



# Treatment Options for Better Speech

**First Edition**

First Edition

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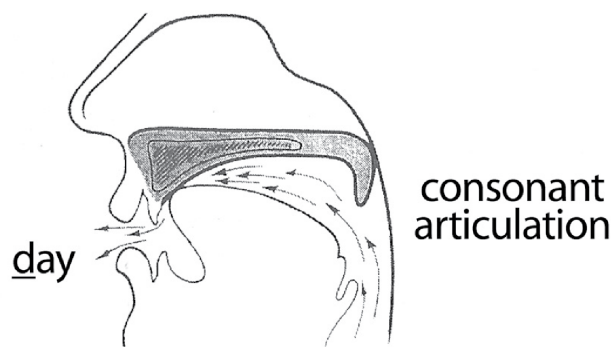
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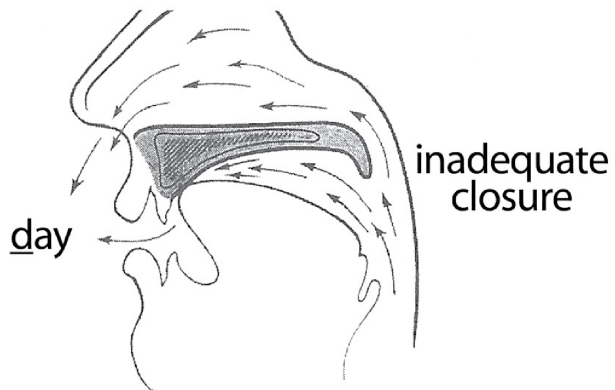
## Velopharyngeal Dysfunction

Velopharyngeal dysfunction (VPD) occurs when the opening between the soft palate and the back wall of the throat (velopharyngeal space) cannot close properly during speech. This problem results in unwanted escape of air or sound through the nose during speech. The word velopharyngeal comes from the words velum, or soft palate, and pharynx, or throat area. Approximately 15-25% of children born with cleft palate (with or without cleft lip) will develop VPD after palate repair. Your doctor or speech-language pathologist may also use the terms velopharyngeal insufficiency or inadequacy (VPI) to describe this problem, which may result in hypernasal speech.

Speech sounds are both nasal and oral. When we talk, some sounds are supposed to come through our noses, like the /m/ and /n/ sounds. You can feel the vibration in your nose when you say words like “mom” and “no.” Most other sounds are supposed to come only through our mouths. You should not feel the same vibration in your nose when you say words like “pop” and “cat.” It is the closure of the velopharyngeal space that allows us to build up air pressure in the mouth and make these consonant sounds (see Figure 1a). This closure occurs when the soft palate lifts up and back to contact the back of the throat, possibly with the walls of the throat moving in to meet it. People with VPD cannot close this space effectively and therefore have air coming through their noses when they should not (see Figure 1b).



**Figure 1a: Normal closure during the production of consonants.** A normal soft palate closes off the nose from the mouth and allows the build-up of pressure that is needed for normal profiction of many consonants.



**Figure 1b: Inadequate closure during th production fo consonants.** When closure is inadequate because of problesm with the soft palate, air comes out th nose, through the velopharyngeal space, and consonants become weak or disappear.

In general, VPD occurs for one of two reasons. First, if there isn’t enough tissue in the palate for the surgeon to use during palate repair, the repaired soft palate may be shorter than normal. As a result, the soft palate may be too short to make contact with the back wall of the upper throat (see Figure 1b).

Second, it is possible that the muscles that move the soft palate and walls of the upper throat are not able to function properly to move these structures far or fast enough to make the velopharyngeal space close when needed. In some instances, a combination of these factors can result in VPD.

## Diagnosis and Treatment

When someone’s speech sounds nasal, it usually means that VPD is present. However, in order to determine the cause of VPD, it is necessary to look at the velopharyngeal structures during speech. A video x-ray machine can allow doctors to view the velopharyngeal mechanism from the side and the front (videofluoroscopy). They can also use a narrow, flexible scope through the nostril to view the palate from above. This procedure is called video-endoscopy because the flexible scope is attached to a video camera.

