Pitch-Raising Surgery in Male-to-Female Transsexuals

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Summary: Several surgical methods for pitch raising have been described such as cricothyroid approximation, anterior commissure advancement, scarification, and injection of triamcinolone into the vocal folds. These procedures have different disadvantages and risks. A new method for pitch raising via endolaryngeal shortening of the vocal folds is presented. Long-term results of the first 10 patients are presented. In 1 person, who smoked immediately after surgery, coughed, and did not observe voice rest, there was a dehiscent suture. In 9 transsexuals after surgery the voice range was reduced for the lower frequencies, and a permanent 9.2-semitone increase of the mean, spontaneous fundamental frequency was obtained. Key Words: Transsexual—Voice—Pitch raising—Vocal fold.

Male-to-female transsexuals are persons who feel they are women trapped in a man's body. They are different from transvestites or cross-dressing persons who just like to wear clothes of the other gender. They hate everything about their bodies that makes them appear as males and they are not homosexuals. Most of them have a long history including attempts at self-castration and suicide. Before these persons come to our department, according to German laws they must have been recognized as transsexuals by a judge, based on a psychiatric expert opinion. Nearly all of them have undergone genital reassignment.

Male-to-female transsexuals very often exhibit a low pitch in speech. Although surgical procedures of the genitals have contributed to a reassignment to the female gender, these patients feel inferior and stigmatized by their deep, male-sounding voices. Even if the pitch is raised functionally, in uncontrolled situations like yawning, coughing, and laughing, the male voice appears. In some cases the habitually raised voice may also lead to functional and subsequent organic voice disorders.

The patients' wish to raise pitch provides a challenge for us and at the same time an opportunity to learn more about vocal physiology.

Until now surgical methods for raising the pitch have used three fundamental principles: increasing the vocal folds' tension, altering the vocal folds' consistency, and decreasing the vocal folds' mass. Several surgical methods for pitch raising have been described such as cricothyroid approximation, anterior commissure advancement, scarification, and injection of triamcinolone into the vocal folds.

The most commonly used surgical method has been increasing vocal fold tension by cricothyroid
approximation described by Isshiki et al. This procedure has disadvantages including the approach from the external neck and the very high tension on the cricoid and thyroid cartilages, which may be damaged as a result. Via the modification of Lee et al a different suture technique was demonstrated, which is aimed to manage the tension on the cartilages in a better way.

However, both Isshiki's technique and the Lee modification commonly produce good early results followed by pitch decline within 6-18 months. Sataloff and Sataloff et al described a technique of cricothyroid fixation that results in long-term pitch improvement. However, this technique also requires an external excision, and it limits pitch range to approximately one octave or less. In addition, it cannot be performed on older patients with ossification of the laryngeal cartilages.

Isshiki and Isshiki et al tried to obtain the effect of an increased vocal fold tension via broadening of the thyroid cartilage. However, Isshiki himself assessed this method as less effective than cricothyroid approximation. LeJeune et al introduced a new procedure in 1983 that was called anterior commissure advancement. In this procedure, a caudally based window is established in the midline of the thyroid cartilage and shifted anterior together with the vocal folds. The opening between the window and the rest of the thyroid cartilage is maintained with a tantalum splint. In Tucker's modification the window of the cartilage is cranially based. Although the results are reported to be good, the disadvantages are the external approach and additional accentuation of the thyroid prominence. This may negate the cosmetic effectiveness of laryngeal shave procedures, which most of these patients have undergone.

Permanent modification of vocal fold consistency may also be obtained by scarification. The vocal folds are cut deeply in slits parallel to, and about 1-3 mm from, the vibratory margin. The results of this method are less encouraging. Vocal fold stripping has also been used. The voices are often hoarse and soft, and thus sound distinctly pathologic.

In 1982, Donald presented a surgical method for pitch raising with opening of the endolarynx in an external approach. After the anterior commissure was split, the front part of the vocal folds was de-epithelized and corresponding regions of the vocal folds were sutured. Wendler described a modification on which our method is based.

METHOD

In our method the endolarynx is exposed via direct laryngoscopy. The anterior part of the vocal folds is deepithelized, and the corresponding tissue of the vocal folds is firmly sutured (Figure 1) to obtain a V-shaped anterior commissure. Thus, the vocal folds are shortened, and the vibrating mass of the vocal folds is reduced.

RESULTS AND DISCUSSION

We have operated on 20 patients using this method. The results of the first 10 patients are reviewed (Table 1). In 1 patient, who smoked immediately after surgery, coughed, and did not observe voice rest, there was a dehiscent suture. Nevertheless, in general the patients demonstrated a 9,2-semitone increase of the mean, spontaneous fundamental frequency. In the voice range profile (Figure 2) it may be seen that after surgery the voice range is reduced for the lower frequencies. This part of the result is desired and permanent. Hence, even in uncontrolled situations no deep voice is possible. Our patients have also shown

![FIG. 1. After endoscopic exposure of the endolarynx, the anterior part of the vocal folds is deepithelized and the corresponding tissue of the vocal folds is firmly sutured. This results in shortened vocal folds with a V-shaped anterior commissure. Note: From "Ergebnisse nach operativer Anhebung der mittleren Sprechstimmlage bei Transsexuellen durch Verkürzung des schwingenden Stimmlippenanteils," by M. Gross and P. Fehland. In: Aktuelle phoniatrisch-pädaudiologische Aspekte 1995, edited by M. Gross, 1996, Berlin: RGV. Copyright 1996 by RGV. Reprinted with permission.](image-url)
TABLE 1. Surgical results for 10 patients

<table>
<thead>
<tr>
<th>Case</th>
<th>Age (years)</th>
<th>Habitual frequency (Hz)</th>
<th>Frequency range (semitones)</th>
<th>Intensity (dB)</th>
<th>Habitual frequency (Hz)</th>
<th>Frequency range (semitones)</th>
<th>Intensity (dB)</th>
<th>Pitch elevation (semitones)</th>
<th>Follow-up duration (months)</th>
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<td>44</td>
<td>127</td>
<td>H</td>
<td>28</td>
<td>33</td>
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<td>fis</td>
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<td>107</td>
<td>A</td>
<td>28</td>
<td>27</td>
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<td>34</td>
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<td>A</td>
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<td>33</td>
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<td>215</td>
<td>gis</td>
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<td>112</td>
<td>A</td>
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FIG. 2. Voice range profile of a male-to-female transsexual (patient 2) preoperatively (solid line) and 4 weeks after surgery (dotted line). Immediately after surgery the voice range is reduced for the lower frequencies. The volume is reduced as well but may be normalized through voice training.
a reduction in loudness over all frequencies in at least the first 3 postoperative months. Only 3 out of the first 10 transsexuals desired a louder voice. Their preoperative loudness levels were restored through voice therapy. Muscle tension dysphonia, a functional voice disorder, was present in 8 out of the first 10 patients in the early postoperative weeks. A clear female voice was accomplished when the anterior commissure became definitively V-shaped and when the hyperfunctional voice disorder was no longer present. Because some of the patients had had their genital reassignment surgery more than 10 years earlier, hyperfunctional voice disorders were a major problem but could be overcome in most cases by conservative voice training.

CONCLUSIONS

Endoscopic vocal fold shortening appears to be safe and effective for elevating fundamental frequency in male-to-female transsexuals. Five-year and 10-year follow-up will be required to clarify the long-term efficacy, but preliminary results suggest that the pitch elevation should be permanent. Additional research is encouraged.

REFERENCES