Efficacy of Seo Dong-Il's Technique as a Method of Improving Voice Quality in Patients with Phonasthenia and Vocal Nodules

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ABSTRACT

The purpose of this study was to investigate the effects of Seo Dong-Il's technique on voice quality in patients with vocal nodules and phonasthenia (vocal fatigue). Ten patients (4 nodules and 6 vocal fatigue) participated in the study. Each subject was assessed acoustically (Fo, Jitter, Shimmer, NNE) in the first and last session. Dr. Speech (version 3.4, Tiger-DRS) was used to compare acoustic parameters of pre- and post-treatment.

Seo Dong-Il's technique consisted of breathing exercise, relaxation exercise, and phonation exercise. The results were as follows:

First, Seo Dong-Il's technique tended to be effective on improving voice quality in patients with phonasthenia and vocal nodules. Second, the nature of improvements were as follows: there was a significant difference between pre- and post-treatment in shimmer ($p < .01$) and NNE ($p < .001$), while there was no significant difference between pre- and post-treatment in Fo and Jitter. Finally, given the fact that the number of subjects was only 10, the jitter might have shown a significant difference if more subjects participated in the experiment.

Keywords: Holistic Voice Therapy, Vocal Nodules, Phonasthenia (Voice Fatigue), Dong-Il Seo's Voice Technigue, Vocal Exercises

1. Introduction

Laryngologists and speech-language pathologists often encounter phonasthenia (vocal fatigue) patients who complain of their hoarse and breathy voice quality, loss of voice, lack of vocal carrying power, throat/neck pain, throat fatigue, pain on swallowing and so on, although they do not demonstrate any apparent lesion in their vocal folds. In the field of voice disorder, however, few therapy techniques have been developed for this population.

In addition, the voice disorder group that laryngologists and speech-language pathologists frequently encounter includes patients with vocal nodules. These dysphonic

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patients are mostly children and female adults who usually speak heavily in their job environments such as classrooms and sports centers.

From a clinical point of view, the etiology of vocal nodules is vocal abuse and misuse. The vocal abuse refers to excessive use of voice, while vocal misuse refers to faulty vocal technique resulting from inappropriate use of laryngeal muscles.

A variety of symptomatic voice therapy techniques along with vocal hygiene program have been used for patients with vocal nodules. The facilitative techniques include yawn-sigh, open-mouth approach, establishing a new pitch, change of loudness, chant talk, chewing, and respiration training etc. Generally, these techniques focus on maximizing airflow for breathing, reducing muscular tension of the pharynx and larynx, and leading to a more efficient use of energy during speaking and singing. Through these facilitative technique, the patient acquires new vocal behavior, producing a smoother and clearer voice without hard glottal attack and laryngeal tension.

In addition, holistic voice therapy techniques have been frequently used to intervene voice disorders. The holistic approaches deal with all aspects of voice production, such as breathing, phonation, articulation, and resonance. The representative holistic voice therapy techniques include accent method, vocal function exercises, and resonance voice therapy. There are differences among exercises of each technique, but these techniques focus on relaxation, breathing exercise, body movement, phonation exercise, and articulation/ resonance exercise in common. Furthermore, the final goal is the transfer of the newly learned vocal behavior into connected speech in a natural environment.

The present study, therefore, attempted to investigate the effects of Seo Dong-Il's technique as a holistic voice therapy in the patients with phonasthenia (vocal fatigue) and vocal nodules.

Seo Dong-Il's technique consisted of breathing exercises, humming, relaxation, and phonation exercises. Therapist-patient interaction is in the form of a "ping-pong" game, in which the patient is trying to copy and respond to the therapist's performance. As most of the exercises are in the form of singing, it is very effective in increasing the patient's motivation.

The specific research questions to be answered were:

1) Does Seo Dong-Il's technique improve voice quality of patients with phonasthenia?

2) Does Seo Dong-Il's technique improve voice quality of patients with vocal nodules?

2. Methods

2.1 Subjects

Our study was conducted on patients with phonasthenia who had no vocal pathology

but complained of vocal fatigue symptoms and 4 patients with vocal nodules residing in Seoul. Morphological pathological pathology of vocal folds was confirmed by stroboscopic examination.

