SPEECH THERAPY TECHNIQUES:

For Errors due to cleft Lip/Palate or Velopharyngeal Dysfunction

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Velopharyngeal dysfunction (VPD) refers to a condition where the velopharyngeal valve does not close consistently and/or completely during the production of oral sounds. There are three types of VPD:

- *Velopharyngeal insufficiency (VPI)* is used to describe an anatomical or structural defect that prevents adequate velopharyngeal closure. Velopharyngeal insufficiency is the most common type of VPD because it includes a short or abnormal velum, which occurs in children with a history of cleft palate or submucous cleft.
- *Velopharyngeal incompetence (VPI)* refers to a neurophysiological disorder which results in poor movement of the velopharyngeal structures. This is common in individuals with dysarthria due to cortical damage or velar paresis due to cranial nerve damage.
- *Velopharyngeal mislearning* refers to the substitution of pharyngeal sounds or nasal sounds for specific oral sounds, resulting in phoneme-specific nasal emission or phoneme-specific hypernasality.

Children with VPI may demonstrate *hypernasality* (too much *sound* in the nasal cavity on vowels and voiced consonants), *nasal emission* (leakage of *air* during consonant production, particularly voiceless sounds), and *compensatory* articulation *productions* (abnormal *articulation productions in the pharynx* to compensate for a lack of adequate oral airflow). Children with velopharyngeal mislearning may produce pharyngeal sounds as a substitute for oral sounds (even without a history of VPI). This placement causes nasal emission. Differential diagnosis is very important in order to determine appropriate treatment. VPI (both types) requires physical management (i.e., surgery or a prosthetic device, if surgery is not an option) and possibly speech therapy for correction of compensatory productions postoperatively. Velopharyngeal mislearning (including the continual use of compensatory productions after surgical correction of VPI) requires speech therapy.

INDICATIONS FOR SPEECH THERAPY

- Speech therapy cannot change abnormal structure and therefore, cannot correct hypernasality or nasal emission due to VPI— even if there is only a small gap!
- Speech therapy is NOT effective for children who have VPI that causes significant nasal emission. Surgical correction of the velopharyngeal valve should be done first.
- Speech therapy can correct placement errors (abnormal function) that cause nasal emission or hypernasality, including the following:

- Phoneme-specific nasal emission or hypernasality following surgery for VPI or due to mislearning (abnormal articulation) only
- Hypernasality or variable resonance due to apraxia

ENHANCING AUDITORY FEEDBACK

After surgery for VPI, the child may continue to use compensatory productions, which result in continued nasal emission. In therapy, begin with awareness of the abnormal production versus the target sound. Give as many clues as possible using visual, tactile, and auditory feedback. Contrasts between the correct and incorrect sound should always be done.

Auditory feedback to the child can be amplified by sending the sound through a tube. Amplification can be done with a stethoscope (with the drum removed), a simple tube, or even a bending straw. The Oral & Nasal Listener1 (ONL) ™ is a particularly helpful tool because it allows both the speech-language pathologist (SLP) and the child to hear the sound at the same time and at the same volume. The ONL is also effective for home practice because it allows the parent and the child to easily distinguish normal from abnormal productions.

Feedback for hypernasality or nasal emission:

- Have the child put one end of the tube or straw in a nostril and the other end in or near his ear. Have him produce an oral sound in a syllable. If there is hypernasality or nasal emission, it will be heard loudly through the tube. Ask the child to try to reduce or eliminate the sound coming through the tube as he produces oral sounds and then words with oral sounds.
- Have the child alternately pinch and open his nose during production of the sound. Have the child try to produce the sound so that there is no difference in sound between the productions.



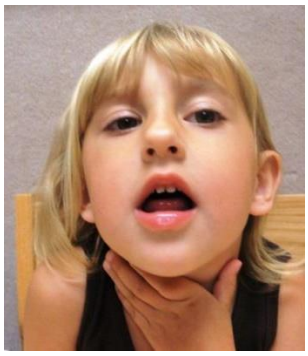
Feedback for oral and anterior airflow:

- Place a straw at the point of your own central incisors during production of a /t/ or an /s/ sound. Have the child listen to the sound of the airflow through the straw.
- Have the child put a straw in front of his incisors and try to push the air through the straw during production of a /t/ sound. Then, have the child produce the /t/ with the teeth closed to produce a /tsss/. Make sure he hears the air through the straw.
- Put the funnel of the ONL in front of the child's mouth to provide feedback about oral resonance and oral airflow.


SPECIFIC THERAPY TECHNIQUES TO ACHIEVE NORMAL PLACEMENT

Glottal Stop

A glottal stop is a grunt sound that is produced by bringing the vocal cords together and then releasing them suddenly. A glottal stop can be used as a substitution, or it can be co-articulated with oral sounds, particularly plosives. It often occurs as a compensation for velopharyngeal insufficiency (VPI).