Your cleft palate team may recommend that one or both of these procedures be done to help diagnose the problem. By viewing how the soft palate and walls of throat are working during speech, the cleft palate team

can determine, 1) whether a velopharyngeal gap is present, 2) the size and the location of the velopharyngeal gap, and 3) what structures are actually moving during speech. This information is important because it helps the cleft palate team determine how the VPD should be treated.

The purpose of treating VPD is to eliminate or significantly decrease hypernasality and excessive nasal air escape during speech. Surgical treatment can change the size and shape of the velopharyngeal space so that when your child speaks, air and sound will be directed out of the mouth rather than into the nose. Sometimes a small amount of nasality is still present after treatment, but perhaps not enough for most people to notice.

Children with VPD may try to compensate for their lack of velopharyngeal closure. In order to try to make speech sounds that other people make, they may use their throats or tongues in ways that actually make it more difficult to understand their speech. These speech patterns are often called compensatory articulations. Treating VPD will not automatically stop your child from making speech sounds incorrectly. Like any habit, it takes effort to change these speech patterns. Speech therapy can often help the child re-train his or her mouth to make speech sounds correctly, even before physical treatment of VPD.

## Surgical Options

You should consult with your cleft palate team about what surgical choices may be best for you or your child. The most common surgeries are described below.

### Lengthening the Soft Palate

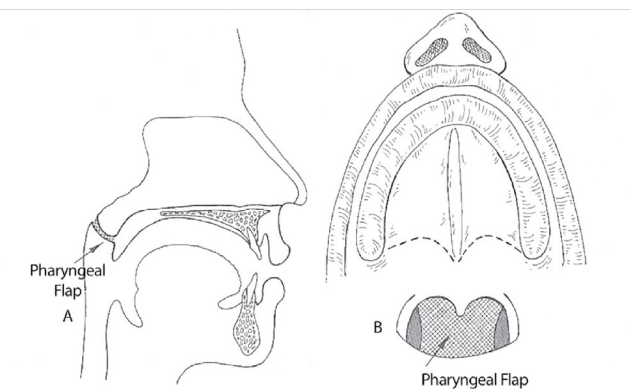
A lengthening procedure involves the surgeon re-operating on the soft palate. There are usually two situations in which this procedure may be selected. First, in some people the soft palate moves well but is slightly short. In this case, surgery involves making the soft palate longer so that when it moves, it can make contact with the back wall of the upper throat during speech. Second, in some people the muscle that moves the soft palate is not in the correct position. In this case, surgery involves repositioning the muscle so that the soft palate will move better while also lengthening the soft palate somewhat. With improved length and mobility, the soft palate should now make contact with the back wall of the upper throat.

### Pharyngeal Flap

During the pharyngeal flap procedure, the surgeon makes incisions in the back wall of the throat and creates a flap of tissue. The surgeon attaches the free end of the flap to

the soft palate. The result is a permanent bridge of tissue between the throat and the soft palate that helps reduce the velopharyngeal space (see Figure 2a). Ideally, the flap does not totally block the opening into the nose. A view of the pharyngeal flap from above (see Figure 2b) shows that there are openings, or ports, on either side that should allow a person to breathe through his or her nose.

This procedure tends to work best for patients who have good movement of the side walls of the upper throat, because it is this movement that closes the openings, or ports, during speech. During speech, the side walls of the upper throat move in and make contact with the flap on either side, thus closing off the velopharyngeal space. When not speaking, the side walls go back to the rest position.



