Embryology Lec.5 **أ.د. عذراء**

Tongue

The tongue appears in embryos of approximately 4 weeks in the form of two **lateral lingual swellings** and one **medial swelling,** calld (**tuberculum impar)** These three swellings **originate from the first pharyngeal arch**. A second median swelling, the **copula,** or **hypobranchial eminence,** is formed by **mesoderm of the second, third, and part of the fourth arch**. Finally, a third median swelling, formed by the **posterior part of the fourth arch**, marks development of the **epiglottis**. Immediately behind this swelling is the **laryngeal orifice,** which is flanked by the **arytenoid swellings .**

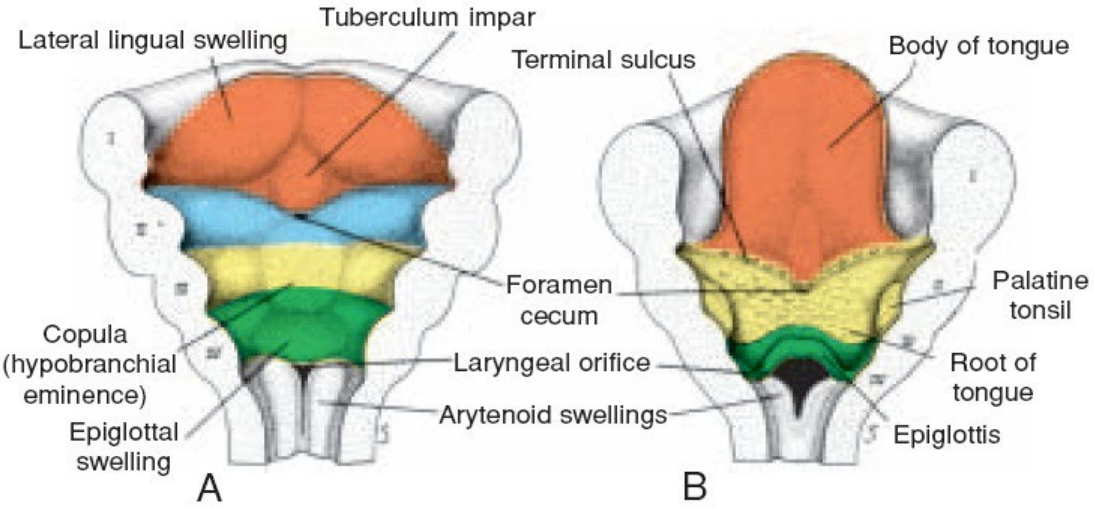
As the lateral lingual swellings increase in size, they overgrow the tuberculum impar and merge, forming the anterior two-thirds, or body, of the tongue .Since the mucosa covering the body of the tongue originates from the first pharyngeal arch, **sensory innervation** to this area is by the **mandibular branch of the trigeminal nerve.** The body of the tongue is separated from the posterior third by a V-shaped groove, the **terminal sulcus .**

The posterior part, or root, of the tongue originates from the second, third, and part of the fourth pharyngeal arch. The fact that **sensory innervation** to this part of the tongue is supplied by the **glossopharyngeal nerve** indicates that tissue of the third arch overgrows that of the second.

The epiglottis and the extreme posterior part of the tongue are innervated by the **superior laryngeal nerve(branch from vagus nerve),** reflecting their development from the fourth arch. Some of the tongue muscles probably differentiate in situ, but most are derived from myoblasts originating in

occipital somites. Thus, **tongue musculature** is innervated by the **hypoglossal nerve.**

The general sensory innervation of the tongue is easy to understand. The body is supplied by the trigeminal nerve, the nerve of the first arch; that of the root is supplied by the glossopharyngeal and vagus nerves, the nerves of the third and fourth arches, respectively. **Special sensory innervation** (**taste**) to the anterior two thirds of the tongue is provided by the **chorda tympani branch of the facial nerve,** while the posterior third is supplied by the glossopharyngeal nerve.



