



Cleft Lip and Palate: The Effects on Speech and Resonance

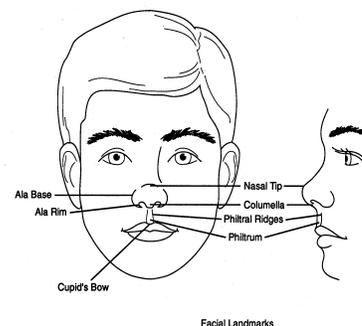
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Cleft lip and/or palate can have a negative impact on both speech and resonance. The following is a summary of normal anatomy, the types and causes of clefts, and the effects on speech and resonance.

Normal Anatomy

Nose

- **Columella** - the column that separates the nostrils and holds up the nasal tip
- **Ala base** - the base of the nostrils
- **Ala rim** - the rim of the nostrils
- **Philtrum** - the depression on the upper lip under the columella
- **Philtral ridges** – embryological suture lines above the lip that border the philtrum

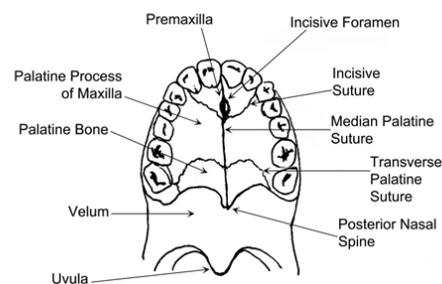


Lip

- **Cupid's Bow** - the shape of the upper lip
- **White Roll** - border of the red part of the lips
- **Vermilion** - the red part of the lip

Hard Palate - consists of the premaxilla, the maxilla proper and the palatine bone.

- **Premaxilla** - triangular structure in the middle anterior portion of the palate. It is bordered by the incisive foramen and bilateral incisive structures, which extend between the lateral incisors and canines.
- **Palatine Process of Maxilla** - horizontal plates starting at the alveolar process, and bordered by the incisive sutures and the transverse palatine suture.
- **Palatine Bone** - horizontal plate which is bordered by the transverse palatine suture and completes the hard palate posteriorly.



Velum (Soft Palate) - muscular portion of palate which is attached to the posterior edge of the palatine bone.

Cleft Lip/Palate (CLP): Types and Causes

Primary Palate (also called pre-palate or intermaxillary segment)

- Anterior to the incisive foramen and includes lip and alveolus
- Clefts can be:
 - complete (thru the lip and alveolus to the incisive foramen) or incomplete (i.e., lip only)
 - unilateral or bilateral

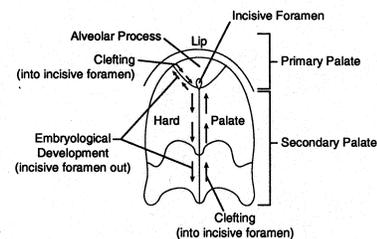
Secondary Palate

- Posterior to the incisive foramen and includes hard and soft palate
- Clefts can be:
 - complete (including the hard palate to the incisive foramen), incomplete (e.g., a portion of the velum only) or a submucous cleft

Embryology

- Primary Palate- lip and alveolus - 7 wks gestation
- Secondary Palate- hard and soft palate - 9 wks gestation

Embryological development goes from the incisive foramen out to the lip and then from the incisive foramen out to the uvula. Clefting occurs from the lip or end of the uvula in to the incisive foramen. Development of the lip and palate occurs independently.



