A Physiological Description of a Debilitating Singing Style

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As a valve, the vocal folds produce varying degrees of closures necessary for respiration, voice production, and other body processes. These varying degrees of closure can best be represented along a continuum ranging from a wide-open glottis to one of extreme closure. During voice production, vocal folds that never completely close appear to produce a voice that may be described as "breathy," and vocal folds with an "excessive" degree of closure appear to produce sound that is usually described as "pressed." It is thought that these phonatory valvings may be associated with the development of vocal fold pathology.

One type of habitual vocal fold valving that brings many patients to the clinic is a faulty combination of the two conditions above. Though often heard as "pressed," it is produced with a high degree of airflow and is therefore very "breathy" as well as constricted. Our name for this kind of vocal fold closure, which can be heard in almost all styles of singing, is "hyperfunctional breathy" or "hyperfunctional underclosure." The term *underclosure* is suggestive of the glottal appearance, that of not being completely closed for any part of the glottal cycle. This article describes this inappropriate habitual vocal fold approximation, used by many singers in various styles, and discusses certain aspects of this approximation.

The following figures aid in our understanding of the hyperfunctional "breathy" glottal configuration. Figure 1 shows normal vocal folds that are typically seen when one produces "flow" phonation. Several aspects should be observed for purposes of comparison. First, notice that there is no space between the arytenoid cartilages. (The male/female difference in this regard is beyond the scope of this article.) A slight (less than one millimeter) space might also be appropriate, but more than one millimeter would most likely result in a perceived "breathy" sound. Second, notice that the vocal folds close along the medial edges. If the reader could see the vibratory pattern of the vocal folds, as is typically seen during stroboscopy, one would notice that the mucosal wave, usually seen as a rippling wave over the superior surface of the vocal folds, would be within normal limits. The still picture in Figure 1 does not allow the appreciation of this dynamic vocal fold movement. Figure 2 shows the normal vocal fold appearance of an habitually incorrect approximation of the vocal folds. It is this type of valving that is seen when the singer produces the hyperfunctional "breathy" phonation. The first obvious differences are that the arytenoids appear to be apart by more than one millimeter and the vocal folds fail to approximate completely along the medial edge. In fact, it can be seen that the vocal folds approximate initially at two locations, the juncture immediately anterior to the vocal process and at the anterior 1/3 posterior 2/3 juncture, or the mid-point of the membranous portion of the vocal folds. Another obvious distinction is the mucosal wave. Because of high airflow, the mucosal wave is greater than that observed in Figure 1. If the reader could observe the stroboscopic view of these vocal folds vibrations, one would see that for softer sounds the mucosal wave is larger than normal, but as the sound gets louder, the wave continues to enlarge until it looks almost like a whiplash across the superior surface of the vocal folds. The whiplash effect appears to occur as a result of greatly increased airflow and the singer's desire for the sound to be louder. However, the loudness of the sound is limited since only so much loudness can be derived from

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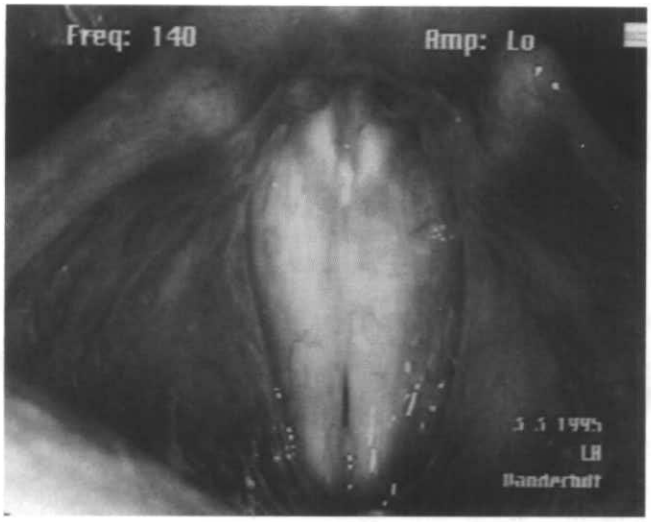

Figure 1.

Figure 2.

vocal folds that are not capable of complete closure.

Hyperfunctional "breathy" voice production can be very destructive to the singer. Not so much because of the possible organic changes it may promote in the form of swelling and/or other yet to be determined lesions on the folds, but because of the limitations it imposes on the mechanics of voice production during singing. For instance, singers who create this type of voice production, that sounds "breathy" and constricted at the same time, have common complaints. They usually report voice fatigue, loss of upper range, and hoarseness. The symptoms usually progress in that order as well. The voice fatigue complaint can be accounted for because of the apparent opposing contraction between the glottal opening mechanism and the glottal closing mechanism. The singer desires the "breathiness" in the sound, so the glottis must not close; however, the singer must also have enough closure to create sound. Very likely, this production sets up a muscle antagonism that promotes fatigue. And, since all muscles work in groups, other antagonistic forces may contribute further to the fatigue factor.

The reduction of the overall range may also stem from this same antagonism. Notice how your range is reduced if you try to sing with a constricted, "breathy" phonation. Oftentimes, the singer can experience a loss of range as much as one octave as a consequence of this faulty production. The hoarseness may likely result from possible shearing forces within the folds which may be caused by the high airflow, as mentioned above. The vocal folds may swell as payoff from these possible shearing forces.

Solving this faulty phonatory production will be the topic of one of our future articles.

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