

New Vocal Fold-shortening Procedure: External Approach to Anterior Vocal Fold Plication

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Summary: Introduction. We believe that our new procedure offers a useful external approach to anterior vocal fold plication. Vocal cord shortening by laryngomicrosurgery (LMS) involves plication of the anterior commissure, but this difficult procedure requires high-level skills. Dehiscence of the plicated location may occur postoperatively.

Methods. In the present case, we applied an innovative procedure combining vocal cord shortening by LMS with cervical incision. This facilitated plication, and no postoperative dehiscence was encountered.

Results. Speaking fundamental frequency (SFF) was 110 Hz at the first visit, 170 Hz after type 4 thyroplasty, 167 Hz after thyroarytenoid muscle myectomy, and 208 Hz after the present procedure, representing a good outcome.

Conclusions. This procedure could be useful when the SFF is not sufficiently raised by existing procedures. The risk of postoperative dehiscence of the plicated location is low compared with LMS.

Case details. The patient consulted with a major complaint of low vocal pitch. At the first visit, SFF was 110 Hz, suggesting a male voice. In April 201X, type 4 thyroplasty was performed and successfully raised SFF to 170 Hz. As the patient did not readily pass as a woman, thyroarytenoid muscle myectomy was performed in February 201X +1 but only achieved an SFF of 167 Hz, which was considered unsatisfactory. As a result, the procedure was performed again in September 201X +1.

Key Words: Gender identity disorder—Phonosurgery—Laryngomicrosurgery—Vocal cord shortening—Speaking fundamental frequency.

INTRODUCTION

The prevalence of male-to-female gender identity disorder (MtF GID) among Japanese men is considered to be 1 in 10,000. For a patient with MtF GID, raising the speaking fundamental frequency (SFF) is necessary to pass as female. Laing reported that the voices of women were characteristically higher in pitch and quieter than the voices of men.¹ In research to determine the factors by which gender is evaluated by a listener, Wolie considered that individuals with a fundamental frequency of ≥ 155 Hz were recognized as female, whereas those with a fundamental frequency of ≤ 145 Hz were recognized as male. The phonosurgical techniques used to obtain a feminine SFF are type 4 thyroplasty (TP4),² thyroarytenoid muscle myectomy (TAM),³ vocal fold shortening by laryngomicrosurgery (LMS),^{4–6} and vocal fold shortening via cervical incision.^{7,8} Each of these options offers specific advantages and disadvantages. Vocal fold shortening by LMS involves plication of the anterior commissure, but this is a difficult procedure and a high level of skill is required. Dehiscence of the plicated location may occur postoperatively. In the present case, we applied an innovative procedure combining vocal fold shortening by LMS with cervical incision. This facilitated plication and no postoperative dehiscence was encountered.

CASE DETAILS

Patient: The patient was a 32-year-old biological male.

Major complaint: The patient's major complaint was a low-pitched voice.

Previous medical history: The patient had a history of MtF GID and underwent laryngeal prominence resection.

Current medical history: The patient consulted with a major complaint of low vocal pitch. At the first visit, the SFF was 110 Hz, suggesting a male voice. In April 201X, TP4 successfully raised SFF to 170 Hz. As the patient did not readily pass as a woman, TAM was performed in February 201X +1 but achieved only an SFF of 167 Hz, an outcome considered as unsatisfactory. As a result, the procedure was performed again in September 201X +1.

Operative details in present case: Procedures were performed under oral intubation and general anesthesia using the two approaches of LMS as described by Ejnell et al⁹ and cervical incision. After separating the anterior third of the vocal fold mucosa during LMS, an anterior neck incision was created to expose the thyroid cartilage plate. While observing the lumen, two 18-G needles were inserted through the thyroid cartilage plate. The points of insertion were 5 mm above and 5 mm below the vocal fold level, about 10 mm lateral to the vertical midline of the thyroid cartilage. The procedure 1) then involved passing a 3-0 nylon thread through the needle into the lumen, attached to a curved needle outside the mouth, 2) inserting the thread deeply into the contralateral vocal cord and bringing it back, 3) then passing the thread through the other 18-G needle and bringing it back outside the thyroid cartilage plate (Figure 1). The curved needle used was a no. 00, 0.48-mm thick, 13.0-mm long, French eye needle.

Contralaterally, thread was inserted and brought back in the same manner. Under the clear LMS field of view, the nylon threads were then ligated. After checking the plication and

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FIGURE 1. Details of the surgery.