Sequence of Palatal Closure

- Mandible grows forward
- Tongue drops down and goes forward
- Palatal shelves move from vertical to horizontal and begin to close at the incisive foramen

Pierre Robin Sequence (pronounced Robann)

- Micrognathia is the underlying cause:
 - Can be due to mechanical forces in utero
 - Can be part of a syndrome
- **Sequence:**
 - Micrognathia (small jaw) which causes...
 - Glossoptosis (posterior tongue position) which causes...
 - Wide bell-shaped cleft palate



Submucous Cleft:

Some or all of the following:

- Bifid or hypoplastic uvula
- Zona pellucida (thin, bluish area)
- Notch in the posterior border of the hard palate
- Abnormal insertion of muscles, causing an upside-down V-shape with phonation



Causes of Clefts

Cause is usually multi-factorial (genetic predisposition and environmental factors)

- Genetic factors
 - Environmental teratogens: maternal nutritional deficiencies or metabolic imbalance; infections (rubella or CMV); drugs (Valium, Dilantin); environmental toxins; radiation
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Effects of Cleft Lip and Palate on Speech

Basic Principles

- Whenever there are abnormalities on the *outside* of the head (face and/or skull)... always look for corresponding *structural abnormalities* on the *inside* of the head.
- Whenever there are abnormalities on the *inside* of the head (face and/or skull)... always look for corresponding *functional abnormalities*.
- Outside anomalies: Typically affect appearance and aesthetics
- Inside anomalies: Typically affect function (cognition, language, speech, resonance, hearing, feeding, and swallowing)
- Structural anomalies can affect speech by causing:
 - Obligatory distortions:
 - Function (articulation placement) is normal
 - Speech distortion is due to abnormal structure only
 - Treatment: Correct structure
 - Examples: Lateral lisp, despite normal tongue position, due to interference of maxillary teeth; hypernasality due to velopharyngeal insufficiency
 - Compensatory errors:
 - Function (articulation placement) is abnormal
 - Articulation placement is altered in response to structural abnormality
 - Treatment: Correct structure and then speech therapy to correct function
 - Examples: Lateral lisp due to abnormal tongue position to avoid interference of maxillary teeth; pharyngeal fricatives to compensate for VPI

The main causes of defective speech following a history of cleft lip/palate are as follows:

Primary Palate Clefts

- Short upper lip
 - May be relative due to position of premaxilla, due to dysmorphology or the repair
 - Affects bilabial competence at rest and production of bilabial phonemes
- Nasal deformities
 - Include deviated septum, nasal cavity blockage, choanal atresia, and stenotic naris
 - Can cause hyponasality or cul-de-sac resonance

- Dental/occlusal abnormalities
 - Dental abnormalities: Missing teeth in the line of the cleft, supernumerary or malpositioned teeth, anterior or posterior crossbite
 - Malocclusions: Open bite, protruding premaxilla, Class II or Class III malocclusion
 - Can cause palatal-dorsal productions for anterior sounds
 - Particularly affect articulation of sibilants (/s/, /z/, /ʃ/, /ʒ/, /tʃ/, /dʒ/)
 - Can affect labio-dentals (f, v), lingual-alveolars (t, d, n, l), or even bilabials (p, b, m)
 - Speech may include obligatory distortions (due to abnormal structure) or compensatory errors (abnormal structure and function). Obligatory distortions cannot be corrected with speech therapy!!!

Small Oral Cavity Size

- Low, flat or narrow arch can cause oral crowding
- When there is crowding, the tongue will seek an opening and affect articulation
- A small cavity size can also cause cul-de-sac resonance (which sounds like mumbling)

Effect of an Oronasal Fistula

- Size: Larger are more symptomatic.
 - If large enough, can cause hypernasality, nasal emission and compensatory articulation
- Location: Above tongue tip will be symptomatic for tongue-tip sounds

Maxillary Retrusion/ Midface Deficiency

- Can restrict the pharyngeal and nasal airway
- May cause hyponasality

Hearing Loss

Normal middle ear function

- At rest, Eustachian tube is closed
- During swallowing, the tensor veli palatini muscle opens the Eustachian tube to release negative pressure and allow fluids to drain

With cleft palate

- Tensor veli palatini muscle is abnormal, so tube doesn't open
- Negative pressure builds and fluids can't drain out
- Causes temporary (conductive) hearing loss
- Can affect articulation and language development in the short term

Treatment of middle ear disease

- Insertion of PE (pressure equalizing) tubes
- Regular otologic (ear) care

Velopharyngeal Dysfunction: See other handout.