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Outpatient Vocal Fold Cyst Surgery under Topical Anesthesia

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Abstract

Background: To treat vocal fold cysts, complete enucleation during laryngomicrosurgery is recommended. However, wounds remaining following dissection may result in scarring and protracted sclerosis of the vocal fold mucosa. Wide-opening of the lateral part of the cyst is considered to be less damaging to the vocal fold mucosa. In this study, we investigated short-term voice improvement and long-term recurrence rates of vocal fold cysts removed using a 'wide-opening' method with a double-bend needle under topical anesthesia.

Materials and Methods: In total, 48 patients who underwent wide-opening surgery using a 23 G double-bend needle under topical anesthesia for vocal fold cysts were enrolled. To evaluate short-term voice improvement, patients' preoperative and 1 month postoperative Maximum Phonation Time (MPT), pitch range, shimmer, jitter, and Voice Handicap Index (VHI) were compared. Long-term cyst recurrence was investigated via endoscopy.

Results: Significant improvements were observed between the preoperative and 1 month postoperative assessments for every parameter evaluated (P <0.01). We observed no cases of postoperative exacerbation of VHI or cyst recurrence upon endoscopic examination during patient follow-up.

Conclusion: Outpatient vocal fold cyst surgery under topical anesthesia is a simple and useful technique, with a high completion rate. This type of surgery results in minimal invasion of the vocal folds, increased short-term voice improvement, and low recurrence rates.

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Introduction

Vocal fold cysts, comprising mucous retention cysts, and epidermoid cysts are non-neoplastic lesions of the vocal folds that obstruct vibration of the vocal fold mucosa during vocalization, causing dysphonia. Clinical symptoms generally include hoarseness and difficulty with vocalization. Diagnosis is based on observations of elevated lesions in the submucosal layer of the vocal folds on laryngeal endoscopy, along with diminished vocal fold mucosal vibration on stroboscopy.

To treat vocal fold cysts, complete enucleation during laryngomicrosurgery is recommended. However, wounds remaining following dissection need more time to be recovered compare to polyps or nodules, and sometimes may result in scarring and protracted sclerosis of the vocal fold mucosa [1]. Chang et al. [2] reported that, under topical anesthesia, the lateral part of a cyst can be opened. This method is believed to less damaging to the vocal fold mucosa, in addition to being associated with a low recurrence rate.

Our Office–based surgery using a 60 mm Double-Bend Cathelin Needle (DBCN) achieved favorable outcomes for various types of vocal fold lesions [3]. This Endoscopic Laryngo Needle Surgery (ELNS) is useful not only for injection laryngoplasty but also for dissecting vocal fold regions. Furthermore, it can be performed under topical anesthesia in an outpatient setting. As mentioned before, recovery time after surgery is expected to be shorter than enucleation technique because the invasion to the vocal fold mucosa is less than cyst enucleation. In this study, we investigated short- and long-term voice improvement, as well as the rate of recurrence of vocal fold cysts removed using a wide-opening method with a double-bend needle under topical anesthesia.

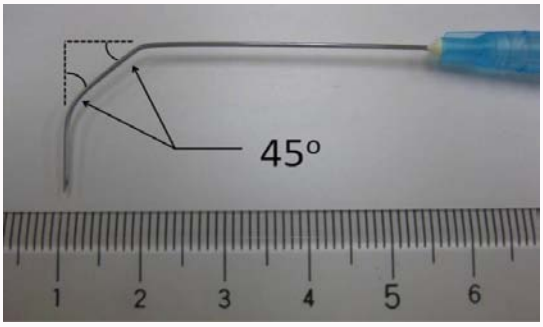

Figure 1: A 60 mm, 23-G Cathelin needle bent at 45° by hand at two sites.

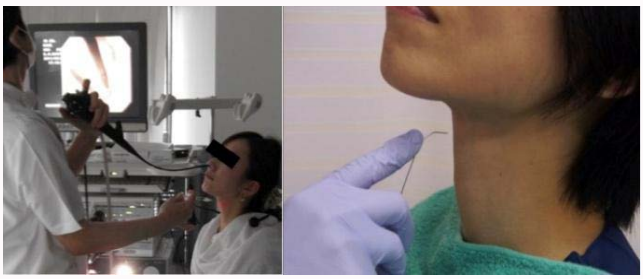

Figure 2: The DBCN was inserted above the superior thyroid notch.

