# DIPLOMA OF PRIMARY CARE DENTISTRY

# -RCSI-

## PART – 1

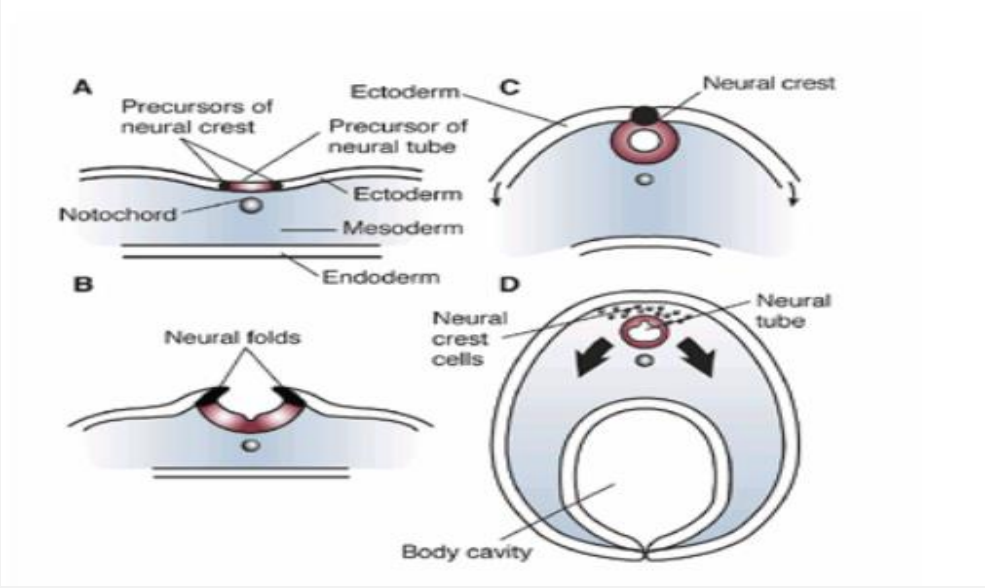
## CLINICAL SKILLS

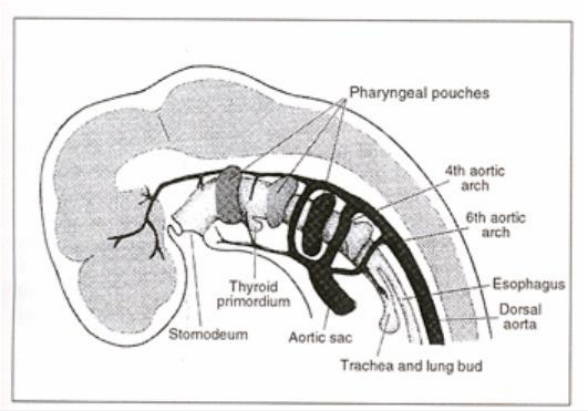
## PART 11: ANATOMY AND EMBRYOLOGY

# TEETH ANATOMY AND EMBRYOLOGY:

## The Formation of the Head:

- At the time when the head region begins to form, the embryo is composed of three layers of tissue, the ectoderm, mesoderm and endoderm.
- These three germ layers become distinct during gastrulation in the third week of development.
- The neural folds fuse and form the neural tube, a process known as neurulation.
- The process of neurulation is completed in distinct steps that include the forming, shaping and bending of the neural plate and then the closing of the neural groove.
- If this process does not occur correctly, major Central Nervous System abnormalities can result.
- In humans, the process of neurulation can be divided into the primary neurulation and secondary neurulation.
- In the first part of this two-stage process, the neural tube forms, which ultimately will become the brain and a large part of the spinal cord.
- The neuroepithelium is folded and shaped so that there can be fusion at the midline and a tube can be formed.
- In an extremely different process, secondary neurulation "involves condensation of a population of mesenchymal cells in the tail bud, to form an epithelial rod".
- The formation of the secondary neural tube results in a canal whose lumen "is continuous with that of the primary neural tube".






⇒ Formation of the head is defined by the migration of neural crest cells that arise from the rhombomeres, segments of the forming hindbrain which will give rise to differentiated neurons.

⇒ The two streams of neural crest cells come from the first two rhombomeres and aid in the development of the face and branchial arch system.

⇒ Migrating as the first stream, the crest cells "intermingle and reinforce the mesenchyme situated beneath the expanding forebrain".

⇒ This first stream of cells becomes the connective tissue that is important for the development of the face, while the second is incorporated in the first branchial arch.

⇒ Hox family of Homeobox genes expressed in the rhombomeres are important in this stage for determining the pattern of development.

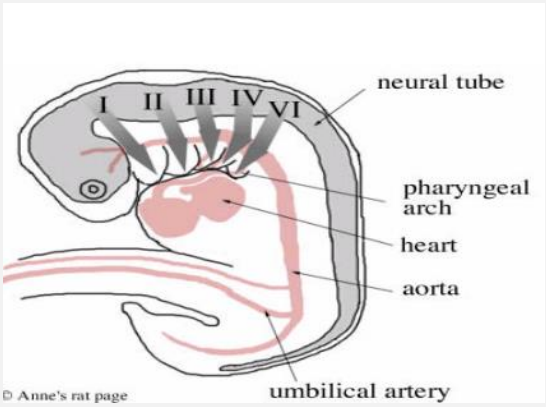
## Skull Development:

- The developing fetal skull can be divided into three sections that will eventually become fused, the cranial vault, cranial base and the face.
- When the brain is developing it 6 requires protection even though bone has not yet formed so it is surrounded by a membranous cranium that will eventually become the site of bone formation.
- At week nine of development, the mesenchymal cells will differentiate into osteoblasts that will form an osteoid matrix and begin to mineralize.
- The ossification process in the cranial vault, as well as the face and vomer, does not have a cartilage model to follow and is, therefore, of intramembranous origin.
- At birth, mineralization has not been completely finished which is why a newborn's head must be treated very delicately.
- **The six fontanels** are attached by connective tissue because fusion between developing bones has not yet occurred.
- The sutures and fontanels are much more noticeable in the newborn head but will disappear during the first few years of life.
- The neurocranium is much larger in proportion to the face because of the growth pattern after birth.

