

Treatment Efficacy of Voice Therapy for Vocal Fold Polyps and Factors Predictive of Its Efficacy

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Summary: Objectives. Vocal fold polyps can be treated with either surgical resection or conservative therapy based on voice therapy. This study was designed to analyze the success rate of voice therapy and identify factors that are predictive of the response to this treatment for vocal fold polyps.

Methods. This was a retrospective cohort study of 92 consecutive patients who were diagnosed with vocal fold polyp(s) and received voice therapy. We divided the patients into responding and non-responding groups. We analyzed clinical and voice parameters related to the voice results.

Results. After voice therapy, 40 patients showed improved findings and did not undergo surgical treatment. By univariate analysis, female patients (54.9%) and small polyps (56.1%) showed a good response to voice therapy. In multivariate analysis, female sex (odds ratio [OR] = 0.34; confidence interval [CI]: 0.14–0.81, $P = 0.01$) and small size (OR = 0.15; CI: 0.05–0.47, $P < 0.01$) were significantly related to a successful voice response. In small polyps, the sessile type of polyp was found to be related to a good response rate (OR = 0.24; CI: 0.11–0.95, $P = 0.04$).

Conclusions. Voice therapy is more effective for small vocal polyps, particularly the sessile type, in female patients.

Key Words: Vocal fold polyp–Voice therapy–Type–Size–Predicting factors.

INTRODUCTION

A vocal fold polyp is usually a unilateral lesion occurring on the vocal folds and is a common benign laryngeal lesion. Phonotrauma disrupts the microstructure in the superficial layer of the lamina propria (Reinke's space). This trauma induces local edema, which contributes to subsequent formation of hyalinized stroma, vocal fold polyps, or nodules.¹ Repeated injuries to the true vocal fold induce permanent changes and disturbances in the mucosal vibration, and closure of the vocal fold induces voice changes, hoarseness, and increased vocal effort.² Vocal fold polyps can be observed in various forms, such as sessile versus pedunculated types, and hemorrhagic versus non-hemorrhagic types.³ These distinct features are likely to attribute to different stages or etiologies of polyp formation.

Whereas the preferred treatment for vocal fold nodules involves a conservative management approach, vocal fold polyps are treated with either surgical or non-surgical therapies.^{4,5} Traditionally, surgical therapy, such as resection under the guidance of a laryngomicroscope with mucosa preservation, has been preferred with expected spontaneous healing.^{5,6} Voice therapy or vocal hygiene education plays an adjunctive role after surgery. Surgery as a treatment modality has the associated risks of general anesthesia and voice aggravation induced by scar formation following surgery. However, current studies have proposed conservative treatments, including voice therapy and vocal hygiene, as acceptable alternative definite therapies to improve voice

outcome.⁷ Although conservative management has a longer duration than surgical treatment and may require guidance from a speech language pathologist, the avoidance of invasive surgical treatment may override those limitations.

Definitive treatment guidelines for choosing surgery or conservative management for the treatment of vocal fold polyps have not yet been established. Vocal polyps of a small size, with hemorrhagic features, and occurring in females show a better response to voice therapy or vocal hygiene education.^{4,8,9} It is necessary to find predicting factors related to effective response to voice therapy when deciding treatment modality for vocal fold polyps. Here, this study was designed to analyze the success rate of voice therapy and determining factors for response to voice therapy for vocal fold polyps.

METHODS

Participants

We performed a retrospective cohort study of consecutive patients who underwent voice therapy from January 2012 to December 2013 at Asan Medical Center, Seoul, Korea. This study was approved by our Institutional Review Board. Ninety-two patients over 18 years old and diagnosed with vocal fold polyp(s) upon videostroboscopy were enrolled for voice therapy. Patients with history of previous treatment (either surgical or non-surgical therapy), other types of accompanying organic lesions, missing follow-up sessions, or missing medical records were excluded from this study.

Voice therapy

The same voice therapy protocols were applied to all subjects, including SKMVT[®] with laughter, vocal hygiene, and breathing exercises. Two experienced speech language pathologists (D.H.L. and G.J.) with greater than 5 years of experience with voice disorders conducted the therapy. The therapy sessions were carried out by two experienced speech pathologists. The average number of sessions per subject was 3.3, ranging from 1 to 7

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sessions. The average period of therapy was 2 months, ranging from 1 to 4 months.

Voice evaluation

For perceptual analysis, the GRBAS (Grade, Roughness, Breathiness, Asthenia, and Strain) scale was evaluated by two speech pathologists, blindly. We used a multiple dimensional voice program from a computerized speech lab (CSL model 4500, KayPENTAX Elemetrics, Lincoln Park, NJ) for acoustic evaluation and analyzed jitter, shimmer, and noise-to-harmonic ratio (NHR). For recording the voice, the microphone was placed 10 cm from the patient's mouth and the patient was instructed to produce a sustained vowel /a/ with a comfortable pitch and loudness three times, the average value of which was subsequently used. For aerodynamic evaluations, a PAS (Phonatory Aerodynamic System Model 6600, KayPENTAX Elemetrics) was used to measure the maximum phonation time (MPT), maximum airflow rate (MFR), and subglottal pressure (P_{sub}). MPT and MFR were measured upon a sustained vowel /a/ as long as possible at a comfortable phonation. The longest value after three trials was subsequently used. To measure subglottic pressures, the patient was instructed to repeat the syllable /pa/ seven times at a single exhalation. A facial mask was firmly fitted and an intraoral tube was placed between the lips. All of these evaluations were conducted by two speech pathologists previously mentioned.