Clinical correlation

Tongue-Tie

In **ankyloglossia** (**tongue-tie**) **the tongue is not freed from the floor of the mouth**. Normally, extensive cell degeneration occurs, and **the frenulum is the only tissue that anchors the tongue to the floor of the mouth**. In the most common form of ankyloglossia, the frenulum extends to the tip of the tongue.

Thyroid Gland

The thyroid gland appears as an **epithelial proliferation in the floor of the pharynx between the tuberculum impar and the copula at a point later indicated by the foramen cecum .**Subsequently the thyroid descends in front of the pharyngeal gut as a blobbed diverticulum .

During this migration, the thyroid remains connected to the tongue by a narrow canal, the **thyroglossal duct. This duct later disappears**.

With further development, the thyroid gland descends in front of the hyoid bone and the laryngeal cartilages. It reaches its final **position in front of the trachea in the seventh week .**

Clinical correlation

Thyroglossal Duct

A **thyroglossal cyst** may lie at any point along the migratory pathway of the thyroid gland but is always near or in the **midline** of the neck. it is a cystic **remnant of the thyroglossal duct**. Sometimes a thyroglossal cyst is connected to the outside by a fistulous canal, called **thyroglossal fistula.**

Figure 15.20 Thyroglossal cyst. These cysts, which are remnants of the thyroglossal duct, may be anywhere along the migration pathway of the thyroid gland. They are commonly found behind the arch of the hyoid bone. An important diagnostic characteristic is their midline location.

Development of Face

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 appear(**Maxillary prominences** and **mandibular prominences)**. On both sides of the **frontonasal prominence**, local thickenings of the surface ectoderm, the **nasal** (**olfactory**) **placodes,formed.** During the fifth week, the nasal placodes invaginate to form **nasal pits.** 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 **lateral nasal prominences which form ala of nose ;** those on the inner edge are the **medial nasal prominences** that fused and form **Intermaxillary Segment** that form the followings:

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

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

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

The **nose** is formed from **five facial prominences** .

1.the frontal prominence gives rise to the bridge

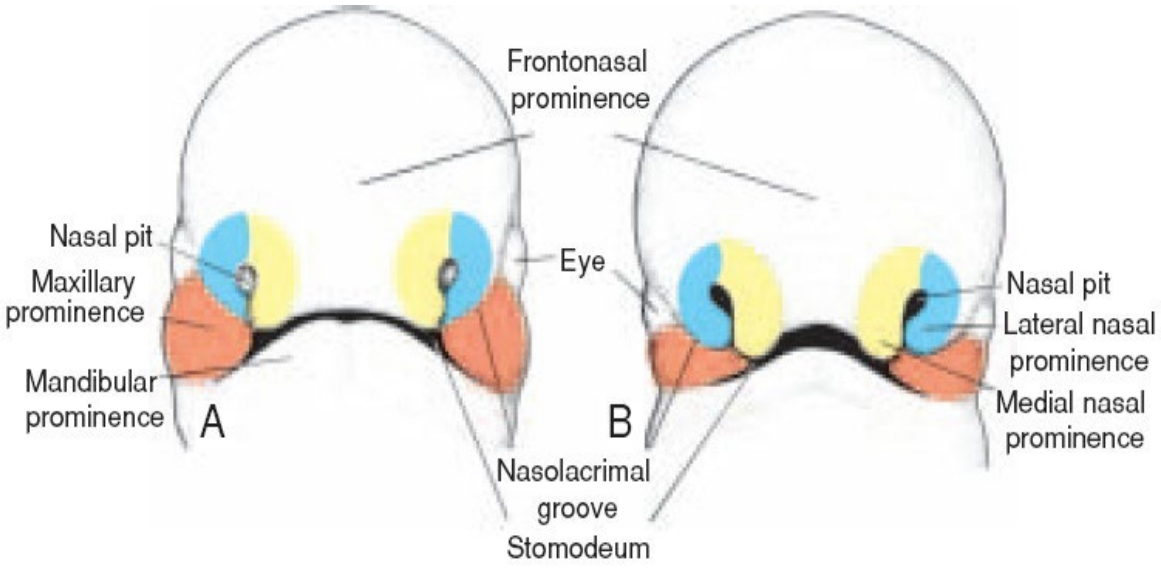
2.the merged medial nasal prominences provide the crest and tip

3. the lateral nasal prominences form the sides (alae) .

