



Cleft Lip and Palate: The Effects on Speech and Resonance

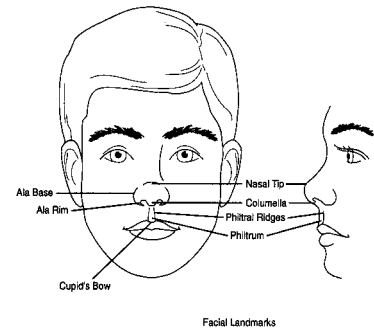
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Cleft lip and/or palate can have a negative impact on both speech and resonance. The following is a summary of normal anatomy, the types and causes of clefts, and the effects on speech and resonance.

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

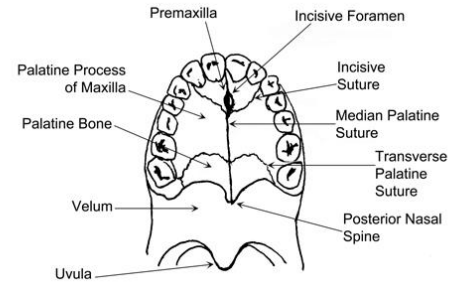
- Cupid's Bow - the shape of the upper lip
- White Roll - border of the red part of the lips
- Vermilion - the red part of the lip

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)

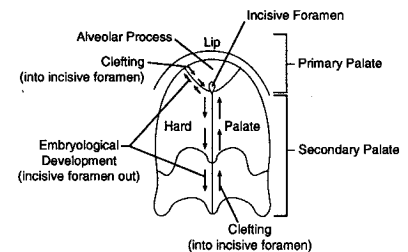
- Anterior to the incisive foramen and includes lip and alveolus
- Clefts can be:
 - complete (thru the lip and alveolus to the incisive foramen) or incomplete (i.e., lip only)
 - unilateral or bilateral

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 (i.e., 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 to the uvula; clefting occurs from the perimeter (the lip or end of the uvula) in to the incisive foramen. Development occurs independently.

Sequence of Palatal Closure

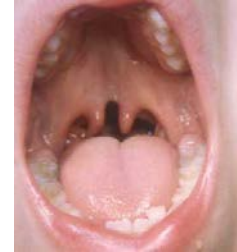
- Mandible grows forward
- Tongue drops down and goes forward
- Palatal shelves move from vertical to horizontal and begin to close at the incisive foramen



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 (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

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, swallowing, etc.)
- 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

- Nasal deformities
 - Include deviated septum, nasal cavity blockage, choanal atresia, and stenotic naris
 - Can cause hyponasality or cul-de-sac resonance
- 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
- 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); 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.

For more information, see chapter entitled **Clefts of the Lip and Palate** in the following text:

Kummer, A. W. (2020). *Cleft Palate and Craniofacial Conditions: A Comprehensive Guide to Clinical Management*, 4th edition. Burlington, MA: Jones & Bartlett Learning. (Available online and in print in September, 2018)