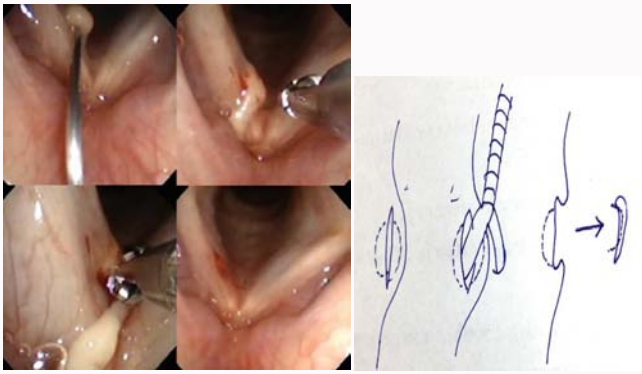

Figure 3: Removal of fluid from cyst by remove a portion of the cyst wall.

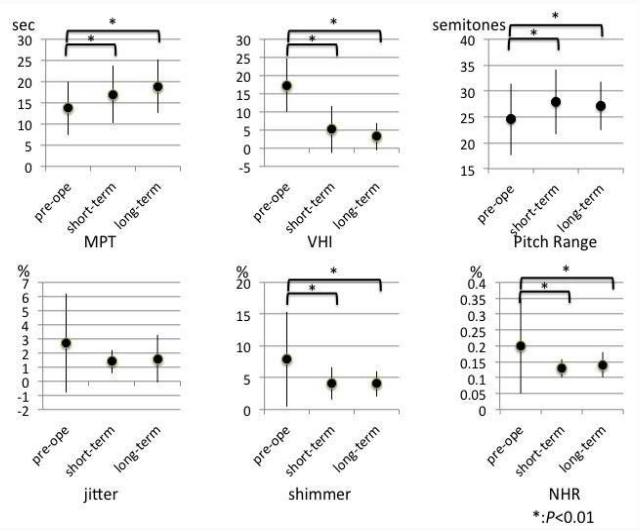

Figure 4: No postoperative exacerbation of VHI was observed in any patient, and VHI improved in all patients in short and long-term results.

Materials and Methods

Patients

We enrolled 48 patients (28 males and 20 females) with a mean age of 49.3 ± 15.7 years (range: 20–81 years) who underwent vocal surgery for vocal fold cysts diagnosed at our facility between April 2011 and March 2015. Follow-up time post-surgery ranged from 1–24 months (mean: 5.9 months).

Surgical procedure

The ELNS was performed under topical anesthesia using 4% lidocaine with the patient in a seated position [3]. Following 3 min of lidocaine nebulization, 4% lidocaine was sprinkled through the instrument channel of a flexible endoscope. A 60 mm, 23-G Cathelin needle (TERUMO Co., Tokyo, Japan) was bent at 45° by hand at two sites (1–1.5 cm and 2–3 cm from the needle tip) (Figure 1). The distance of the bend was determined based on the size of the patient's larynx. Next, the DBCN was attached to a 2.5 ml syringe, which was used as a handle when performing procedures. The DBCN was inserted above the superior thyroid notch (Figure 2).

For vocal fold cysts, we incised the cyst wall with the tip of the DBCN and drained the fluid. The incision was enlarged and we cut the upper portion of the cyst wall, which spanned the entire cyst including the vocal fold mucosa. Following removal of fluid, we inserted one cup of the biopsy forceps into the cyst and the other cup around the outside of the cyst wall to remove a portion of the cyst wall (Figure 3).

It took 5-10 minutes to perform surgery and total treatment time including topical anesthesia before surgery were less than 30 minutes.

This procedure was approved by the Ethics Committee of the Tokyo medical university on February 5, 2013.

Voice evaluation

To evaluate short-term voice improvement, patients' preoperative and 1 month postoperative Maximum Phonation Time (MPT), Voice Handicap Index (VHI), pitch range, jitter, shimmer, and Noise-To-Harmonic Ratio (NHR) were compared. Long-term cyst recurrence and long-term voice improvements were investigated on the final visit (6–24 months). Cyst recurrence was investigated via storoboscopy. The voice result was analyzed by same method for short-term voice improvement. In total, 8 of the 48 patients did not visit the clinic 6 months post-surgery. For these cases, patients were asked via phone interview to rate their voice improvement following surgery. Five patients, who never visited the clinic following surgery, were excluded from this study.

Results

All cases were accomplished without any complication.

Significant improvements were observed between the preoperative and 1 month postoperative assessments for MPT (13.7 ± 6.3 *vs.* 17.0 ± 6.8 s, $^{**}p$ <0.01), VHI (17.3 ± 7.4 *vs.* 5.2 ± 6.5, $^{**}p$ <0.01), pitch range (24.5 ± 6.9 *vs.* 27.9 ± 6.3 semitones, $^{**}p$ <0.01), shimmer (7.9 ± 7.5 *vs.* 4.1 ± 2.5%, $^{**}p$ <0.01), and NHR (0.20 ± 0.15 *vs.* 0.13 ± 0.03%, $^{**}p$ <0.01). And were observed between the preoperative and long term post operative assessments for MPT (13.7 ± 6.3 *vs.* 18.9 ± 6.3 s, $^{**}p$ <0.01), VHI (17.3 ± 7.4 *vs.* 3.3 ± 3.6, $^{**}p$ <0.01), pitch range (24.5 ± 6.9 *vs.* 27.2 ± 4.7 semitones, $^{**}p$ <0.01), shimmer (7.9 ± 7.5 *vs.* 4.1 ± 2.0%, $^{**}p$ <0.01), and NHR (0.20 ± 0.15 *vs.* 0.14 ± 0.04%, $^{**}p$ <0.01).

