



SPECIAL INTEREST GROUP 5

Craniofacial and Velopharyngeal Disorders

Evaluation of Speech Disorders Associated with Cleft Palate and Velopharyngeal Dysfunction

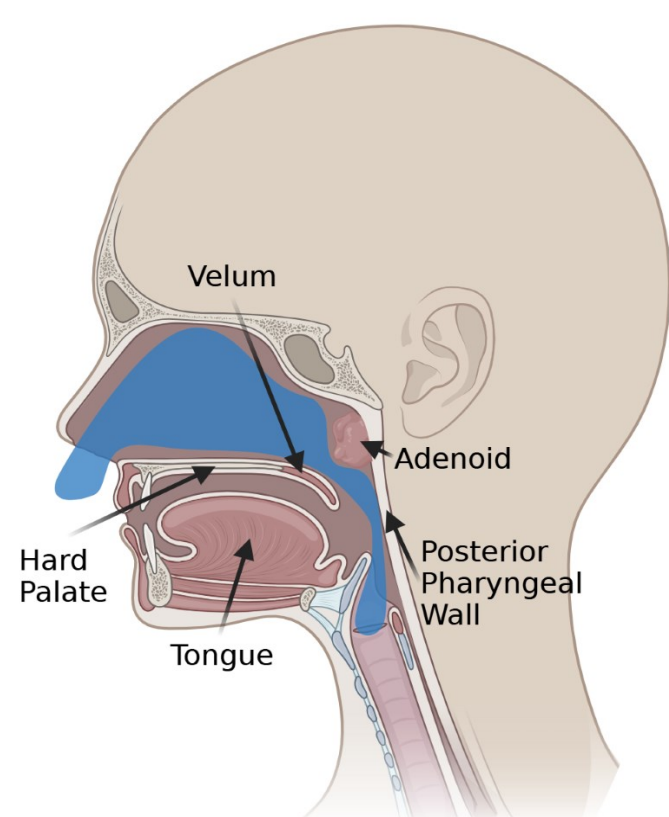
Abstract

ASHA SIG 5 offers this poster as a practical review of assessment and management approaches for speech disorders associated with cleft palate and/or velopharyngeal dysfunction (VPD). Causes of VPD are outlined and types of resonance disorders are described. This poster focuses on differential diagnosis and management algorithms for addressing articulation and resonance disorders in children with repaired cleft palate and/or suspected VPD. Collaboration between the community SLP and the Cleft Palate or VPD Team is emphasized.