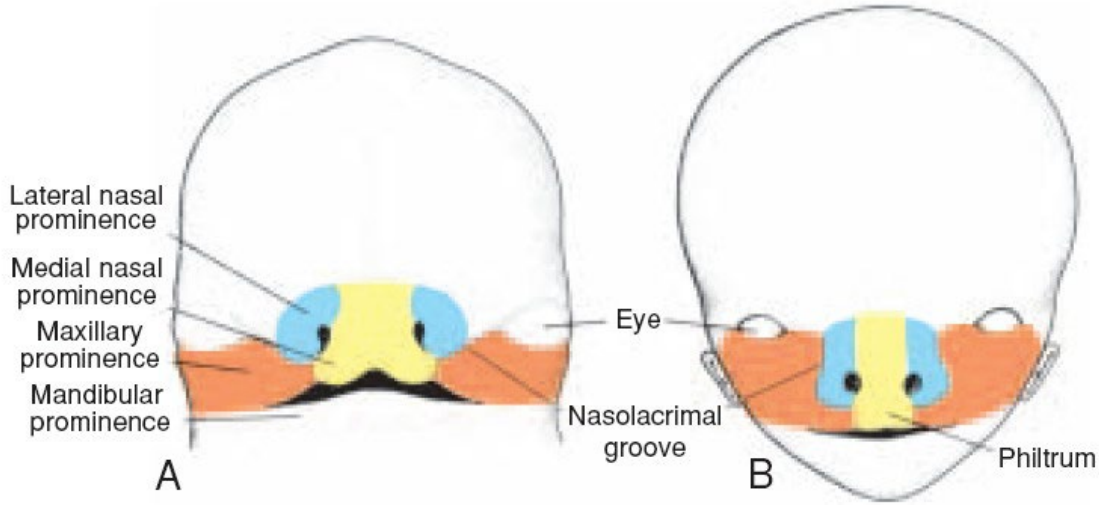
During the following 2 weeks, the **maxillary prominences** continue to increase in size. Simultaneously, they grow medially, **compressing the medial nasal prominences toward the midline** and the two fuse .

Initially, the maxillary and lateral nasal prominences are separated by a deep furrow, the **nasolacrimal groove** . After canalization, the cord forms the

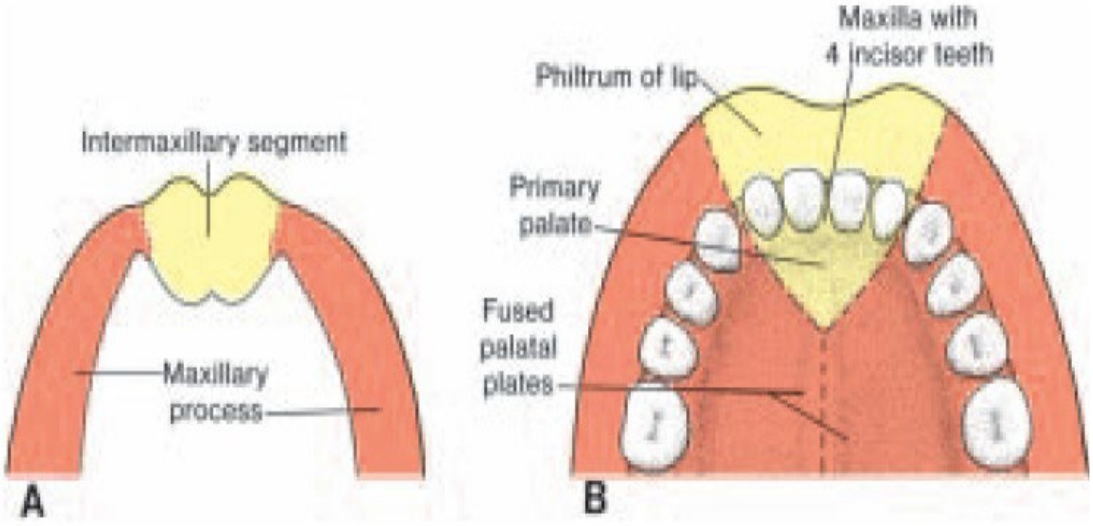
nasolacrimal duct; its upper end widens to form the **lacrimal sac.** the maxillary prominences enlarge to form the **cheeks** and **maxillae.**



