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## Current Trends in Treating the Palatal Air Leak (Stress Velopharyngeal Insufficiency)

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Air leaking through the nose while playing the clarinet, or any wind instrument, is annoying, embarrassing and usually stressful. The noise can range from a mild hiss to a loud snort and can even be heard by the audience during a recital. The problem does not occur in a large number of players, but when it does, it can be career threatening.

My interest in this topic developed because I spent many years struggling with the air leak, unable to find anyone who could help me control or eliminate it. During my doctoral studies, I was finally able to bring this problem under control, and I wrote my dissertation about five wind players with palatal air leaks.

I am periodically contacted by individuals who have developed this air leak and are searching for solutions on the clarinet chat board. When I was contacted by a clarinet-playing physician experiencing the air leak, I was intrigued by her use of newer medical diagnostic procedures in her attempt to understand the problem, and began to explore recent advances in diagnosis and treatment. Unfortunately, there does not appear to have been a great deal of progress. And although there have been a couple of research projects related to this issue, the number of players who seek help for this leak is apparently very low, and so the number of subjects studied is very small.

What exactly is a palatal air leak, as experienced by a clarinetist or other wind player? Very briefly, it can be a physical defect (short soft palate), injury (during adenoid and tonsil removal), or dysfunction (fatigue) that allows some air to escape into the nasal passages while the player is blowing through the mouth.

Before we discuss the causes of the palatal air leak, let me take a moment to briefly explain the physiological terms used. I have provided references that will allow one to follow up on specific areas of interest at the end of this article.

The usual medical term for the air leak is Stress Velopharyngeal Insufficiency. "Stress" is a critical part of the definition, because it explains that this particular leak occurs only when the area is under pressure or tired. "Velo" is the combined form of the word "Velum," which is commonly called the Soft Palate. This is the area at the extreme back of the top of the mouth, farther back than the bony area called the "roof" of the mouth. "Pharyngeal" means "of the pharynx," which is the whole area at the top back of the throat, above the windpipe and esophagus. "Insufficiency" means that although the velum may function normally much of the time, its functioning is not always adequate for a wind player. The terms "incompetence," "inadequacy," or "dysfunction" are used interchangeably. I will use SVPI to refer to the air leak for the remainder of my discussion.

Let's take a look at the velopharyngeal area.

It is located at the top of the trachea (windpipe). This is the crossroads of the air and food passageways. There are four separate exits from the pharynx:

1. The trachea, which leads to the lungs.
2. The esophagus, which leads to the stomach.
3. The mouth

#### 4. The velopharyngeal port, which leads to the nose.

Each of these exits has its own closure mechanism, but to get a general idea of the nature of the SVPI problem, it is enough to know that the muscles of the nasopharynx that determine whether air travels through the mouth or the nose when blowing. In a normally-functioning pharynx, the soft palate remains firmly sealed when blowing through the mouth. In SVPI, the soft palate is unable to seal firmly enough, or to maintain the seal throughout the exhalation. This allows air to escape into the nose. And since it continues to try to seal, the palate and certain parts of the nasal passages may vibrate and this is what causes the noise!

In my research, I have found that there are several characteristics common to wind players who experience SVPI.

- They are older teens or young adults, usually students
- They play daily for long periods of time and typically have aspirations of a career in performance.
- They most likely play clarinet, oboe or bassoon, instruments which demand high levels of intra-oral pressure for long periods of time.
- They possess a good tonal concept, but have a fault in some small aspect of tonal production.
- They have normal speech.

The first onset of SVPI tends to occur during periods of change or stress, such as:

- Intensive, short-term performance experiences such as summer music camp or an All-State group.
- Preparation for auditions or important recitals.
- Changes in routine such as beginning with a new instructor, or playing again after a vacation.
- Equipment changes, such a different mouthpiece, harder reed strength, or even a different instrument.

Knowing the contributing factors of SVPI does not mean that anyone really understands why it happens. This means that it is harder to find treatments for the problem. And as I mentioned earlier, the fact that relatively few musicians experience SVPI and few seek treatment means that research tends to be limited to case studies with small sample sizes.

There are a number of non-medical techniques that have helped some wind players overcome SVPI. It is probably also important to realize that since SVPI may be caused by a combination of problems, successful remediation may also require the use of several techniques.

The simplest treatment strategy involves a thorough evaluation of the physical aspects of playing, such as posture, breathing, and embouchure. Any flaws should be corrected through re-training. While some of these suggestions sound simple, each seems to be very important in reducing the stress that causes air leaks.

- Posture: Re-evaluate from head to toe, standing and sitting. Become aware of your Head, neck, spine, shoulders, arms and hands, all should be free of stress.
- Breathing and breath support: Throat free of tension, good inhalation with relaxed shoulders thus allowing for needed expansion and constant support during exhalation.
- Embouchure: Examine the combination of instrument setup and embouchure formation and function for an embouchure that is too tight can indicate overall tension, and can also create additional stress of the velopharyngeal muscles. A too-resistant mouthpiece-reed combination can contribute to the air leak, although if the embouchure is working correctly, a variety of reed strengths may be tolerated.

If making corrections to physical and equipment setups does not provide enough relief, there are a few non-medical practices that have been found to be useful.