- “The neurocranium reflects the growth of the brain and follows the neural curve, whereas the facial area follows the somatic growth curve”.
- The skull base is actually the first part of the skull that begins to take shape as the mesenchymal tissue migrates to the areas that will become the ethmoid, auditory, nasal and optic centres as well as the floor that will support the developing brain in the seventh week.
- The chondrocranium is formed from cartilage which will give rise to ossification centers and ultimately become bone.
- At this time the middle and external ear develop, but the inner ear will develop separately.
- Defects of the middle ear and pinna are linked and will not necessarily affect the inner ear.
- Many of the bones that make up the skull base will undergo significant changes from their state during fetal development to maturity.
- The facial area is developed from both the frontal prominence and the pharyngeal arches but will eventually become one cohesive structure.
- The nasal placodes and mandibular arches begin their formation in the fifth week from the frontal prominence.
- The nasal placodes are “paired ectodermal thickenings” that arise in the fourth week of development.
- Specialized cells from the placodes will become olfactory neuroepithelium that line the nasal fossae.
- After the nasal placodes have formed they become involved in the formation of the nasal pits, and eventually the nasal sacs, along with the frontonasal prominence and the first branchial arch.
- When the nasal sacs invaginate a separation between the oral and nasal cavities occurs.
- The frontonasal prominence and the maxillary prominence continue to emerge.
- This will give rise to the nasal and frontal bones, the primary palate, the nasal capsule and part of the upper lip.
- The cheeks and corners of the mouth will take shape in the eighth week and when the orbits over the nose form the face will begin to finally take a recognizable shape.
- Facial development nears completion when the nose reaches its mature form and the sinuses begin to emerge, but the development will not be completed until well into puberty.

## The Fate of the Pharyngeal Arches:

- The pharyngeal, or branchial arches, begin to form during the fourth week of development because neural crest cells begin to move to the areas that will become the head and neck.
- In the human there are six arches, and they are separated by pharyngeal grooves externally and the pharyngeal pouches internally.
- The arches are composed of mesenchyme covered by both ectoderm externally and endoderm internally.
- When the neural cells migrate to the arches and surround them, they begin to increase in size.
- The pharyngeal arches give rise to much of the skeletal muscle and connective tissue in the head and neck region.




- The centre of each arch is composed of cartilage that has formed as a result of condensation of the mesenchyme.
- The cartilage in the first arch has been named Meckel's cartilage.
- Each arch also has two nerves, one sensory and one motor, that will eventually innervate the muscle that is derived from that arch.
- The first pharyngeal arch, or mandibular arch will eventually become the mandibular and maxillary processes that will take part in jaw and nasal cavity formation.
- It will also give rise to two bones in the ear, the malleus and incus, and the ligaments associated with them.
- An abnormality in the first arch will cause congenital defects in the eyes, ears, palate and jaw.
- The second pharyngeal arch, or hyoid arch, "overgrows the third and fourth" arches and forms the cervical sinus.
- The neck begins to take shape in the sixth and seventh week of fetal development when "the second and fourth branchial grooves and cervical sinus are obliterated".
- The bones that arise from the second arch are the stapes in the ear, the styloid process of the temporal bone, the lesser cornu and the hyoid bone, as well as the stylohyoid ligament.
- The third pharyngeal arch is also involved in the formation of the hyoid bone and also becomes the greater cornu.

- The fourth and sixth arches will fuse to form the laryngeal cartilages.
- The fifth cartilage does not appear to have any contribution to the adult anatomy.

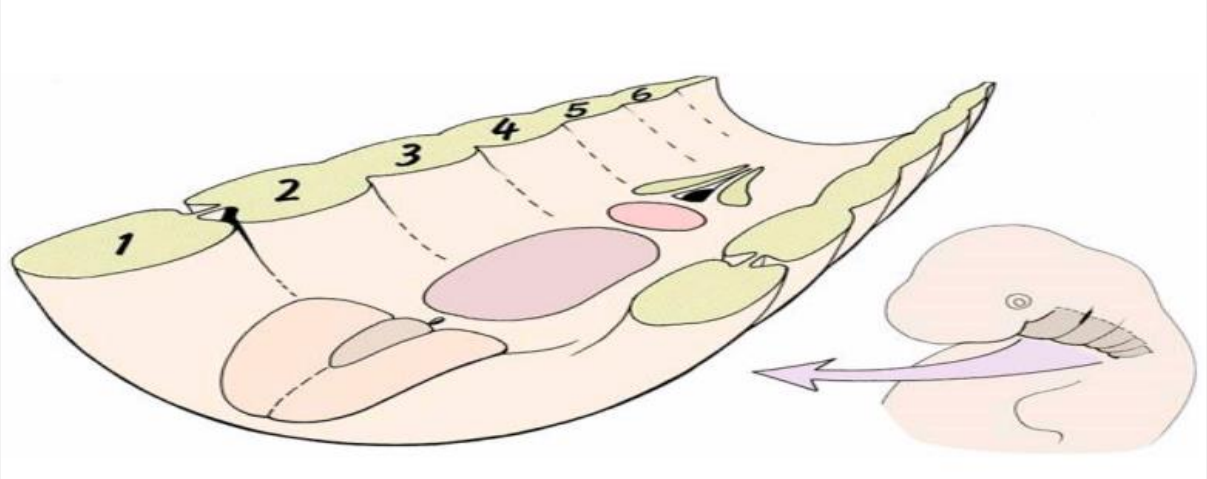
| Arch | Nerve | Muscles | Skeletal Structures | Ligaments |
|---|---|---|---|---|
| First (mandibular) | Trigeminal (V) | Mastication<br>Mylohyoid and anterior belly of digastric<br>Tensor tympani<br>Tensor veli palatine | Malleus<br>Incus | Anterior ligament of malleus<br>Sphenomandibular ligament |
| Second (hyoid) | Facial (VII) | Muscles of facial expression<br>Stapedius<br>Stylohyoid<br>Posterior belly of digastric | Stapes<br>Styloid process<br>Lesser cornu of hyoid<br>Upper part of body of the hyoid bone | Stylohyoid ligament |
| Third | Glossopharyngeal (IX) | Stylopharyngeus | Greater cornu of hyoid<br>Lower part of body of the hyoid bone | |
| Fourth and Sixth | Superior laryngeal branch of vagus (X)<br>Recurrent laryngeal branch of vagus (X) | Cricothyroid<br>Levator veli palatine<br>Constrictors of pharynx<br>Intrinsic muscles of larynx<br>Striated muscles of the esophagus | Thyroid cartilage<br>Cricoid cartilage<br>Arytenoid cartilage<br>Corniculate cartilage<br>Cuneiform cartilage | |