- While in front of a mirror, have the child watch the contraction in his neck when producing the glottal stop on /b/ versus an /m/sound.
- Have the child place his hand on his neck during the productions of a glottal stop to feel the "jerk" versus the smooth voice onset during production of a vowel of the /m/ sound.

1. Have the child produce isolated voiceless plosives (/p, t, k/)—without the vowel—while feeling his neck and while watching in a mirror. (For voiceless sounds, the glottal stop does not occur until transition to the vowel.)
2. Have the child produce the voiceless plosive /p/ and then a vowel preceded by an /h/. For example, /p…hɑ/ for /pɑ/ and /p…ho/ for /po/. This keeps the vocal folds open during transition from the consonant to the vowel and prevents the production of the glottal stop. Gradually, decrease the transition time from the consonant to the vowel until the syllable is produced normally without the glottal stop.
3. Once voiceless consonants are produced, move to voiced plosives (/b, d, g/). Have the child produce the voiced sound slowly with a breathy voice. Gradually add "smooth" voicing and transition to the vowel with an inserted /h/. Have the child watch or feel his neck for feedback.

Nasalized Vowels or ŋ /l Substitution

Nasalized plosives or vowels can persist after surgical correction of VPI. Nasalized vowels can also occur in children with no history of VPI. This is usually due to an abnormally high posterior tongue position during production of high vowels, particularly /i/ (as in "feet"). This faulty articulation placement causes "phoneme-specific" hypernasality. In addition, some children have phoneme-specific hypernasality due to substitution of ŋ/l. The nasal for oral sound makes connected speech sound hypernasal.

1. Ask the child to produce a big yawn, which pushes the back of the tongue down and the velum (soft palate) up. Make him aware of the stretch in the back of his mouth.
2. Have the child co-articulate the nasalized sound (vowel or /l/) with the yawn, while feeling the stretch in the back of the mouth.
3. Gradually decrease the size of the yawn.
4. Enhance the child's auditory feedback of oral versus nasal productions by using a tube, straw, or Oral & Nasal Listener (Super Duper Publications). On end of the tube goes in the child's nostril and the other near his ear. He should hear no sound through the tube on oral sounds.

Nasalized /ə˞/

The final /ə˞/ sound is a continuant sound that is produced by articulating the sides of the back of the tongue against the gum under or behind the molars. The mid portion of the tongue forms a

boat-like shape through which sound enters and resonates. If the child raises the entire back of the tongue, the sound becomes an ŋ/ə˞, which is a nasal substitution for an oral sound. (Other children do not raise the back of the tongue, resulting in an /ʌ/ sound.)

1. Using your hand, show the child how the shape of the tongue forms a "boat" when producing final /ə˞/. Note that the back of the tongue has to touch the gums behind the back teeth.
2. With a tongue blade, stimulate both sides of the tongue towards the back. Then stimulate the upper gum ridge behind the molars. Tell the child that these come together for /ə˞/.
3. Ask the child to make a wide smile while "backing up the boat" to make the tongue touch the upper gums on each side.
4. Assist the child with posterior tongue elevation by pushing up against the base of the chin with your middle finger while squeezing his cheeks with your thumb and forefinger. If you feel his tongue push down under the chin, have him relax it so you can push it up.
5. If the child continues to raise the entire back of the tongue for /ə˞/resulting in an /ŋ/, have him close his nose during production. That will make the /ŋ/sound impossible to produce.
6. Once final /ə˞/ is established, show the child how the tongue tip moves forward for initial /r/. Have the child put his hands on his face while producing the /r/. Tell him to move his tongue forward, but not move his face or lips.

Pharyngeal Plosives

Pharyngeal plosives are produced with the back of the tongue against the pharynx and are usually substituted for velars (k/g). They are (The following technique is effective in establishing /k/ and /g/ in other cases as well.)

1. Establish placement for velar plosives (/k, g/) by starting with an /ŋ/. If the child can't produce an /ŋ/, put a tongue blade on the middle of the tongue and push down and back OR firmly press your thumb under the base of the child's chin to push the back of the tongue up while he is producing the /ʌ/ vowel.
2. Once /ŋ/ placement is established, have the child achieve the position and then drop the tongue. Work on the up and down movement of the back of the tongue to replace the back and forth movement which occurs with the pharyngeal plosive.
3. Have the child take a breath and place his tongue in an /ŋ/ position. Have him hold and then drop the tongue. This will produce a /g/ sound. If necessary, pinch his nose closed during the child's effort.
4. Once the child can produce the /g/, have him whisper to produce the /k/.

Phoneme-Specific Nasal Emission (PSNE)

Phoneme-specific nasal emission (PSNE) is the result of the use of a pharyngeal or posterior nasal fricative as a substitution for sibilants (most commonly /s/) and rarely for labiodentals (/f, v/). Because of its production in the pharynx, the velopharyngeal valve must open to allow the release of the airflow, which causes the nasal emission. PSNE can be a compensatory production for VPI (and remain after surgical correction), or it can be a learned misarticulation. Regardless of the original cause, the methods for correction are the same.

