

VPI: Velopharyngeal Insufficiency and Incompetence

What is normal velopharyngeal function?

To understand velopharyngeal function, it is important to know about the structures in the mouth. **Figure 1** shows the structures of the roof of the mouth-- the hard palate and the soft palate. The soft palate is also called the velum. This figure also shows the tonsils, which are located toward the back of mouth on each side.

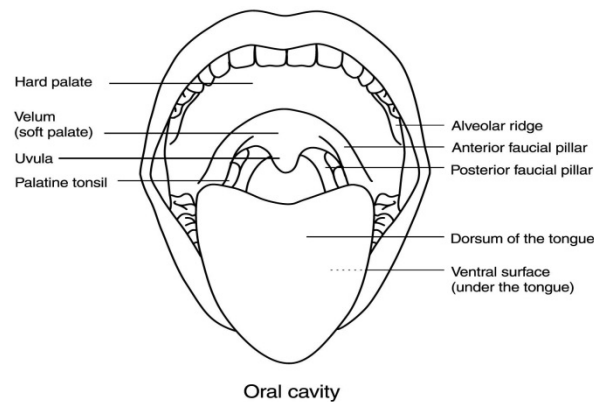


Figure 1

During normal speech, air from the lungs and sound from the vocal cords (in the larynx or “voice box”) travel upward in the throat (pharynx). In order to produce most speech sounds, the air and sound need to be directed into the mouth and blocked from entering the nasal cavity. This is done through closure of the “velopharyngeal valve.”

The velopharyngeal valve consists of the following structures:

- Velum (soft palate)
- Lateral pharyngeal walls -- side walls of the throat
- Posterior pharyngeal wall -- the back wall of the throat

Figure 2 shows the velum resting against the back of the tongue during normal nasal breathing. During inhalation, air can flow through the nose and pharynx down to the lungs without obstruction. Exhalation of carbon dioxide follows the same path in reverse.

Figure 3 shows how the velum raises to close against the posterior pharyngeal wall during speech. At the same time, the lateral pharyngeal walls (not shown in the diagram) move to close against the soft palate. This results in a sphincter-type closure. Velopharyngeal closure also occurs during swallowing, gagging, vomiting, sucking, blowing and whistling.

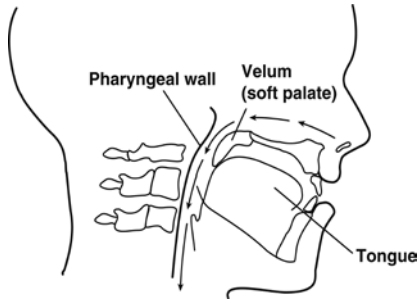


Figure 2

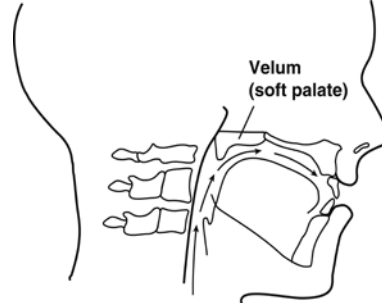


Figure 3

What is VPI?

Velopharyngeal dysfunction (VPD) is a general term. It is used to describe different disorders of the velopharyngeal valve, including velopharyngeal insufficiency (VPI), velopharyngeal incompetence (VPI) and velopharyngeal mislearning.

Figure 4 shows velopharyngeal insufficiency, which is caused by an abnormality of the structures. Velopharyngeal insufficiency is common in children with a history of cleft palate or a submucous (under the skin) cleft. Sometimes, subtle signs of a submucous cleft can be seen when looking in the mouth. However, the abnormality may only be visible by putting a scope in the nose and looking at the top side of the velum.

Velopharyngeal insufficiency can also occur after adenoidectomy, although the incidence is rare (about 1 in 2,500 cases). This is because the adenoids are right in the area of normal velopharyngeal closure. **Figure 5** shows the position of the adenoid pad in the throat.