### **The Pharyngeal Pouches:**

- The pharyngeal pouches form as outgrowths of the pharyngeal arches when they become lined by the pharynx.
- There are four pairs of pouches, and similarly to the pharyngeal arches, the fifth pair of pouches does not have any known developmental purpose.
- The first pharyngeal pouch forms the tympanic cavity, mastoid antrum and Eustachian tube.
- The second pouch becomes segmented and one of the segments forms the tonsils and lymphatic nodules.
- The third pouch forms bulbous portions that will have several different fates.
- The fourth pouch also differentiates into several different structures, including the superior parathyroid gland which will fuse with the inferior portion. It will also become the parafollicular, or C cells, associated with the thyroid gland that produce calcitonin, a hormone that regulates calcium levels in the body.

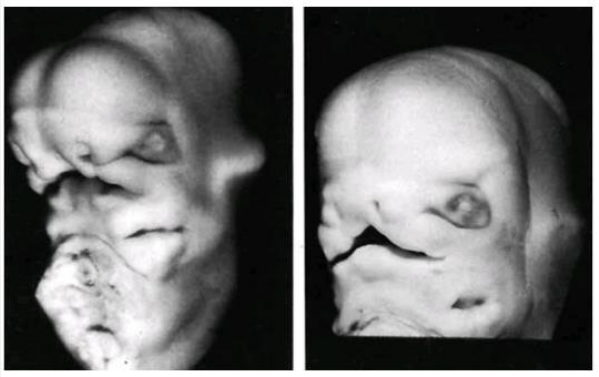
⇒ Pharyngeal pouch derivatives:

| Pouch | Derivatives |
|---|---|
| 1 | middle ear cavity, endodermal aspect of tympanic membrane, pharyngotympanic tube |
| 2 | palatine tonsil |
| 3 | inferior parathyroid gland, thymus |
| 4 & 5 | superior parathyroid gland, parafollicular cells of thyroid gland |




## Fetal Facial Formation:

- The stomodeum is the rudimentary mouth that forms between the first pharyngeal arches around the fourth week of development in the centre of the area that will become the face.
- The neural crest cells of the arches contribute to the development of the skeleton, while the mesoderm will provide the musculature for the face and neck.
- Around the fifth week of fetal development the face begins to take shape starting with the nasal placodes that will become the nasal pits after evagination.
- The frontal nasal prominences form above the stomodeum like a primordial lip. When the mandibular prominences merge, they will form the beginnings of lower lip, chin and mandible.
- The nose is actually the result of a fusion of five separate prominences: “the frontal prominence forms the bridge of the nose; the two medial nasal prominences form the crest, tip and central portion of the lip, or intermaxillary segment; and the lateral nasal prominences form the sides.
- Complete fusion of the medial nasal prominences is important because this is where cleft lip and palate can occur.
- Next, the nasolacrimal groove and duct develop in the seventh week.

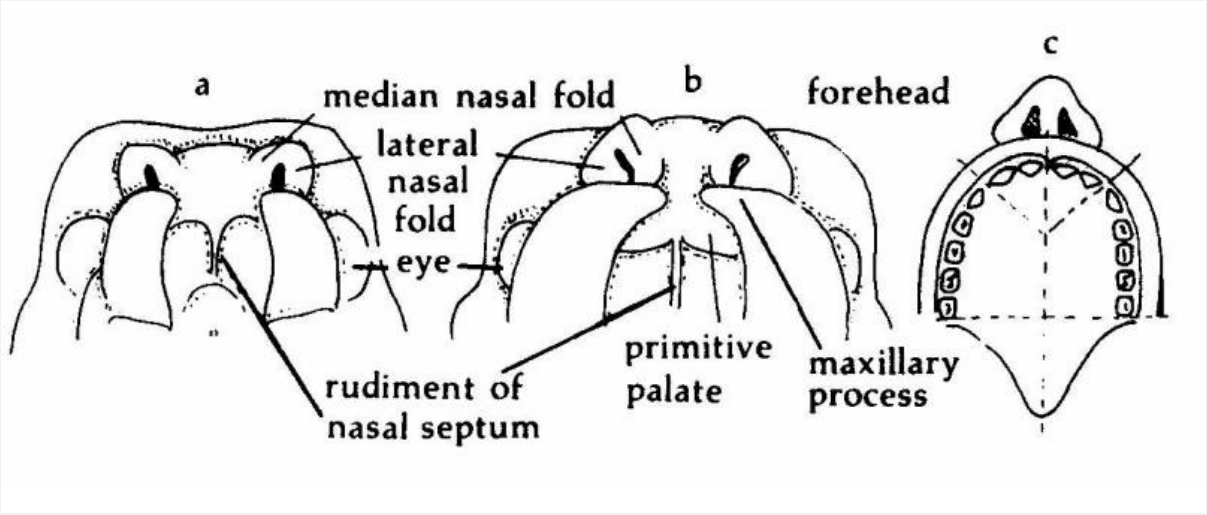


- The nasolacrimal duct is important in the "drainage of excess tears from the conjunctiva of the eye into the nasal cavity".
- During the sixth and seventh week the nasal and maxillary processes begin to expand and fuse to form the upper lip.
- The lower lip begins to form earlier when the mandibular swellings become continuous, and the mandibular depression is filled in "by proliferation of mesenchyme".
- The buccopharyngeal membrane "ruptures to form a broad, slitlike embryonic mouth" and will not take its mature shape until well into the second month of development when the "maxillary and mandibular swellings create the cheeks".