Velopharyngeal Mechanism

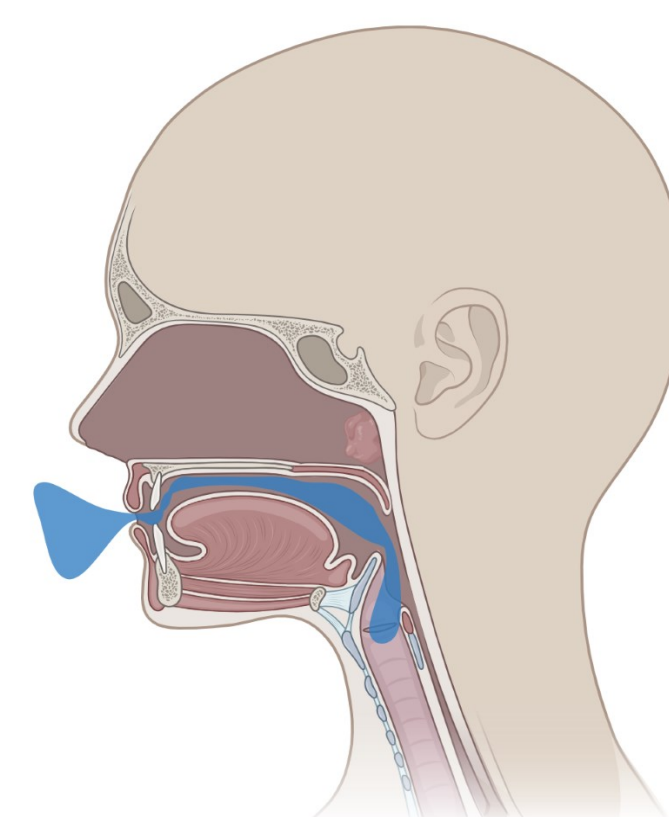
Velopharyngeal Function

- ✓The velopharyngeal mechanism is a muscular valve that is made up of the soft palate (velum), the lateral and posterior pharyngeal walls.
- ✓Contraction of the muscles within these structures provide velopharyngeal closure that is needed for speech and swallowing.
- ✓During nasal consonant production, at rest and during nasal breathing, the velum is maintained in a lowered position (Figure 1).
- ✓When a speaker produces oral pressure consonants (e.g., /p, t, s/etc.), the velum elevates to create a tight seal to close off the nasal cavity above, thus directing airflow out of the mouth (Figure 2).



Nasal Airflow

Figure 1. VP mechanism at rest during nasal breathing and Production of nasal phonemes



Oral Airflow

Figure 2. VP mechanism during normal oral speech production.

Velopharyngeal Dysfunction

- ✓**Velopharyngeal dysfunction (VPD)** is failure of the velopharyngeal mechanism to achieve consistent and complete closure during oral speech tasks. This umbrella term includes velopharyngeal insufficiency, incompetence, and mislearning.
- ✓If the velum does NOT elevate properly, hypernasality and/or nasal air emission/escape can occur.

Symptoms of VPD at Various Ages

- ✓**Perinatal/Infancy:** Nasal regurgitation or difficulty feeding, as a precursor to speech difficulties
- ✓**12 months/First Word:** Uses only nasal sounds (m, n, ŋ) and vowels; limited consonant inventory
- ✓**School age/Connected speech:** Hypernasality, nasal air emission; and/or possibly compensatory (AKA "active") articulation errors

Speech & Resonance Characteristics

Normal resonance is based on having an appropriate balance of sound in the oral and nasal cavities during speech. When there is an imbalance in resonance, this results in a **resonance disorder**:

- **Hypernasality:** excessive nasal resonance on vowels and voiced sounds; associated with VPD
- **Hyponasality:** too little nasal resonance on /m/, /n/, and /ŋ/; associated with nasal obstruction
- **Cul-De-Sac resonance:** a muffled quality resulting from anatomic differences within the vocal tract
- **Mixed resonance:** a combination of hyper- and hyponasality

Obligatory Features (ie "passive" errors)

(Resonance Disorder → Refer to Cleft Palate Team and/or Consider VP Imaging)

- ✓Hypernasality/Hyponasality
- ✓Audible nasal air emission (abnormal escape of airflow through the nose during speech, due to a structural cause).
- ✓Weak pressure consonants (high pressure consonants have reduced intraoral pressure and intensity).

Compensatory Articulation Errors (ie "active" errors)

(Speech Sound Disorder → Initiate Speech Therapy)

- ✓Using the velopharyngeal mechanism in an atypical way by valving airflow outside the oral cavity
- ✓Common: Glottal stops, pharyngeal stops, nasal fricatives, pharyngeal fricatives, nasal substitutions
- ✓See associated **SIG 5 handout** for detailed descriptions of each compensatory error.
- ✓Other types of articulation or phonological errors may also be present, as well as distortions secondary to dental malocclusion.