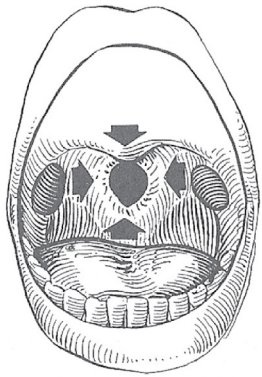
**Figure 2a & 2b: Pharyngeal flap surgery.** In pharyngeal flap surgery, the surgeon creates a bridge or flap of tissue that connects the soft palate to the back wall of the throat. This flap improves closure between the nose and the mouth and helps to eliminate nasal sound in speech.

### Sphincter Pharyngoplasty

Like pharyngeal flap surgery, the sphincter pharyngoplasty changes the shape of the velopharyngeal space, but it does it in a different way. Instead of lifting one flap from the back wall of the throat, the surgeon makes incisions along each side of the throat in order to create two flaps of tissue. These two flaps are then pulled up and attached to the sides and back of the throat. The result is a permanent ring of tissue that lines the walls of the upper throat and makes the velopharyngeal space smaller (see Figure 3).

While pharyngeal flap surgery creates two holes near the sides of the throat for air to pass through, sphincter pharyngoplasty creates one hole in the middle of the throat surrounded by the new ridge of tissue. As the soft palate elevates during speech, it will make contact with

this ridge to close the smaller velopharyngeal space. This procedure tends to work best for patients who have good soft palate movement and poor movement of the side walls of the upper throat.



**Figure 3: Sphincter pharyngoplasty.** The surgeon creates a ring of the tissue that reduces the size of the velopharyngeal space.

### Pharyngeal Wall Augmentation

Some people with VPD already have a rather small velopharyngeal space and may need a pharyngeal wall augmentation procedure. In this case, the surgeon creates a bulge on the back wall of the upper throat so that part of the wall is closer to the soft palate. The surgeon can add bulk to the back wall of the upper throat by either: a) injecting or inserting some artificial material, b) injecting or inserting fat or cartilage from the person's body; or c) creating a flap (similar to a pharyngeal flap), rolling it up, and sewing it into the back wall of the throat.

After surgery, the velopharyngeal space is smaller because of the added bulge along the back wall of the upper throat. As the soft palate elevates during speech, it will make contact with the bulge to close the small velopharyngeal space (see Figure 4). This procedure tends to work best for patients who have good palatal movement and a very small velopharyngeal gap.

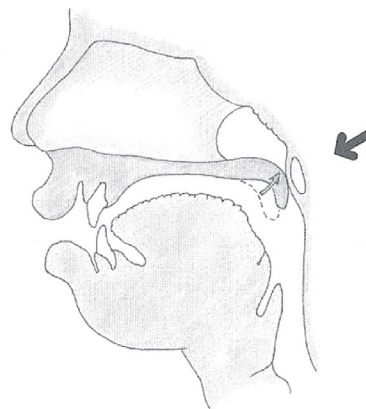
### After Surgery

After surgery, the palate and throat will be swollen and bruised for several days. The feeling of nasal congestion is common during this time, and speech may sound stuffy (denasal or hyponasal) for 7-10 days or longer. The stitches in the palate and throat will dissolve a few days

after surgery. Your surgeon will give you instructions about foods that are appropriate to eat during this period. Questions about the duration of the surgery, length of hospital stay, managing pain, and problems to watch for after surgery can be answered by your surgeon and your team.

Surgical treatment has been shown to be very successful in treating VPD. However, there are possible problems as well. Sometimes the pharyngeal flap or the sphincter pharyngoplasty reduces the size of the velopharyngeal space more than desired. When this happens, it may be more difficult to breathe through the nose, and speech could sound stuffy for months (or perhaps longer) after surgery.

If nasal breathing becomes extremely difficult, a person may be unable to breathe normally during sleep and could develop sleep apnea. In extreme cases, another surgery may be needed to remove some of the tissue put in place during the first surgery. The surgeon will try to remove enough tissue to improve nasal breathing but still leave enough tissue to help with the original VPD problem. Keep in mind that surgery cannot solve every speech problem, especially when a person's airway cannot tolerate the extra tissue needed to improve speech.