1. Have the child produce the /s/ (or misarticulated sound) with the nostrils open and

then occluded to get the feel for the fact that there is nasal airflow.

2. Have the child produce a strong /t/ sound.
3. Then have the child produce the /t/ with the teeth closed. This will result in /ts/.
4. Have the child prolong the production until it becomes /tssss/.
5. Have the child note the position of the tongue and feel the airstream flowing over the tongue tip as he prolongs the production. Finally, eliminate the tongue tip movement for the /t/.
6. For /ʃ/, follow steps 1-4 with rounded lips. For /ʧ/, have the child produce a /t/ with the teeth closed and lips rounded. Transition to /ʤ/ by adding phonation.

Palatal-Dorsal Productions

Palatal-dorsal productions (AKA mid-dorsum palatal stops) can be substituted for lingual-alveolars (/t, d, n, l/) and velars (/k, g, ŋ/). This placement can also be used for sibilants, resulting in a lateral lisp. Palatal-dorsal productions are often compensatory errors as a result of dental crowding of the tongue tip. This can occur due to an anterior crossbite or Class III malocclusion. If that is the case, therapy should be delayed until after correction of the abnormal structure.

1. Have the child bite on a tongue blade so that it is between the canine or molar teeth. Make sure it is back far enough to depress the middle part of the tongue, which prevents a dorsal production.
2. Have the child produce lingual-alveolar sounds (/t, d, n/) in front of the tongue blade and velar sounds (/k, g, ŋ/) behind the tongue blade.

OR

1. Have the child achieve placement by producing the nasal cognate sound first (/n/ for lingual-alveolar placement and /ŋ/ for velar placement). Nasal sounds are easiest to produce because they are continuants.
2. Have the child work on achieving the nasal sound placement and then dropping the tongue to achieve the correct movement. This can be done silently at first and then have the child add the vowel.
3. Have the child take a deep breath, achieve that placement, hold it, and then release to produce the plosive. Pinch the nose closed if necessary to achieve the plosive sound.

Lateral Lisp

A lateral lisp on sibilants (/s, Z, ʃ, ʒ, ʧ, ʤ/) is the result of the tongue tip or dorsum of the tongue touching the alveolar ridge, teeth, or palate during production. This causes the airstream to be diverted laterally. A lateral lisp may be due to crowding of the tongue tip as a result of an anterior crossbite or Class III malocclusion. If that is the case, therapy should be delayed until after correction of the abnormal structure.

1. Place a straw at the front of your own closed incisors and produce an /s/. Have the child listen to the airstream as it goes through the straw.
2. Place a straw at the front of the child's closed incisors during production of the /s/ and note the lack of air stream through the straw.
3. Move the straw to the side of the child's dental arch during production of the /s/, and

find the place where the air stream can be heard through the straw.

4. Have the child put the straw at the front of his mouth and produce a /t/. Tell the child to push the air into the straw as he produces the sound. Then have him close his incisors and produce the /t/ with the straw at the front of his teeth while still directing the air into the straw. Finally, have him prolong the /t/ sound until it is a /tssss/.
5. Have the child feel the airflow over the tongue tip and hear the air through the straw.
6. Then have the child achieve that position and prolong the /s/ without using the /t/.
7. Transition to the syllable by inserting an /h/ between the /s/ and vowel. For example, "s… hay" for "say."
8. Once the /s/ is established, the same techniques can be used to achieve other sibilant sounds.

GENERAL PRINCIPLES

- **Do not use blowing exercises, sucking exercises, velar exercises or oral-motor exercises!** The problem is rarely muscle weakness and these exercises do not work!!!
- Use general articulation procedures to establish correct oral placement. In some cases, this may result in the establishment of oral airflow.
- Remember, motor learning is dependent on feedback. Motor memory is dependent on practice. Make sure the child practices frequently at home. Several short sessions each day works best. Success depends on the frequency and consistency of practice between sessions!
- If progress is not being made, discontinue therapy and refer the child to a ***craniofacial team*** (not a general ENT) for further evaluation of velopharyngeal function.

TIMETABLE FOR INTERVENTION

Ages 0–3: Concentrate on ***quantity*** (language)

- Home program with emphasis on language
- Start language therapy if indicated

Ages 3–4: Begin evaluating ***quality*** (speech and resonance)

- Evaluate speech and velopharyngeal function- Refer to a ***craniofacial specialist*** as needed.
- Start speech therapy or consider surgery as indicated

Goal of Treatment: Normal (not just "acceptable") speech and resonance

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Resources:

1. The Oral & Nasal Listener (ONL) by Super Duper®, Inc. www.superduperinc.com

2. Kummer AW. (2020). *Cleft Palate and Craniofacial Conditions: A Comprehensive Guide to Clinical Management, 4th Edition.* Burlington, MA: Jones & Bartlett Learning.
http://www.jblearning.com/catalog/9781284149104/

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