There was no significant improvement only in Jitter.

No postoperative exacerbation of VHI was observed in any patient, and VHI improved in all patients in short and long-term results (Figure 4).

We did not observe any cases of recurrence during the follow-up period, which was confirmed for 40 patients using endoscopy at their last visit and for 8 patients by phone interview when 6-18 months after their operation.

Discussion

The type of vocal surgery performed in this study reduced patient treatment costs and outcome because the procedure is awake office-based technique. In addition, we asked the patients to vocalize during surgery and were able to observe vocal fold mucosa vibration using stroboscopy, which confirmed treatment outcome in real-time. The vocal fold mucosal incision was performed using the tip of a 23-G needle, which minimized surgical invasiveness; the use of a wide-opening method also reduced invasiveness. Thus, the risk of vocal dysfunction due to the formation of a postoperative scar was minimized, which allowed for good mucosal vibration and rapid postoperative wound healing. It is important to note that it may be difficult to perform this procedure on patients who have a strong gag reflex. However, for patients that were able to tolerate nasal endoscopy, we observed a 100% surgical completion rate.

The standard surgical approach for vocal fold cysts involves elevation of the mucosal flap overlying the cyst, dissection of the entire cyst, and then replacement of the mucosal flap (microflap technique) during laryngeal microsurgery under general anesthesia. This method is advantageous in that the entire cyst wall is removed, thereby, at least theoretically, preventing recurrence. However, to achieve such enucleation, widespread detachment of normal surrounding tissue is required, and the wound remaining after dissection of the cyst may produce scarring and result in protracted sclerosis of the vocal fold mucosa.[1] Furthermore, cases of recurrence have been reported, even with enucleation [4]. Chang et al. [2] reported 'wide-opening' method involving incision into the cyst and partial dissection of the cyst wall, along with the overlying vocal fold mucosa has achieved equivalent postoperative improvements in vocal function to those obtained with enucleation. The reported recurrence rate was 1 in 21, demonstrating no greater risk of recurrence even without enucleation. While Chang et al. [2] performed the 'wide-opening' method under general anesthesia, we performed this method under topical anesthesia, which can reduce the treatment cost and time burden for the patient. Furthermore, asking the patient to vocalize during surgery and observing the vocal fold mucosa vibration on stroboscopy can confirm treatment effects in real time. Conventionally, excision of vocal fold lesions under topical anesthesia in an outpatient setting is performed perorally using specialized forceps while observing the glottis on laryngeal endoscopy [5]. However, this approach readily stimulates the gag reflex, which in addition to causing suffering to the patient, can prevent successful completion of surgery if the gag reflex is particularly strong (reported rate of unsuccessful surgery due to gag reflex, ~10%) [5]. Because the present approach does not require the passage of instruments through the mouth, the gag reflex rarely interferes with surgery. In the 48 cases investigated here, none were inoperable due to the gag reflex. Intrafold injection in vocal surgery involving a thyrohyoid approach under topical anesthesia was first reported by Amin et al. [6] in 2006. However, this method was limited by the use of a standard straight needle as an injection needle, which prevented the needle from entering the target site at certain angles [7,8] Achkar et al. [9] used a 3.8 cm-long, 25-G needle for intra fold injection with two separate 45° bends created at the hub and 1 cm from the needle tip. However, with this method, needle length was insufficient in patients with a large larynx, preventing the needle tip from reaching the target site. The DBCN used in the present approach allows the needle tip to reach all aspects (anterior, posterior, lateral) of the vocal folds bilaterally, enabling adequate surgical manipulation at the target site. Incision into the vocal fold mucosa is performed with the tip of a 23-G needle, resulting in minimal surgical invasion of the vocal folds. Use of a wide-opening method also has limited invasiveness, because forceps removal of the cyst wall occurs only in the range of the incision created by the needle tip. Thus, the risk of exacerbation of vocal dysfunction due to postoperative scar formation is also minimized. Rapid postoperative wound healing is also possible, resulting in early postoperative improvement in vocal function. With this method, the recurrence rate is considered to be very low because we experienced no recurrence of cysts in this study.

Conclusion

The ELNS is a simple and useful technique, with a high completion rate. This type of surgery results in minimal invasion of the vocal folds, increased short-term voice improvement, and low recurrence rates.

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