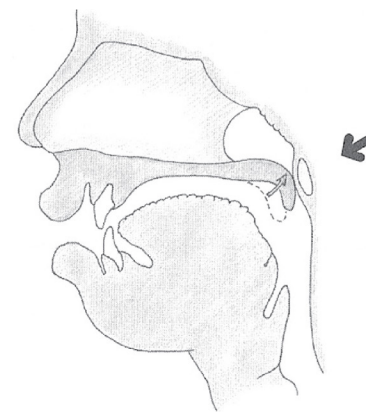
**Figure 4: Pharyngeal wall augmentation.** The surgeon has added a bulge to the back of the throat to reduce this patient's velopharyngeal space.

Another possible problem is that the size of the velopharyngeal space may still be too large after surgery. The tissue intended to make the space smaller might pull away from the throat, or the tissue might shrink too much when the back of the throat heals. If this happens, you may still hear air and sound escaping out of the nose during speech. In some cases, an additional surgery may be needed to reduce the size of the velopharyngeal space

further. Again, surgery may not be able to solve every person's speech problems.

### Non-Surgical Treatment Options

In some instances, surgery may not be the best option for people with VPD, either because they are not healthy enough to undergo an anesthesia or surgery, or because the cleft palate team believes that surgery would not be successful. In these cases, VPD may be treated with a removable appliance (prosthesis) that assists velopharyngeal closure during speech. These prostheses are made by a dental specialist such as a prosthodontist. The two main types of appliances are the speech bulb and the palatal lift.



**Figure 5**

### Speech Bulb

A speech bulb is a plastic ball that fits into the velopharyngeal space. It is attached to a plastic plate that is fitted to the roof of the mouth and held in place by wire clasps on some of the teeth (see Figure 5b). It looks like an orthodontic retainer with an extension on the end. The size of the bulb will vary depending on the size of the velopharyngeal space and how much the soft palate and pharyngeal walls are able to move. During speech, the walls of the upper throat move in and make contact with the bulb, closing the velopharyngeal space and preventing air and sound from escaping into the nose. The appliance is removed at night before bedtime.

In some cases, the speech bulb is a permanent solution to VPD. That is, although it is removable, some patients may wear it daily for the rest of their lives. However, it usually is a temporary solution until a person is considered a good candidate for surgery. In a few cases, the speech bulb

can stimulate more velopharyngeal movements. In these cases, the bulb can be made smaller over time.

### Palatal Lift

A palatal lift is similar to a speech bulb in that it consists of a plastic plate on the roof of the mouth that is clasped to several teeth. However, its extension is a wider plastic paddle that extends straight back to lift the soft palate up and back, closing the velopharyngeal space (see Figure 5c). This appliance is also removed at night before bedtime.

The palatal lift raises the soft palate into the velopharyngeal space and holds it up whether the person is speaking or not. In its lifted position, the soft palate and/or the walls of the upper throat close the velopharyngeal space. There are still small openings on the sides to allow a person to breathe through the nose. The palatal lift is usually appropriate for patients who have a soft palate of normal length and little movement of the soft palate or walls of the throat. This problem could be caused by cleft palate, but it is usually the result of a neurologic disorder.

### Making a Decision

It is common for people to ask which of the treatment approaches is best. To answer this question, it is important to remember that there are different causes of VPD. The approach to treatment must be designed to address the cause of the problem. Your health care providers must consider such factors as the size of the velopharyngeal gap, the length of the soft palate, and what parts of the palate and/or throat move well during speech. Because these factors vary from person to person, the treatment approach that is appropriate for one person may not be appropriate for another. Talk with members of your cleft palate team for more information.



## For More Information

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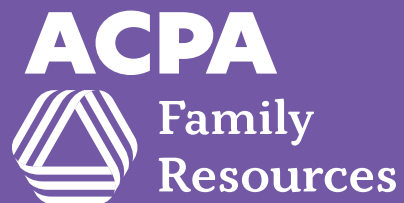
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