Figure(1) show development of face



Figure(2) maxillary process fused with medial nasal process



Figure(3) intermaxillary segment

Secondary Palate

Although the primary palate is derived from the intermaxillary segment, the main part of the definitive palate is formed by two shelf like 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**, 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** the newly formed palate.

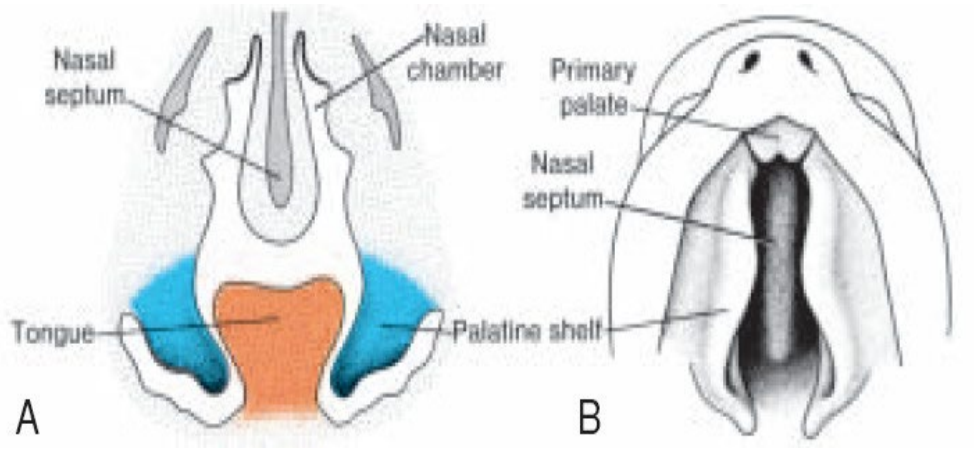
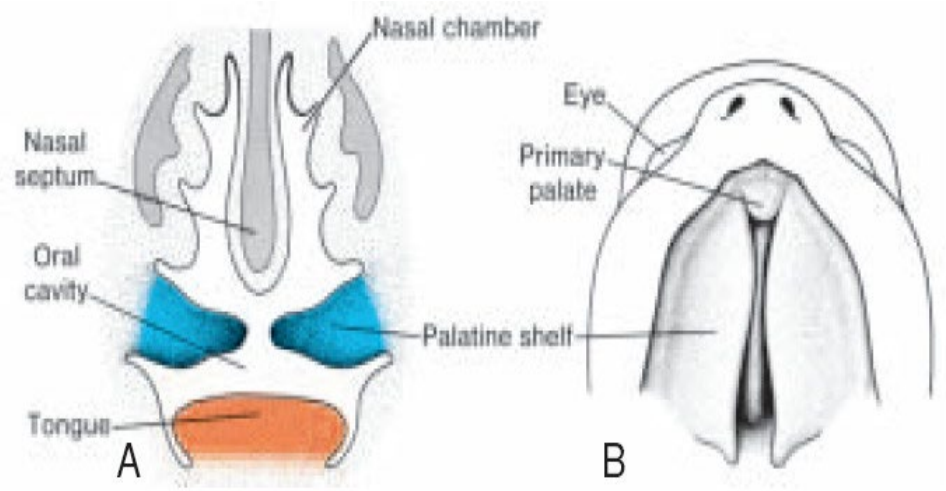
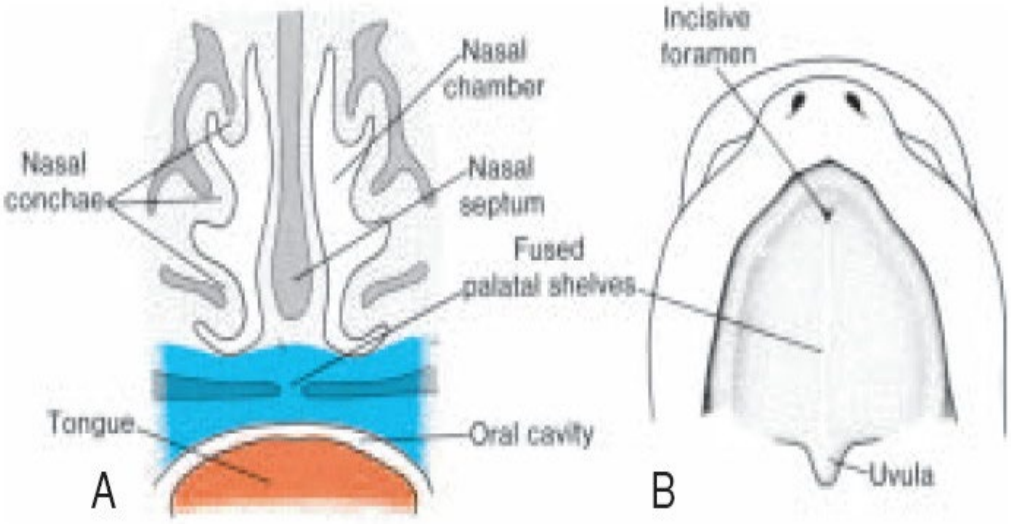