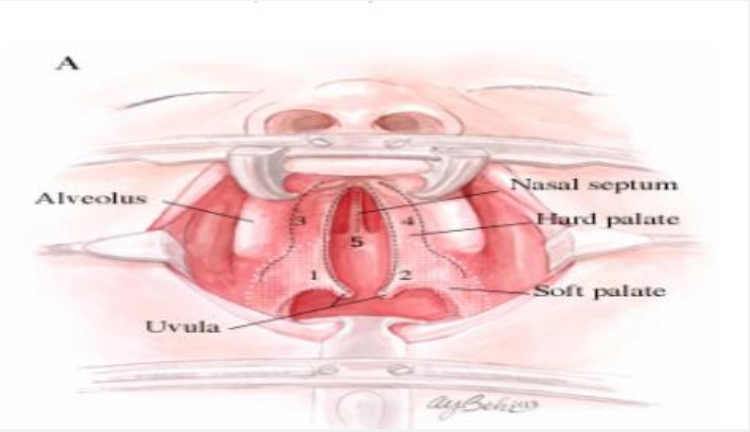
## Formation of the Primary and Secondary Palates:

→ The palate as a whole forms from two primordia which can be classified as the primary and secondary palate.
→ At around the sixth week of development the primary palate begins to take shape, arising from the medial nasal process.
→ Composed of mesoderm, this "wedge-shaped mass" will eventually extend to form the floor of the nasal cavity.
→ Around the eighth or ninth week of development the secondary palate begins to develop from two lateral palatine processes, but this is not completed until the third month of gestation.
→ The two processes grow vertically on either side of the tongue, but as the oral cavity develops "the tongue moves inferiorly" and the processes move up and toward each other so that they can fuse.
→ As this shifting occurs the oral cavity begins to develop along with the formation of the mandible.
→ In order for the fusion of the two palatine processes to occur a significant amount of force is necessary, but the nature of this force is unknown.
→ Multiple physiological changes that are occurring at this time in fetal development have been attributed to these phenomena.
→ The specific steps in the formation of the tongue and head attribute to this growth pattern.

→ When fusion of the palate occurs, the two layers of epithelia must align and become adjoined with only a midline seam.
→ Junctions are formed due to the carbohydrate-rich surface coat because this allows for a simpler adhesion process.
→ The seam that forms at the junction is then composed of two epithelial cell layers that must eventually become one when “the growth of the seam fails to keep pace with palatal growth so that the seam first thins to a single layer”.
→ Fusion is completed around the twelfth week when the midline edge seam (MES) disappears completely.
→ The epithelial cells then begin to differentiate to form the other structures associated with the palate.
→ On the nasal side the cells become pseudostratified ciliated columnar epithelium.
→ On the oral side the cells become stratified squamous, non-keratinizing epiethelium.
→ The hard palate forms when “ossification occurs in the anterior two-thirds of the palate” and the soft palate is formed because ossification does not occur in this area.
→ When these cells do not differentiate correctly then problems such as a cleft palate may occur.
→ The maxilla is not derived from a primary cartilage, but rather ossification begins where the anterosuperior dental nerve and inferior orbital nerve divide and is linked to the cartilage that makes up the nasal capsule. It does however have a secondary cartilage, the zygomatic cartilage, that contributes to the maxilla growth.
→ Bone growth continues both posteriorly and anteriorly and troughs form to house the nerves and tooth germs just as in the mandible so that the teeth are held in place.
→ It is at this time that ossification of the hard palate occurs.
→ The maxilla increases in size after birth due to the development of maxillary sinuses.



## ➲ Cleft palate:




- It occurs once in 2500 births and are more common in females.
- There are multiple forms of this congenital defect as it can be unilateral or bilateral and involve the uvula and hard and soft palates.
- On an embryological level, a cleft palate occurs because there has been insufficient fusion of the palatine processes or formation of the nasal septum.
- Other factors that may cause a cleft palate include “lack of growth”, inability of the palatine shelf to elevate, failure of the septum to fuse, inability of the epithelium to breakdown or “defective merging of the mesenchyme of the shelves”.
- There are also specific environmental factors that may contribute, including “infectious agents, x-ray radiation, drugs, hormones, and nutritional deficiencies”.
- Generally restorative surgery for cleft palates is done around one to two years of age.
- There are “several types of operative procedures” that can be used for the repair based on the type and severity of the case.
- As cosmetic surgery techniques begin to improve, the success of these surgeries to reconstruct normal and functioning palates increases.
- Children with a cleft palate are generally candidates for speech therapy from an early age to improve the quality and ease their speech.
- Unfortunately, after surgery children may experience scarring of the palate and other growth abnormalities of the oral cavity.

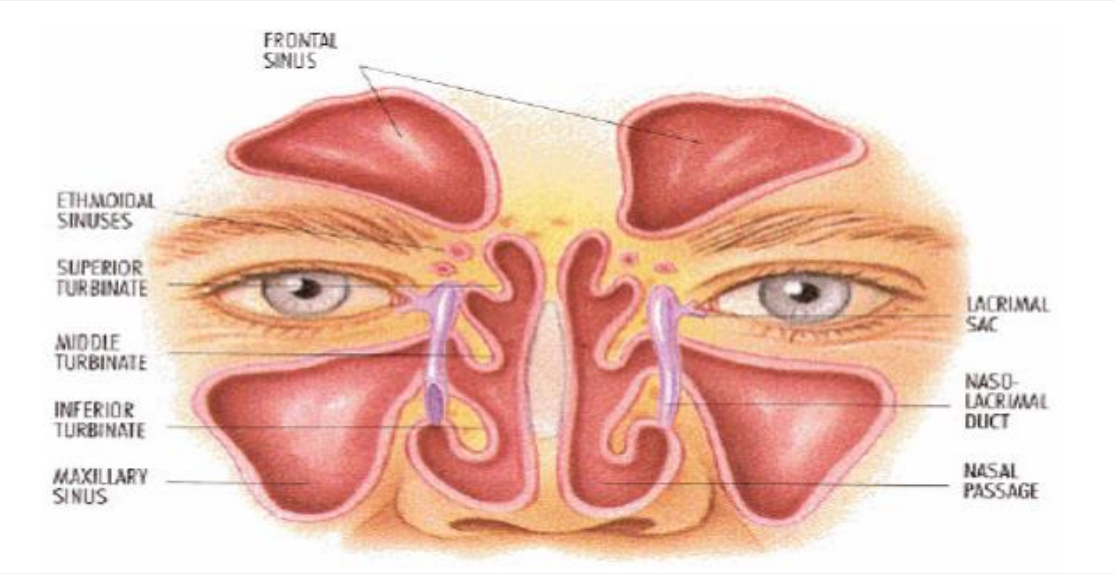
## Mandible Formation:

- At the sixth week of development a cartilaginous rod forms, also known as Merkel's cartilage for the anatomist that first defined it, from the region around the ear to the midline mandibular processes and are separated by mesenchyme.
- The mandibular nerve splits at this time into the lingual and inferior alveolar branches and will line the cartilage.
- During week 7 the first ossification center forms and from this point bone develops out from the midline.
- Medial and lateral alveolar plates form so that tooth germs can form between them.
- Therefore, as the teeth develop they will each have their own space to occupy.
- The bone of the mandible will continue to form after the teeth have developed to support them.
- Around ten weeks the mandible is recognizable and much of the bone has formed.
- After this point there will be a strong dependence for formation on three cartilaginous growths: the condylar cartilage, the coronoid cartilage and the symphyseal cartilage.
- The condylar cartilage will be converted almost entirely to bone, but the small portion of cartilage that remains at the articular end is necessary for the continuous growth of the mandible.
- The coronoid and midline symphyseal cartilages are also important for growth and development but disappear before birth and in the year after respectively.
- The growth of the jaw continues throughout the years before puberty and misalignment of teeth and bones is common and can be attributed to problems with the muscles or joints or genetics.
- Later in life it is possible that this can contribute to temporomandibular joint disorder (TMD) in which patients may experience joint pain, a locking or popping of the jaw and other symptoms.
- Children and teens with jaw or teeth misalignment, which can result in an overbite, under-bite or cross bite, are often treated with orthodontics to correct the bite.

## Development of the Nasal Cavities and Sinuses:

- The nasal prominences form around the nasal placodes and will "form the floors of depressions called nasal pits" which fuse during the sixth week to become one single sac.
- At first the oronasal membrane separates the oral and nasal cavities, but when this ruptures the two spaces will become connected.
- The primordial choanae are "the openings between the nasal cavity and nasopharynx".

- At the same time that the secondary palate is forming, the nasal septum begins to take shape, arising from the frontonasal process and the medial nasal processes.
- The septum grows downwards toward the primary and secondary palates so that the nasal cavity is divided into two passages, "which open into the pharynx behind the secondary palate through an opening called the definitive choana".
- In order for the olfactory epithelium to form, epithelial cells on the roof of the nasal cavities must specialize.
- There are four distinct types of sinuses that will form, though only two will develop before birth. In the third fetal month the maxillary sinuses, those that are present in the maxillary bones, form "as invaginations of the nasal sac that slowly expand in the maxillary bones".
- They will be very small at birth but will continue to grow during 18 the first few years of life.
- Two months later the ethmoid sinuses, those that sit between the eyes, will form in the ethmoid bone.
- They will continue to grow until approximately the time that the child reaches puberty.
- At birth the sinuses are so small they cannot even be detected by radiographs, and this can make diagnosing infection more difficult.
- In the first few years after birth, the sphenoid and frontal sinuses will form within the bones of the same name.
- Surprisingly, the development of the sinus passageways plays one of the greatest roles in determining the size and shape of the face.
- Their growth during fetal development and through puberty will alter appearance and result in the changing of the voice later in life.



## Formation of the Lips:

- The mandibular arches give rise to the lower lip and the upper lip forms from maxillary processes, the lateral nasal prominences and intermaxillary segment.
- Between the fifth and sixth weeks of development the components that will become the lower lip begin to form, but it is not until the seventh week that the lip is distinguishable amongst the other swellings and processes in the facial region.
- By **week nine** the formation of the upper lip has almost been completed and by the time the fetal period is completed it will have taken the adult form and will change very little during the rest of development.

⇒ A cleft lip can occur on either the top or bottom lip, though a cleft of the bottom lip is extremely rare.

⇒ A cleft lip occurs "about once in 1000 births" and are more common in males. There are a variety of abnormalities that can occur "from a small notch in the lip to complete division of the lip and alveolar part of the maxilla".

⇒ A unilateral cleft lip is diagnosed when only one side of the maxillary process fails to merge with the nasal prominence, while a bilateral cleft occurs on both sides.

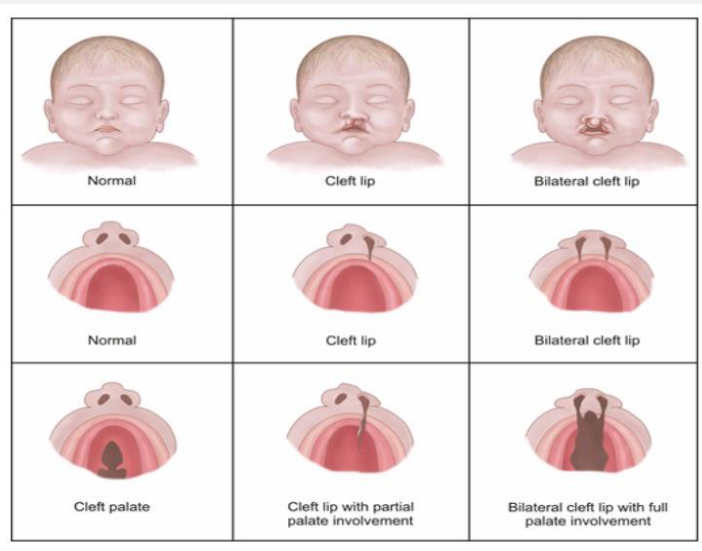
⇒ With a bilateral cleft, because the deformation of the upper lip prevents the connection of the lip and alveolar part of the maxilla, it appears that the bottom portion of the nose and a portion of the upper lip are hanging freely.

⇒ Cleft lip correction surgery is often done very shortly after birth to avoid anatomical abnormalities that may occur during the growth of the lips, jaws and nose.

⇒ Generally, the surgeon must create a more normally shaped nose and nostrils and correct for the deformation of the upper lip and sometimes the lower lip as well.

