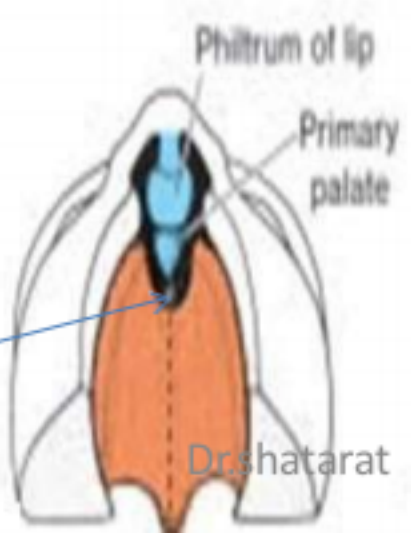
The ***incisive foramen*** **is considered the dividing** landmark between the **anterior and posterior cleft deformities**

A- Cleft of the primary palate

Results from failure of the palatine shelves to fuse with the primary palate which takes place ***anterior to the incisive foramen therefore this type is anterior cleft palate***

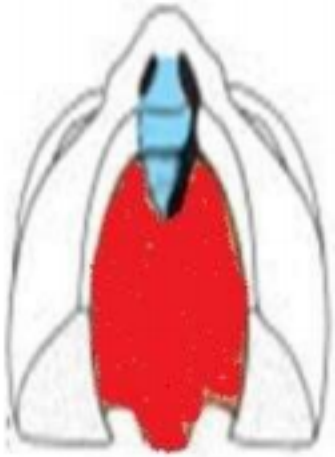
Note that **Cleft of the primary palate is always anterior and can be unilateral and bilateral**

Primary Bilateral cleft (involving the lip and jaw)



Note :It is anterior to the incisive foramen

Primary Unilateral Cleft palate (combined with unilateral cleft lip)

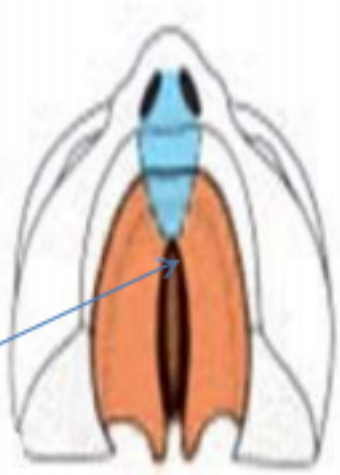


B. Cleft of the secondary palate

Results from failure of the palatine shelves to fuse with each other and with the primary palate which takes place ***posterior to the incisive foramen therefore this type is***