- The Alexander Technique is helpful in providing body awareness and re-education.
- Learning to play with an "Inner Smile" is a very effective vocal technique that lifts the soft palate, thereby increasing the size of the oral cavity. It is accomplished by making a tiny, "secret" smile with closed lips but teeth parted. The action is seen only in the eyes and upper cheeks. If properly performed, you can feel the soft palate lift and the nasal-pharyngeal opening close.
- A careful muscular retraining program has helped others to permanently eliminate SVPI, and was what was successful for me. This practice regimen begins with short sessions and material that places the least possible amount of stress on the velopharyngeal region, (long low tones in mp) and very gradually progress to more strenuous activities (scales and technical etudes). I should point out that this re-training process may take several months, and during the early stages, no other playing should be done. It takes much time, energy and patience to re-educate and retrain these muscles. Although there appears to be no studies of the value of relaxation training in treating SVPI, I personally found it to be an important part of my retraining process. It is also interesting to note that relaxation training has been studied in the treatment of performance anxiety, which is itself a factor in some cases of SVPI.

Finally, several of my contacts stress the importance of a carefully-planned warm-up routine which gradually increases the amount of stress on the velopharyngeal area. I believe this is especially useful after muscular retraining, and may help avoid any relapse of SVPI. The warm-up should also focus on any problem areas that originally caused the leak, such as posture, breathing or embouchure.

Wind players with serious air leaks, and for whom non-medical interventions have been unsuccessful typically consult a physician who specializes in ear, nose, and throat disorders, an "E-N-T." The ENT will evaluate the problem, often using newer technology such as endoscopy.

The patient might then be referred to a Speech Therapist or a Speech Pathologist, since there are a number velopharyngeal disorders that produce speech problems.

A variety of strategies have been reported for treating SVPI, typically involving a combination of two or more different types of training. This makes it difficult to determine statistical significance of any one method, but it probably increases the potential success for the patient.

The most common strategies involve exercises prescribed by the therapist after a period of evaluation, and are designed to address specific problems observed by the speech pathologist. These exercises include activities such as blowing, swallowing, repeating certain sounds such as "K." sucking on a straw, and using the soft palate to stop the flow of air being exhaled through the nose. Breathing exercises may also be prescribed to reduce tension during inhalation.

In the event that speech therapy fails to result in any improvement after a period of time, perhaps six months, surgery may be considered. Again, there are a variety of surgical procedures that have been used to treat SVPI, and they tend to be highly individualized.

According to Sheri Rolph, retired ENT Surgeon, in the world of surgery, this is not necessarily a good sign, because if one procedure worked reliably, there would be no need for others.

The following surgical procedures have been reported recently:

- Posterior Pharyngeal Wall Augmentation is a procedure in which a substance (currently human fat is used) is injected into the back wall of the pharynx so that the soft palate can seal correctly. This is the least invasive surgical procedure, and recovery period is short. Unfortunately, fat is eventually re-absorbed, and so the procedure may need to be repeated.
- Push-Back Palatoplasty lengthens too-short soft palate.
- At least three procedures that tighten or reinforce the muscular ring or sphincter that closes the velopharyngeal port.

To summarize, then, the palatal air leak can be very frustrating, but a number of successful techniques and interventions have been identified. Unfortunately, because the number of players affected by SVPI is relatively low, treatment regimens have been primarily individualized, and reports of successes tend to be case studies.

Nonmedical strategies such as muscular retraining are effective for some players. The newer medical technologies using fiberoptic endoscopy and laparoscopy or micro-surgery for repairs have only just begun to be used to treat SVPI, but I believe the use of these and others will result in potential improvement in treatment success for many players. Clearly, much more research is needed in this area, especially as the newer technologies are being explored. Hopefully, larger sample sizes can be obtained to improve validity and relevance. Before such research can be done, some type of survey should be done in order to accurately determine the scope of the problem in the total population of a particular instrument (like clarinet), or even of all wind players in general. Finally, I hope that this short overview of the SVPI problem and current interventions will give you a general understanding of the problem should you encounter it in students or colleagues.

I continue to be very interested in this problem, and would be happy to answer any questions you may have. Please feel free to contact me with other information you may have regarding SVPI.

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### **Surgical Procedures for the Management of SVPI**

This is a listing of some of the procedures currently being used to correct SVPI.

#### Posterior Pharyngeal Wall Augmentation

The posterior pharyngeal is made to bulge anteriorly by the addition of something. Fat is the most common now. This is the least invasive and there is quick recovery period. Drawbacks to this procedure include the fact that it is hard to be precise, and that since fat re-absorbs, the procedure may need to be repeated.

#### Push-Back Palatoplasty

If the palate is too short, the mucosa can be elevated off the hard palate in order to displace the soft palate posteriorly.

#### Pharyngeal Flap

A strip of the posterior pharyngeal wall is elevated then attached to the soft palate leaving two lateral ports through which the patient breathes.

#### Sphincter Pharyngoplasty

A more extensive procedure in which the posterior pharyngeal flap and two lateral mucosal-muscular flaps are sewn together to create a smaller, tighter, dynamic pharyngeal sphincter.

### Palatal Adhesion

Part of the upper surface of the soft palate mucosa is elevated, as well as a portion of posterior pharyngeal mucosa. The superior surface of the palate is then sewn to the posterior pharyngeal wall.

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