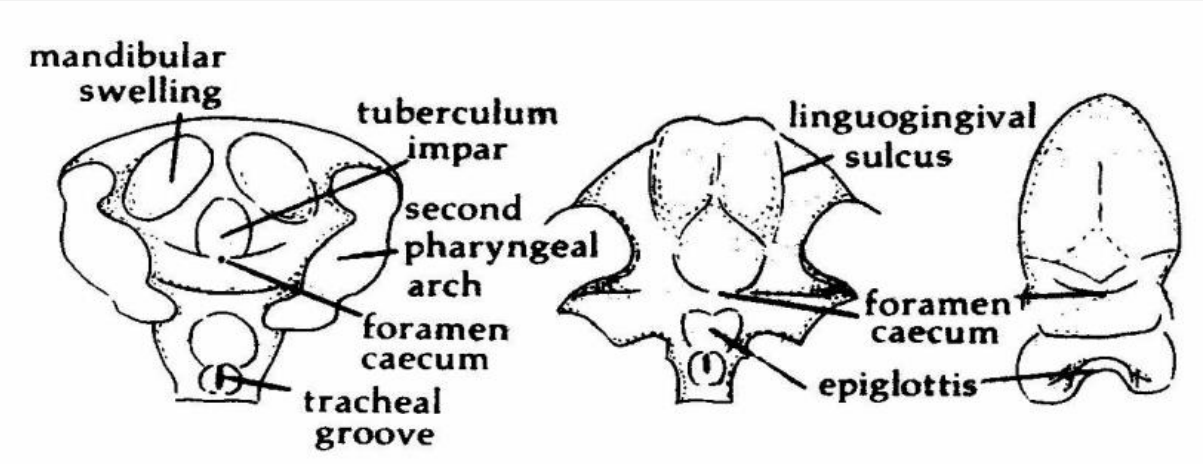
⇒ Often a cleft lip is associated with a cleft palate, and this can be dealt with surgically at the same time as the lip reformation.

⇒ Children with cleft lips often experience dental abnormalities when the teeth form and erupt in the mouth and are frequently candidates for orthodontic treatment.



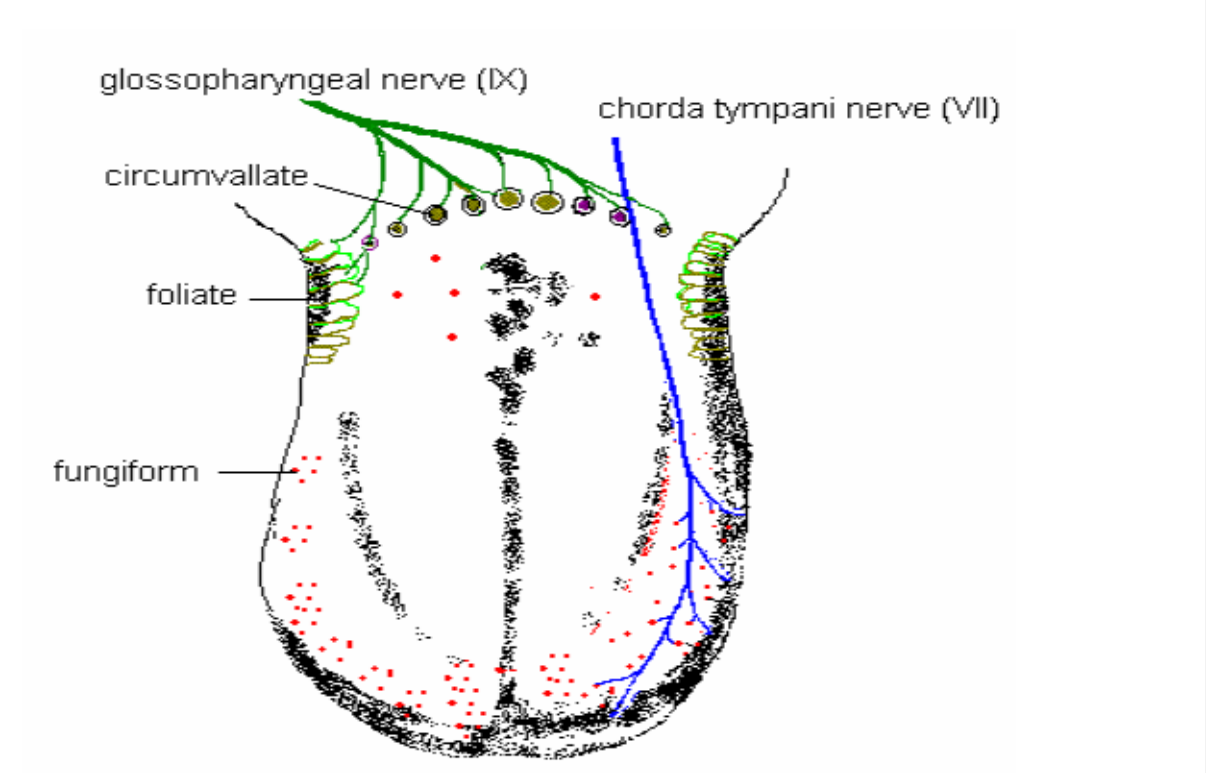
## Development of the Tongue:

- Around the fourth week of embryonic development the structure that will become the tongue begins to form from the first, second, third and fourth pharyngeal arches. Part of the tongue is also derived from the floor of the pharynx.
- Three swellings (the median tongue bud and two distal tongue buds), form and grow rapidly during the fifth week.
- The tongue itself will continue to expand throughout fetal development.




- The lateral tongue buds grow at a more rapid pace than the median tongue bud, and therefore overgrow it beginning in the fifth week.
- The place where these two swellings fuse is indicated in the anatomy by the median sulcus, which can be seen in the adult tongue.
- When the anterior and posterior portions of the tongue fuse the groove that forms in a V-shape at their intersection is called the terminal sulcus.
- The thyroid gland has its origin in the tongue as a small mass that eventually undergoes invagination.
- The anatomy of the tongue reflects the origination of the gland through the remnant named the foramen cecum.
- Multiple cranial nerves are involved with the innervation of the tongue.
- All of the tongue muscles are innervated by the hypoglossal nerve (cranial nerve XII) except for the palatoglossus which is innervated by the pharyngeal plexus of the vagus (nerve X).
- This muscle is involved in swallowing and elevating the posterior portion of the tongue.
- The lingual nerve, which is a branch of the mandibular division of the trigeminal nerve (Cranial Nerve V3), is responsible for providing general sensory information from the anterior two-thirds of the tongue.