Assessment

Assessment Protocol:

- 1.Perceptual Judgments:** Uses perceptual scales to rate resonance, nasal air emission, oral pressure, speech acceptability/intelligibility.
 - 2.Clinical Assessment of VP Function:** Uses low-tech tools to assess air escape and velopharyngeal function (straw, nasal mirror, nasal occlusion, or See-Scope).
 - 3.Articulation Evaluation:** Uses spontaneous connected speech and a structured speech sample to identify & transcribe compensatory articulation errors, developmental errors, and obligatory errors related to anatomy/structure.
 - 4.Oral Exam:** Evaluates the lips, tongue, jaw, palate, and dentition. Checks for presence of fistulae, submucous cleft (bifid uvula, bony notch at the junction of the hard and soft palate, zona pellucida, or tenting during phonation). Note that scarring related to surgical history may be present.
 - 5.Instrumentation:** * Uses the Nasometer to measure the relative amount of oral and nasal sound intensity during speech. Pressure flow techniques can also quantify air leakage through the nose with high pressure consonants.
 - 6.Imaging:** * Uses nasopharyngoscopy, video fluoroscopy, and/or MRI to quantify and visualize velopharyngeal closure, size of velopharyngeal opening/nasopharynx, pattern of closure, consistency of velopharyngeal closure, and adenoid/tonsillar tissue.
- *Delineates procedures in which specialized equipment from the cleft or VPD team is needed.



A. Use of a nasal mirror to assess nasal air escape.



B. The oral exam (see bifid uvula).

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*For more information, reference the SIG 5 Poster & Handout for Therapy Techniques for Speech Sound Disorders Associated with Repaired Cleft Palate

Differential Diagnosis

Velopharyngeal Insufficiency – consistent across phonemes, articulator placement IS accurate, surgical intervention is needed

- ✓ Vowels - listen for hypernasality on all vowels or high vowels /i/ and /u/
 - Use nasal flutter testing- have child sustain vowels while opening and closing the nose to listen for resonance shift
- ✓ Oral pressure consonants – listen for hypernasality, nasal air emissions, weak oral pressure build-up
 - Use nasal mirror to look for consistent "fogging" or air on the mirror during production of oral pressure sounds; listen with straw up to the nose to hear leakage of air through the nose in productions of oral pressure sounds
 - Nasal occlusion – plug the nose to listen for improved intraoral pressure; sounds will be more clear with nares occluded if VPI is present

Velopharyngeal Mislearning – inconsistent across phonemes (ie phoneme specific nasal emissions), articulator placement and/or airflow direction is NOT accurate, speech therapy is needed

- ✓ Child is producing sounds in the throat or pushing air through the nose (see compensatory articulation error description)
- ✓ "Fogging" of a nasal mirror or air heard through listening tube only present during errored oral phonemes and not present for other correctly articulated oral phonemes
- ✓ Nasal occlusion results in sound "stopping" or becoming trapped in the nasal cavity – indicative of nasal fricative substitutions AKA phoneme specific nasal emissions

VP Insufficiency and VP mislearning CAN co-occur

Diagnostic Considerations:

- ✓Nasal congestion or dysphonia can mask VPD
- ✓Child must be behaviorally mature enough and have an adequate speech sample of correctly articulated pressure sounds to participate in VPD imaging (if indicated) - typically at least 3 years of age
- ✓Limited correctly articulated speech or low spoken output may inhibit differential diagnosis. Progress in speech therapy may be necessary before re-evaluation.
- ✓Some compensatory articulation errors such as glottal stops will not sound different with nares occluded.

Velopharyngeal Dysfunction

Velopharyngeal Insufficiency	Velopharyngeal Incompetence	Velopharyngeal Mislearning
Due to structural differences, generally managed with physical alterations (i.e. surgical or prosthetic)	Due to neuromotor or motor speech, management may be surgical, prosthetic, or speech therapy	Learned behavior, typically managed with speech therapy
Potential diagnoses include: cleft palate, residual VPI s/p cleft repair, idiopathic, adenoidectomy, nasopharyngeal tumor removal	Potential diagnoses include: TBI, stroke, Cerebral Palsy, Dysarthria, or Apraxia of Speech	Potential diagnoses include: profound hearing loss, phoneme specific nasal emissions, or compensatory articulation errors

Referral & Intervention Hierarchy

