

# Novel Use of Feminization Laryngoplasty

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**SUMMARY: Introduction.** Wendler glottoplasty is a voice feminization surgical procedure designed to increase the fundamental frequency (F<sub>0</sub>) in male-to-female transsexual patients with gender dysphoria. On average, Wendler glottoplasty has the most significant effect on F<sub>0</sub> among voice feminization surgical procedures.

**Case report.** We present the case of a young female patient with a testosterone-producing adrenocortical adenoma who underwent irreversible vocal changes secondary to virilization, which impacted her self-esteem and quality of life (QOL). Voice feminization surgery using Wendler glottoplasty was performed with significant improvement in F<sub>0</sub> and QOL.

**Discussion.** Sex hormones have a profound impact on the voice. Increased testosterone and dihydrotestosterone are known to cause hypertrophy of the laryngeal muscles and ligaments, which leads to a drop in F<sub>0</sub>. However, women who present androphonia rarely require surgical management and improve with vocal therapy alone. Few cases of voice feminization procedures for the treatment of androphonia have been described in the literature. Our patient presented with severe masculinization of her voice with a F<sub>0</sub> lower than the average adolescent male, which led to the requirement of surgical management.

**Conclusions.** Patients with severe androphonia that significantly affect their QOL and show no improvement after the management of the underlying pathology and intense vocal therapy are candidates for voice feminization surgeries. These procedures offer positive results both in terms of F<sub>0</sub> and in improving patient's self-esteem and QOL.

**Keywords:** Hyperandrogenemia—Pitch-raising surgery—Voice feminization surgery.

## INTRODUCTION

Wendler glottoplasty is a voice feminization surgical procedure designed to increase the fundamental frequency (F<sub>0</sub>) in male-to-female transsexual patients with gender dysphoria.<sup>1</sup> On average, Wendler glottoplasty has the most significant effect on F<sub>0</sub> among voice feminization surgical procedures.<sup>1</sup> Adrenal cortical tumors that produce testosterone are rare.<sup>2</sup> Elevated levels of androgens in females produce morphologic changes in the vocal folds that are irreversible even after removing the source.<sup>2</sup> We present the case of a young female patient with a testosterone producing adrenocortical adenoma who underwent irreversible vocal changes secondary to virilization which impacted her self-esteem and quality of life (QOL).

## CASE REPORT

A 14-year-old girl with a past medical history of an androgen producing adrenocortical adenoma was referred to our Laryngology clinic for her voice disorder. She had a low tone masculine voice that persisted after the tumor had been removed, one year prior, and that showed no improvement with vocal therapy. It significantly impacted her QOL and

psychosocial development. The patient hardly spoke, her mother said that she had become very withdrawn, and was bullied at school. On physical examination, she had a voice with a very low or bass tone that was unsuitable for her age and sex. Laryngeal videostroboscopy showed a F<sub>0</sub> of 134 Hz, and the vocal folds and related structures showed no overlying pathology, which could explain her tone of voice (Figure 1). We decided to perform voice feminization surgery using Wendler glottoplasty. The procedure was performed under general anesthesia. The larynx was exposed through rigid suspension laryngoscopy. Bilateral de-epithelialization of the anterior commissure and free edge of the anterior and middle third of the membranous portion of the vocal folds was performed using microlaryngeal curved scissors. Three simple sutures were made using 4.0 reabsorbable thread, passing the thread through the vocal ligament of each vocal fold to bring together the anterior two-thirds of the vocal folds (Figure 2). The patient was instructed to keep vocal rest during the 4 weeks following the procedure, and antireflux and anti-inflammatory medication was prescribed. A new videostroboscopy was performed 1 month after the surgery showing the adequate formation of an anterior glottic synechia without dehiscence of the sutures. Mild edema was observed and a small granuloma over one of the sutures. The F<sub>0</sub> increased to 268 Hz. She again underwent vocal therapy. Two months later, another videostroboscopy was conducted, exhibiting resolution of the granuloma. The patient continued follow-up appointments. She showed an important improvement in voice quality; however, she also exhibited muscle tension dysphonia, and vocal therapy was prescribed with improvement of symptoms. Videostroboscopy three and a half years after surgery showed an anterior glottic synechia in good condition, a good vibrating pattern in the posterior portion of both vocal folds, and a F<sub>0</sub> of 201 Hz (Figure 3). Her

Accepted for publication December 21, 2020.

Funding: This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflict of Interest: The authors have no conflict of interest to disclose.

Institutional Review Board Approval: The patient and her parents have given signed consent form. The ethics committee of the Faculty of Medicine of the Pontificia Universidad Javeriana has approved this case report.