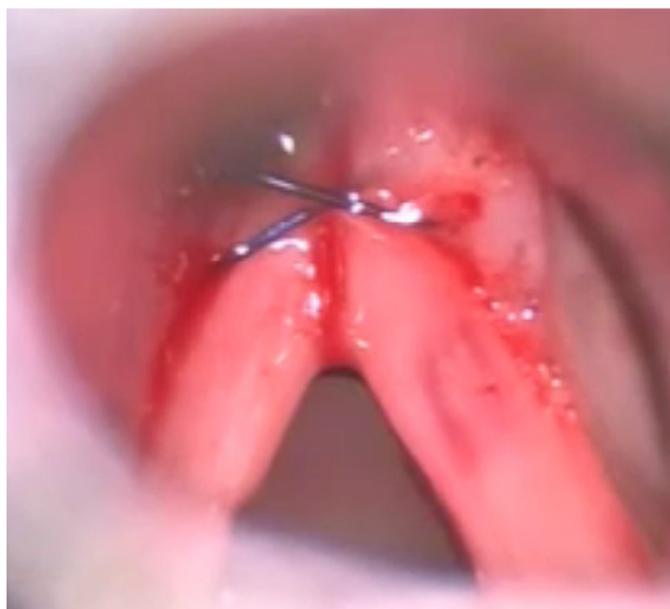


FIGURE 2. View during the procedure.

shortening of the anterior vocal folds, the procedure was completed (Figure 2).

Postoperative course

Outcomes of cervical incision were favorable, with no infection or other complications. In the lumen, postoperative white fur remained, but no subsequent granulation was identified. Vocalization was possible 5 days postoperatively, and sutures were removed after 1 week, then the patient was discharged. On evaluation 1 month after surgery, the SFF was 208 Hz.

TABLE 1.
Changes in Pitch Range and VHI

	Lowest (Hz)	SFF (Hz)	Highest (Hz)	VHI
Initial visit	103	110	571	67
After-TP4	151	170	515	30
Pre-TAM	123	151	423	52
After-TAM	161	167	492	54
Pre-shortening	128	151	473	62
After-shortening	185	208	463	51

RESULTS

The SFF was 110 Hz at the first visit, 170 Hz after TP4, 167 Hz after TAM, and 208 Hz after the present procedure, representing a good outcome. The pitch range narrowed, but the SFF became high-pitched and the voice handicap index (VHI) was decreased after the present procedure (Table 1). The patient was satisfied with the vocal outcomes.

DISCUSSION

The phonosurgical techniques used to obtain a feminine SFF are TP4, TAM, vocal cord shortening by LMS, and vocal fold shortening via cervical incision. Each of these methods is associated with specific advantages and disadvantages. Although Wendler's method^{5,6} can be simple, vocal fold plication by standard LMS⁴ can be considered a difficult procedure requiring a high level of skill, and postoperative dehiscence of the pliated location may occur. Procedures providing a greater degree of certainty comprise vocal fold shortening techniques performed via cervical incision, as reported by Kunachak et al⁷ and Donald,⁸ but these procedures are highly invasive, because the whole anterior surface of the thyroid cartilage needs to be exposed. Displacement of the incised thyroid cartilage may also be seen after surgery. We combined LMS with cervical incision, taking an approach from the thyroid cartilage plate for the present case. This method allowed vocal fold shortening to be performed more easily and with greater certainty. The possibility of postoperative dehiscence of the pliated location was considered low, and the procedure was accomplished with no structural damage to the larynx. Granulation due to suture exposure could have occurred, but no granulation tissue became apparent during the 1-year period after surgery. As the new procedure was effective in a case where the outcomes of TP4 and TAM had proven unsatisfactory, this approach could prove useful when the SFF is not sufficiently raised with existing procedures. The pitch range narrowed, but the SFF became high-pitched and the VHI decreased after the present procedure. The VHI also improved to 51, and this improvement was considered somewhat poor as a numerical value. Although SFF is rising as reason, due at least in part to difficulty with vocal output after surgery. However, the patient was satisfied with the new voice. Because this result was from a single report, we intend to accumulate and examine more of such cases in the future.

CONCLUSIONS

- Vocal cord shortening by LMS could be useful when the SFF is not sufficiently raised by existing procedures.
- The risk of postoperative dehiscence of the plicated location is low in this procedure compared with LMS.
- The possibility of granulation due to suture exposure remains, so careful observation of the postoperative course is necessary.

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