- The posterior one-third of the tongue is innervated by the superior laryngeal branch of the vagus nerve (Cranial Nerve X) which relays sensory information.
- The third pharyngeal arch is involved with the glossopharyngeal nerve (Cranial Nerve IX) which “carries both general sensation and taste from the mucosa to the tongue root” as well as vallate papillae, the large taste buds on the terminal sulcus.
- The taste buds are innervated on the anterior two-third of the tongue by a branch of the facial nerve (nerve VII) known as the chorda tympani.

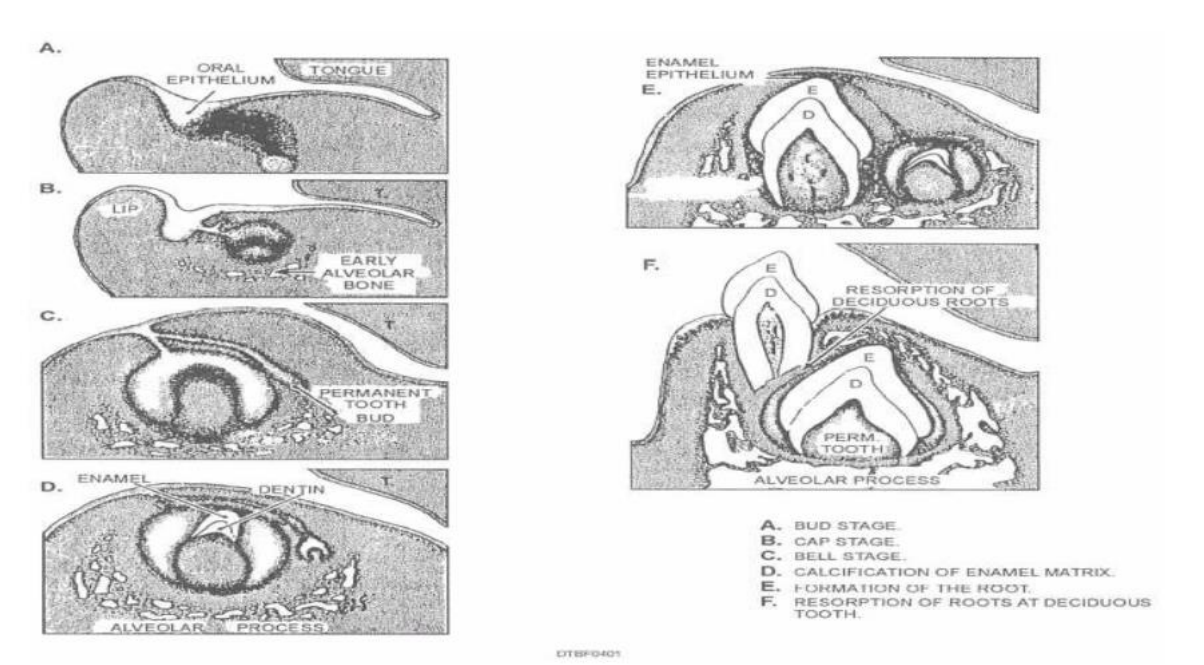



- Abnormalities in the development of the tongue are rare but can often be seen in infants that have been diagnosed with Downs Syndrome.
- Ankyloglossia, more commonly known as tongue-tie, occurs when the frenulum is extended to the tip of the tongue and therefore inhibits normal movement and protrusion.
- Often the frenulum will stretch and correct itself, but the difficulty that occurs during breast feeding often leads to the necessity of surgical correction.
- Macroglossia, an unusually large tongue, is very uncommon.
- In some cases, normal sized tongues appear large because there is underdevelopment of the mandible.
- Even more rare is microglossia, an extremely small tongue, which can also be the result of abnormal jaw formation.
- Both of these abnormalities may lead to difficulty with speech and swallowing.

## Tooth Formation:

- By the fifth week of development a horseshoe-shaped band of thickened epithelium forms on the maxillary and mandibular bones.
- These are essentially the primordial dental arches.
- The dental lamina forms and development of the teeth occurs in three distinct phases based on the characteristics of the developing teeth, the bud, bell and cap stages.
- Ectoderm and mesoderm give rise to the teeth.
- Enamel is derived from the ectoderm.
- The mesoderm forms the dentin and the pulp.
- All of the teeth do not develop at the same time and formation of the dentition continues long after birth.
- Around week six of development, tooth formation begins when the thickened epithelium invaginates into the mesoderm and produces tooth buds that look like small swellings.
- Each tooth develops from its own individual bud.
- The deciduous teeth, or those that will be lost before adulthood, grow into the mesenchyme.
- This ectoderm also gives rise to tooth buds that will form the permanent dentition.
- During the cap stage, the dental papilla form as invaginations that “gives the developing tooth a caplike appearance”.
- The cells begin to condense so that a thick grouping of cells forms and provides density.
- The dental papilla, formed from the mesoderm, becomes the dentin and dental pulp and the enamel organ, derived from the ectoderm, forms on the outer layer so that enamel can be produced.
- The enamel organ rests upon the top of the dental papilla like a cap.
- It is at this time that histodifferentiation occurs and the different elements of the tooth and surrounding tissue become distinct.
- Glycosaminoglycans play an important role in this stage because they are “hydrophilic and so pull water off the enamel”.
- They also give rigidity to the developing tooth structure.
- Both ectoderm and endoderm are needed for tooth formation to occur.
- In the bell stage, invagination continues, and this allows the tooth to begin to take its mature shape.
- Odontoblasts begin to produce predentin which will calcify and become dentin.