Figure 6 shows velopharyngeal incompetence, which is caused by poor movement of the velopharyngeal structures. The inadequate movement of the velopharyngeal structures is usually due to a neurological disorder or injury (as in cerebral palsy or traumatic brain injury).

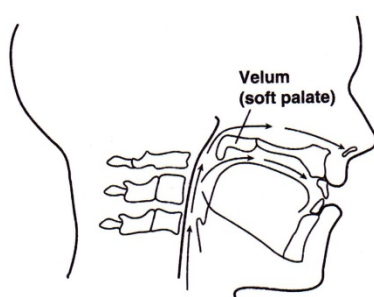


Figure 4

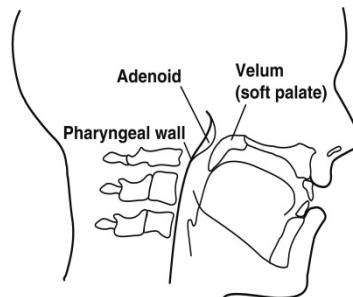


Figure 5

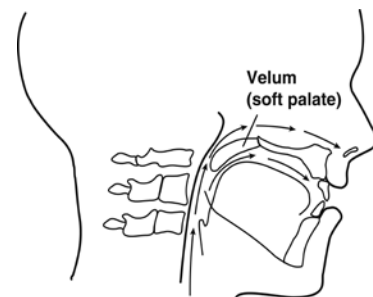


Figure 6

Some children have a form of velopharyngeal dysfunction called velopharyngeal mislearning. In this case, the velopharyngeal valve does not close appropriately during speech because the child has not learned to use it correctly.

How does velopharyngeal dysfunction affect speech?

Velopharyngeal dysfunction can cause the following speech characteristics:

- Hypernasality, which is too much sound in the nose during speech
- Nasal emission of air during consonant production
- Weak or omitted consonants due to inadequate air pressure in the mouth
- Short utterance length due to the loss of air pressure through the nasal cavity (nose)
- Compensatory articulation productions (speech sounds produced in a different way to compensate for the lack of air pressure in the mouth).

How is velopharyngeal dysfunction treated?

The treatment of a resonance disorder or velopharyngeal dysfunction depends on the type and cause of the problem. If the problem is due to velopharyngeal mis-learning, speech therapy alone will correct the abnormal speech. The treatment of velopharyngeal insufficiency or velopharyngeal incompetence usually requires a surgical procedure (tonsillectomy, pharyngeal flap, sphincter pharyngoplasty, or posterior pharyngeal wall implant). Prosthetic devices can also be used for VPI on a temporary or permanent basis in some cases.

Although surgery is usually needed for VPI, the surgery does not change the way the child has already learned to talk. Therefore, postoperative speech therapy is usually required to help the child learn how to use the corrected structure and produce sounds correctly.

If therapy is necessary, the speech pathologist on our team will advise the child's current therapist on effective methods of treatment. **Note:** Contrary to previous beliefs, blowing, sucking and oral-motor exercises are **not** effective in improving velopharyngeal closure or the abnormal resonance.

Websites on VPI Disorders

- Cincinnati Children's Hospital Medical Center – Resonance Disorders and Velopharyngeal Dysfunction:
<http://www.cincinnatichildrens.org/svc/alpha/v/vpi/about./resonance.htm>
- Cincinnati Children's Hospital Medical Center – Velopharyngeal Dysfunction:
<http://www.cincinnatichildrens.org/health/info/speech/diagnose/velopharyngeal.htm>
- Cleft Palate Foundation - Cleftline: <http://www.cleftline.org/>

What can parents do to help?

- Parents should be active members of the child's treatment team. They can help in the following ways:
- Follow-up on recommendations from the surgeon and speech-language pathologist.
- If surgery has been performed, the child may need to learn how to use his or her new structure. This is done through speech therapy.
- It is important that the parent and child work together in between therapy sessions on activities suggested by the speech pathologist.
- Several short practice sessions each day are the most effective in helping the child at home.