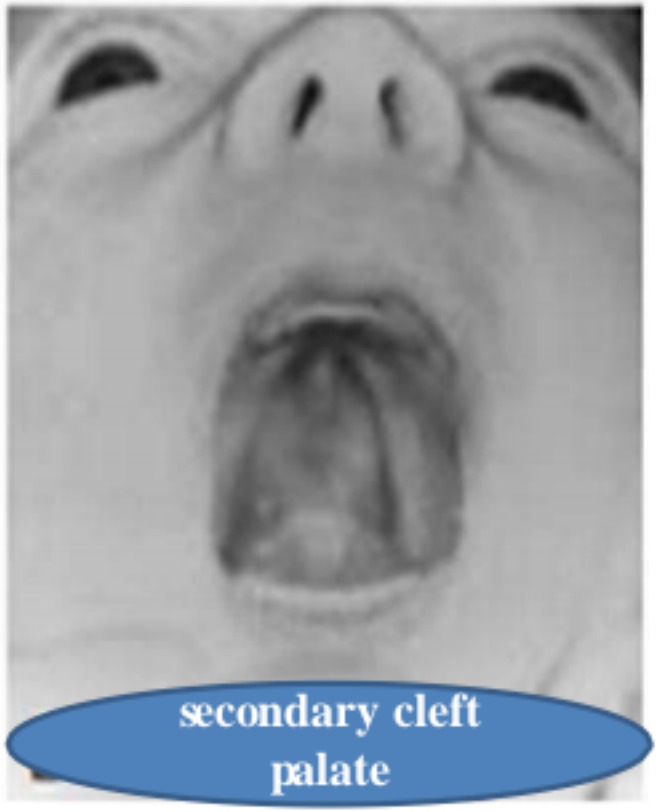
Posterior cleft palate

Note that **Cleft of the secondary palate is always posterior**



secondary cleft palate

Note it is located posterior to the ***incisive*** foramen

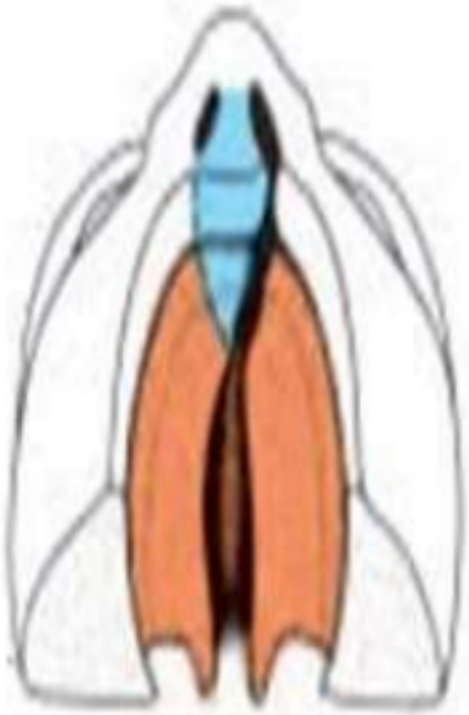


secondary cleft palate

Cleft of the primary and secondary palate

Results from failure of the palatine shelves to fuse with each other and with the primary palate which takes place ***anterior and posterior to the incisive foramen***

therefore this type is mixed anterior and posterior cleft palates

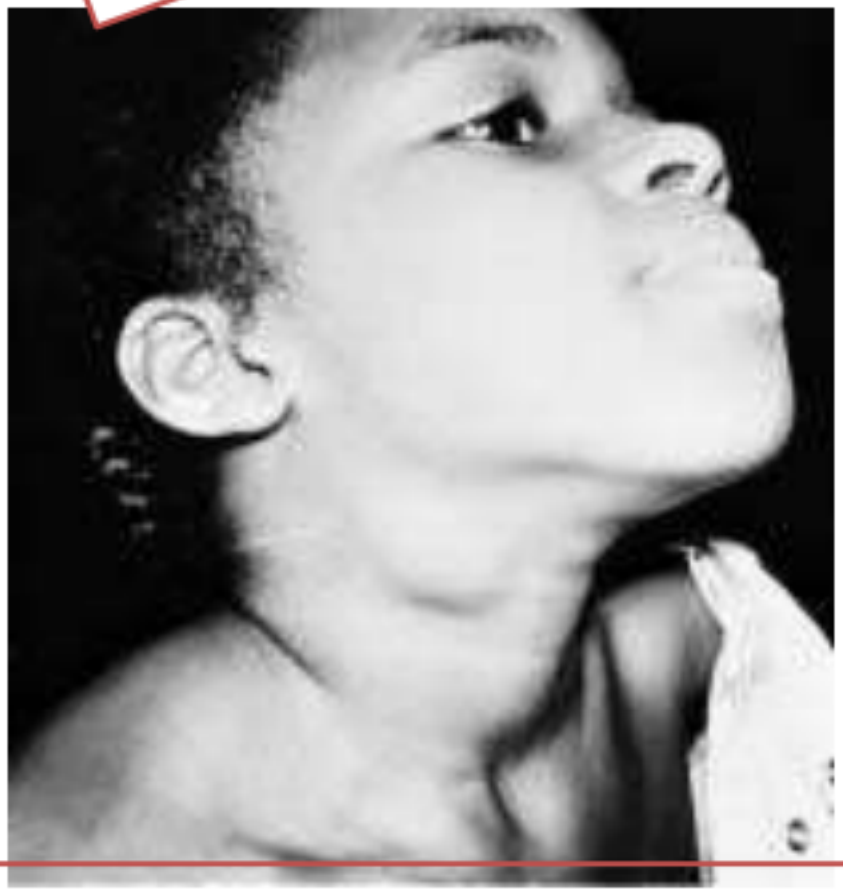


Primary and secondary Cleft palates combined with unilateral cleft lip

BranchialFistulas

lateral

cervical cyst



Branchial fistulas occur when the second pharyngeal arch fails to grow caudally over the third and fourth arches, leaving remnants of the second, third, and fourth clefts in contact with the surface by a narrowcanal.

Such a fistula, found on the lateral aspect of the neck directly anterior to the **sternocleidomastoid muscle, usually provides drainage for a lateral cervical cyst *These cysts, remnants of the cervical sinus, are mostoften*** just below the angle of the jaw

Frequently a lateral cervical cyst is not visible at birth but becomes evident as it enlarges during childhood.

Patient with a lateral cervical cyst. These cysts are always on the ***lateral*** side of the neck in front of the sternocleidomastoid muscle. The cysts may not be under the angle of the mandible and do not enlarge until later inlife.