Figure (4) palatine shelves



Figure(5) Tongue move down ward and palatine shelves reah a horizontal position.



Figure(6) Two palatine shelves fuse with each other and with nasal septum

Structures Contributing to Formation of the Face

Prominence	Structures Formed
1.Frontonasal	Forehead, bridge of nose, medial & lateral nasal prominences
2. Maxillary	Cheeks, lateral portion of upper lip, secondary palate
3. Medial nasal	Philtrum of upper lip, crest and tip of nose, premaxilla, primary palate
4. Lateral nasal	Alae of nose
5. Mandibular	Lower lip,chin

Note :**The frontonasal prominence is a single unpaired structure; the other prominences are paired.**

Facial Clefts:

Incidence of cleft lip is common among male, unilateral cleft (80%) while bilateral cleft (20%).The cleft palate is more common in female .

1.Cleft of upper lip

Median cleft lip(median hare lip) = medial nasal prominences fail to merge together = often baby mentally retarded .

Lateral cleft lip = failure of fusion between medial nasal and maxillary prominences

2.Median cleft lower lip = failure of fusion between the 2 mandibular process.

3.Oblique facial clefts = failure of fusion between maxillary and lateral nasal prominences

4.Cleft palate = failure of fusion maxillary prominences (palatal shelves)