- The enamel will eventually form from ameloblasts over this layer starting at the cusp of the tooth and moving down to the root.
- The crown of the tooth will begin to take shape and the teeth will differentiate into their specific types.
- After the dentin and enamel have become well formed the root of the tooth will begin to develop.
- The epithelial root sheath is where the inner and outer dental epithelial layers come together at the apex of the tooth and this area initiates root formation.
- Odontoblasts continue to form dentin which is a continuation of the crown and grows down to form the root canal where the blood vessels and nerves can enter the tooth.
- Cementum, produced by cementoblasts, covers the dentin of the root and bone forms around each of the teeth to hold them in place in the jaw.




- It is at this time that tooth abnormalities may occur in the shape or number of the teeth. If an individual does not grow a sufficient number of tooth buds this will result in a missing tooth and if an extra bud forms then they will have more than the normal number of teeth.
- Enamel hypoplasia is caused by a defect in the enamel that results in pits and grooves in the crowns of the teeth.
- This occurs when there is a disruption of the ameloblasts during enamel formation that can be caused by such factors as an infectious disease or a nutritional deficiency.

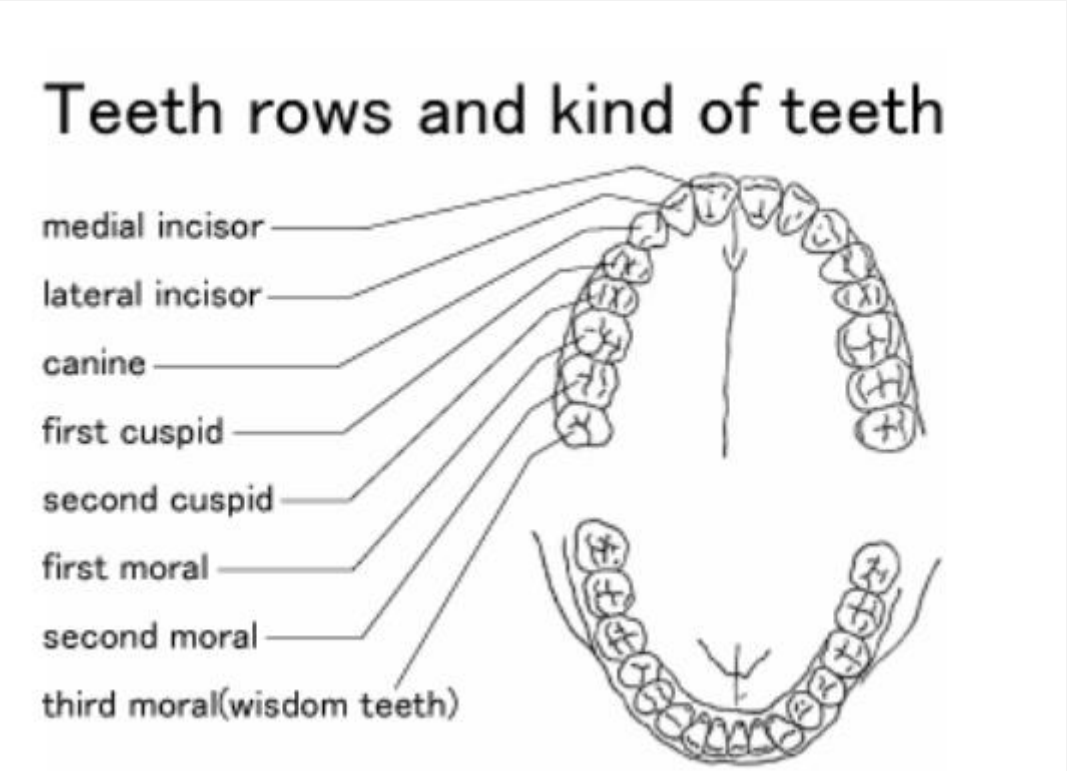
- Other deformations of the crown include pearls, or small circular masses of enamel, irregular and unsmooth crown surfaces and double crowns.
- The roots can also become divided, distorted or fused.
- Rickets, a vitamin D deficiency generally related to bone health, can cause the "disturbance of ossification" and greatly affect permanent tooth development. Individuals may also develop Dentinogenesis Imperfecta, or the genetic discoloration of the teeth from a brown to a gray blue.
- This enamel is much more susceptible to wear, exposing the underlying dentin, making the teeth less strong.
- Even though teeth do not begin to erupt until six to eight months after birth, they begin to move toward the exterior as soon as development begins.
- Generally, the mandibular teeth erupt before the maxillary teeth and this occurs earlier in girls than in boys.
- Teething is often painful for small children because in order for eruption to occur the tooth must break through the epithelial lining of the mucosa of the oral cavity. The primary dentition usually consists of twenty teeth that will be exfoliated starting around age six when the permanent teeth begin to erupt.
- It is extremely important that these newly erupted teeth are well-cared for because they should last the entire adult lifetime.

⇒ Tooth Eruption Chart for Primary Teeth: Upper Teeth

| Tooth | Dental Name | Eruption Age | Root Fully Formed |
|---|---|---|---|
| A | Central Incisor | 7-9 Months | 20-22 Months |
| B | Lateral Incisor | 7-9 Months | 20-22 Months |
| C | Canine | 17-22 Months | 30-35 Months |
| D | First Molar | 12-17 Months | 27-32 Months |
| E | Second Molar | 24-33 Months | 38-48 Months |

⇒ Tooth Eruption Chart for Primary Teeth: Lower Teeth

| Tooth | Dental Name | Eruption Age | Root Fully Formed |
|---|---|---|---|
| A | Central Incisor | 6-8 Months | 18-20 Months |
| B | Lateral Incisor | 7-9 Months | 20-22 Months |
| C | Canine | 17-22 Months | 30-35 Months |
| D | First Molar | 12-17 Months | 27-32 Months |
| E | Second Molar | 24-36 Months | 38-48 Months |




- The formation of the tissues surrounding the teeth is also very important for the development of the root.
- The tissue arises from the dental follicle and will differentiate when the “root sheet fragments and ectomesenchymal cells of the dental follicle penetrate between the epithelial fenestrations and become opposed to the newly formed dentin of the root”.
- Some cells become cementum-forming cells on the tooth root surface, and some will take part in the mineralized organic matrix of supporting bone.
- Periodontal ligament fibers insert into both cementum and supporting bone to anchor the teeth into the arches.

The End