When vocal fold polyps were observed using videostroboscopy, we recorded the polyp color, the presence or absence of muscle tension dysphonia (MTD), and the degree of glottal closure using the RLS 9100 device (KayPENTAX Elemetrics). We divided the polyps into three groups according to their size: small if smaller than one fourth of the length of the vocal folds, medium if larger than one fourth and smaller than one third of the vocal folds, or large if larger than one third of the vocal folds.¹⁰ Polyps were divided into two groups, "hemorrhagic" and "non-hemorrhagic," based on color, and also "sessile type" and a "pedunculate type" according to the presence or absence of a tumor stalk (Figure 1). We also divided the subjects into "perfect" and imperfect" groups based on the existence of MTD and the degree of glottal closure. We defined effective or successful voice therapy as a decrease of >50% of the initial polyp size without necessity of surgical resection.

Statistical analysis

Statistical analyses were performed using IBM SPSS software (version 21.0 for Windows; IBM Corp., Armonk, NY). We used the chi-square test and the Student's *t*-test to compare subjects who showed a decrease in size of the polyp but who did not show meaningful decrease. To investigate factors that influence the effectiveness of voice therapy, we used logistic regression to compare subgroups within the "small" group. The *t*-test and logistic regression analysis were performed with a statistical significance level of 0.05.

RESULTS

The age range of the subjects (41 males and 51 females) was 22–72 years, with an average age of 51. After voice therapy, 40 patients showed polyp shrinkage more than 50% and did not

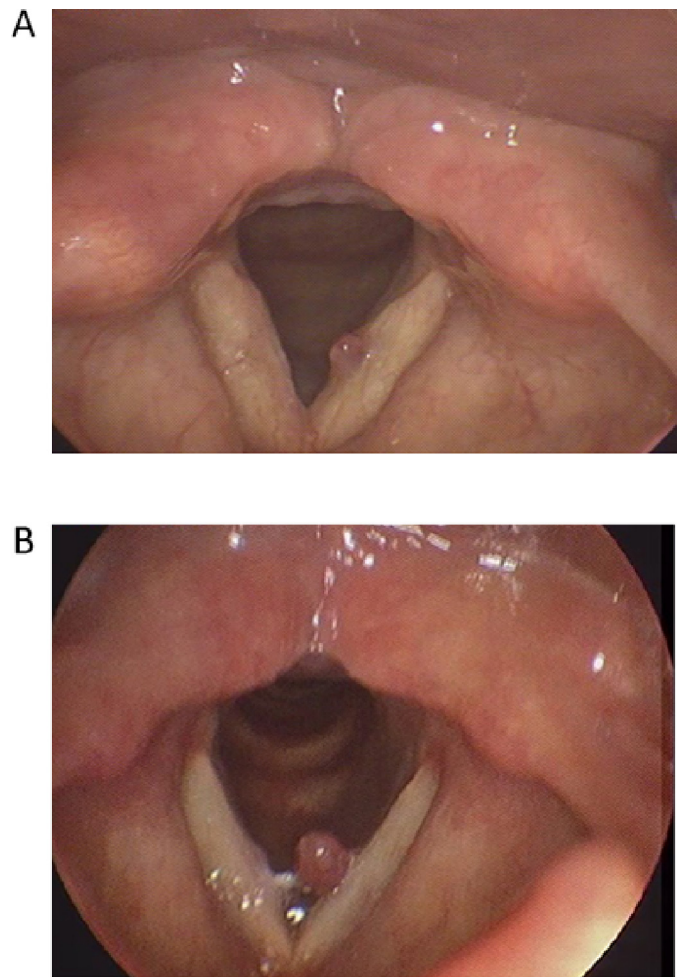


FIGURE 1. Classification of vocal fold polyp according to the stalk: (A) sessile type and (B) pedunculate type.

undergo surgical treatment, whereas 52 patients showed no significant change and 41 patients of them (78.8%) underwent laryngomicroscopic surgery. By univariate analysis, female patients ($n = 28$, 54.9%) presented a good response to voice therapy compared with male patients ($n = 12$, 29.3%, $P = 0.01$; Table 1). Age and smoking were not related to the response to voice therapy. We reviewed the videostroboscopic findings for polyp size, color, and type, and accompanying MTD and glottal closure. Sixty-six patients had a small polyp, whereas 14 and 12 patients showed medium and large polyps, respectively. Small polyps ($n = 37$, 56.1%) responded to voice therapy significantly better than medium- ($n = 2$, 14.3%) or large-sized polyps ($n = 1$, 8.3%, $P < 0.01$). Polyp color and type, accompanying MTD, and glottal closure were not found to be related to the voice therapy response rate. There was no difference found either in the average GRBAS scale, acoustic parameters (jitter, shimmer, and NHR), or aerodynamic parameters (MPT, MFR, and P_{sub}) between responders and non-responders before treatment (Table 2). The responsive patients were also more likely to have higher breathiness than the cases in the non-response group ($P = 0.06$).

In multivariate analysis, female sex was a significant factor indicative of a positive response to voice therapy (odds ratio [OR] = 0.34; confidence interval [CI]: 0.14–0.81, $P = 0.01$;

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