5. Macrostomia(larg mouth)= due to arrest of fusion between the maxillary and mandibular.

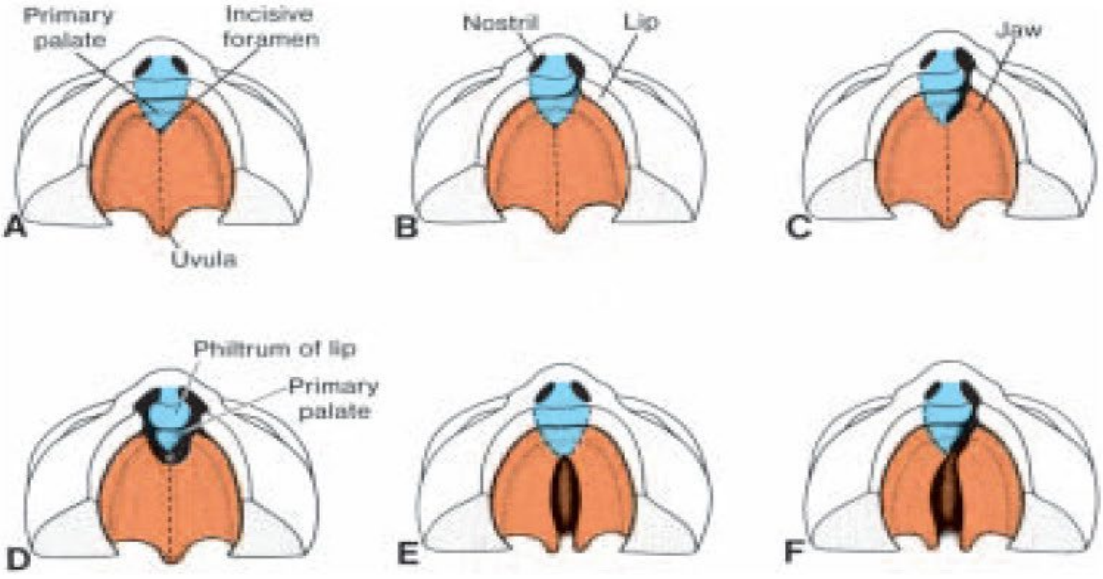


Figure 15.28 Ventral view of the palate, gum, lip, and nose. **A.** Normal. **B.** Unilateral cleft lip extending into the nose. **C.** Unilateral cleft involving the lip and jaw and extending to the incisive foramen. **D.** Bilateral cleft involving the lip and jaw. **E.** Isolated cleft palate. **F.** Cleft palate combined with unilateral anterior cleft lip.

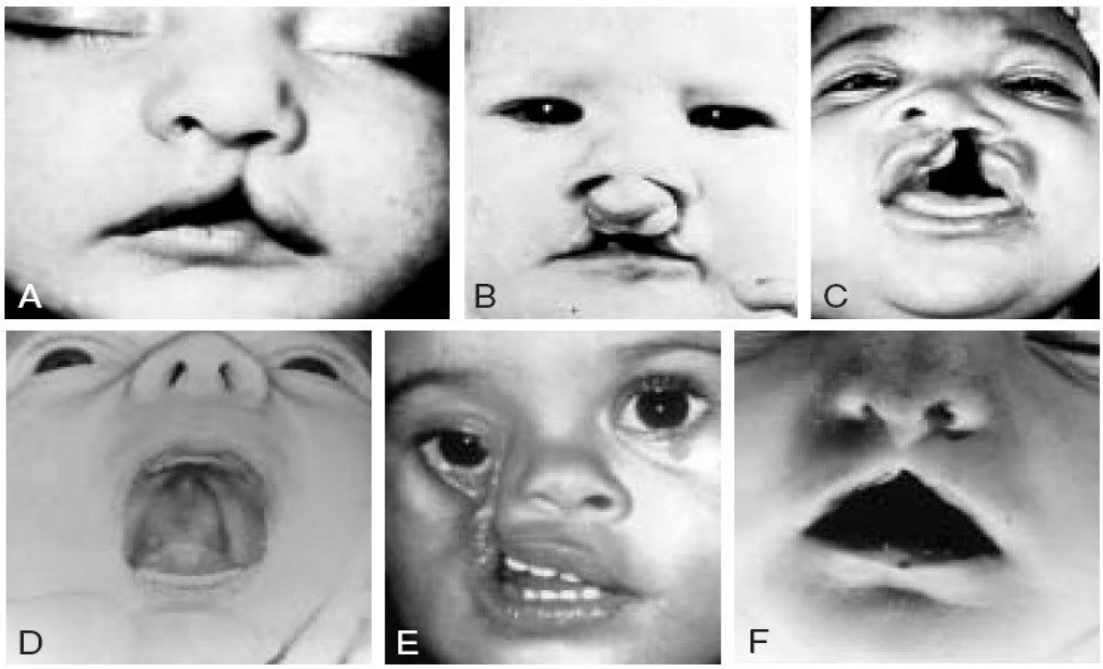


Figure 15.29 A. Incomplete cleft lip. **B.** Bilateral cleft lip. **C.** Cleft lip, cleft jaw, and cleft palate. **D.** Isolated cleft palate. **E.** Oblique facial cleft. **F.** Midline cleft lip.