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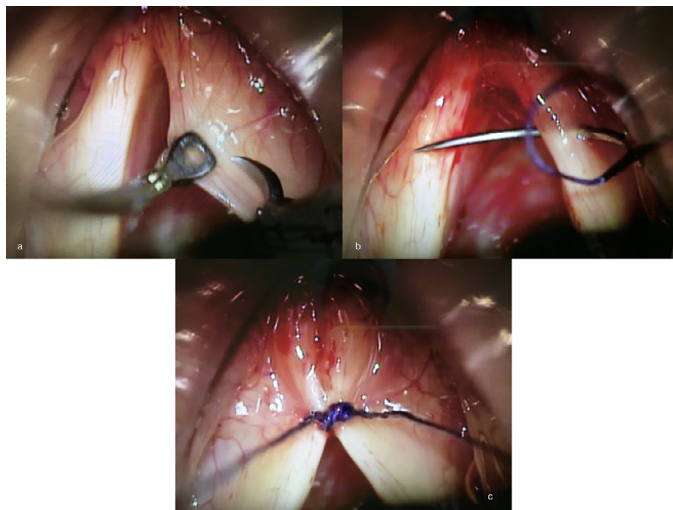
Journal of Voice, Vol. ■■■, No. ■■■, pp. ■■■–■■■  
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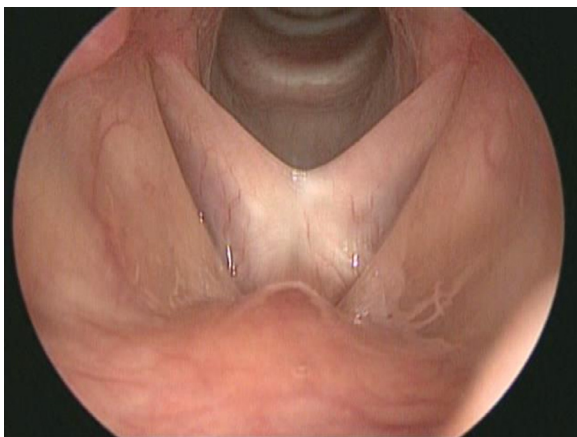
<https://doi.org/10.1016/j.jvoice.2020.12.048>



**FIGURE 1.** Videostroboscopy of the patient's larynx before the surgical procedure.



**FIGURE 2.** Wendler's glottoplasty procedure. (a) Right vocal fold de-epithelization with microlaryngeal curved scissors, (b) curved needle going deep through the right vocal fold, (c) the vocal folds are sutured firmly to obtain a V-shaped commissure at the mid-portion. We made three simple sutures using 4.0 reabsorbable thread.



**FIGURE 3.** Videostroboscopy of the patient's larynx three and a half years after surgery. A synechia can be seen in the anterior third of the glottis resulting in a reduction in length of the vibrating portion of the vocal folds.

voice has changed noticeably, and so has her demeanor and self-esteem, with a noticeable improvement in school and social life.

## DISCUSSION

Sex hormones have a profound impact on the voice.<sup>3</sup> Increased testosterone and dihydrotestosterone are known to cause hypertrophy of the laryngeal muscles and ligaments which leads to a drop in  $F_0$ .<sup>4,5</sup> Polycystic ovarian syndrome is the most common cause of androphonia; however, usually no surgical treatment is required and patients improve with vocal therapy alone.<sup>6-8</sup> Few cases of voice feminization procedures for treatment of androphonia have been described in the literature.<sup>9,10</sup> To our knowledge, this is the first report of a pitch-raising surgical procedure performed on a female patient with undesired masculinization of her voice in Latin America.

The  $F_0$  required for a voice to be perceived as "female" is debated and very controversial. However, most laryngologist agree that a typical  $F_0$  for women is on the order of 210 Hz.<sup>11</sup> Our patient presented severe masculinization of her voice with a  $F_0$  lower than the average adolescent male; 134 Hz.<sup>5</sup> The decision to perform a voice feminization surgery was made after failure to improve with removal of the tumor and after extensive vocal therapy. Wendler glottoplasty was chosen as it has been reported to produce the greatest increase in  $F_0$  out of the different pitch-raising surgical techniques described.<sup>1</sup> The patient did not have a prominent thyroid cartilage, and no reduction of Adam's apple was required. Follow up showed no dehiscence of the sutures, and long term follow-up showed an increase in  $F_0$  from 134 Hz to 268 Hz, which stabilized at 201 Hz after three and a half years.

## CONCLUSION

In the management of adolescent female patients with virilizing pathologies early diagnosis is critical since it is known that intervention on the hormonal cycle prior to puberty reduces voice changes. However, in cases where virilization is already present it is known that these changes are not reversible.<sup>5</sup> When the  $F_0$  is clearly masculine and does not fit into the ambiguous pitch range, and when it importantly affects the quality of life, voice feminization surgeries can be considered as a viable option that achieves positive results both in terms of  $F_0$  and in improving a patient's self-esteem and QOL. Vocal therapy should always be the first line of treatment and surgery should only be considered if adequate results are not achieved. If surgical management is chosen, postoperative vocal rest is critical for surgical success to avoid suture rupture. Granuloma formation over the sutures can be expected, but it tends to disappear in the first month after the surgery. We also recommend the patient continues with vocal therapy in the postoperative period. To our knowledge, this is the first report of a pitch-raising surgical procedure performed on a female patient with undesired masculinization of her voice. Further investigation in this topic is required.

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