Table 1. Characteristics of the subjects

subjects	sex	age	job	pathology	session	vocal symptoms
S_1	F	38	singer	phonasthenia	25	dysodia, difficulty of producting falsetto voice
S_2	F	41	teacher	phonasthenia	5	dysodia, difficulty of producting high pitch
S_3	F	41	teacher	phonasthenia	14	dysodia, throat/neck pain
S_4	M	53	pastor	phonasthenia	5	sensation of an alien matter, sense of dryness
S_5	M	21	student	phonasthenia	14	throat/neck pain
S_6	M	63	teacher	phonasthenia	51	hoarseness
S_7	F	19	student	vocal nodules	7	pitch break, hoarseness in singing
S_8	F	27	teacher	vocal nodules	18	sensation of an alien matter, hoarseness
S_9	F	36	teacher	vocal nodules	20	sensation of an alien matter after operation, hoarseness, short of breath
S_{10}	F	64	housewife	vocal nodules	20	throat/neck pain after operation, short of breath

2.2 Materials

In order to investigate the effects of Seo Dong-Il's technique on voice quality in the patients with phonasthenia and vocal nodules, we administer therapeutic practice individually (For the number of sessions for each patient, see Table 1).

2.3 Procedures

Voice therapy using Seo Dong-Il's technique consisted of relaxation, breathing exercises, and phonation exercises (see Table 2).

Table 2. Exercises of Seo Dong-Il's technique

Procedure	Exercises
Relaxation	① relaxation in supine position ② contemplation in sitting position ③ head, face, neck, and shoulder massage ④ stretching of upper body (reduction of total body tension)
Breathing	① strong inspiration + strong expiration (activation of abdominal muscles) ② weak inspiration + strong expiration ③ strong inspiration + deep & smooth expiration ④ deep & smooth inspiration + smooth expiration ⑤ prolongation of /s/ as long as possible ⑥ humming with forward/backward body movement and laryngeal massage ⑦ thorax massage during smooth phonation of /a/
Phonation	① /nu/ - /i/ while rotating shoulders ② /nu/ - /mi/ while rotation shoulders ③ /mi/ + tongue trill in staccato rhythm ④ /mi/ in legato rhythm (projected sound) ⑤ /mi/ - /me/ (gliding from high to low tone) ⑥ /mi/ - /a/ (gliding from high to low tone) ⑦ /a-e-i-o-u/ (phonation on optimal pitch)

2.4 Apparatus

Dr. Speech (version 3.4, Tiger-DRS) was utilized to measure F_0, jitter, shimmer, and NNE.

2.5 Voice samples and analyses

A measurement was taken for each patient to establish a baseline before the treatment began. The patients were re-assessed after treatment was completed. Each subject was seated stably and positioned at a mouth-to-microphone distance of 10cm.

Acoustic analysis of voice quality used a recording of the patient's best attempt at a stable production of a prolonged /a/ vowel (approximately 3 sec). We selected and analyzed the most stable duration of /a/ vowel (1 sec).

All data were subjected to a statistical analysis by paired t-test.

3. Results

3.1 Voice changes of 6 patients with phonasthenia

Table 3 shows the raw score of the acoustic measures before and after treatment.

Table 3. Acoustic measures of 6 patients with phonasthenia

subjects	session	acoustic measures			
		F_0	Jitter	Shimmer	NNE
1	1	235.2	0.46	3.79	-11.39
	25	226.0	0.16	3.11	-15.65
2	1	272.6	0.34	4.31	-13.94
	5	222.7	0.19	1.83	-13.57
3	1	220.7	0.12	4.53	-14.34
	14	208.1	0.14	2.99	-18.75
4	1	129.1	0.19	6.16	-5.88
	5	122.6	0.14	3.73	-13.96
5	1	124.4	0.22	6.57	-9.94
	14	116.1	0.23	2.51	-16.58
6	1	167.0	0.24	6.01	-10.84
	51	145.0	0.22	4.88	-11.05

There was a strong tendency that voice quality in patients with phonasthenia was improved after voice therapy using Seo Dong-Il's technique.

3.2 Voice changes of 4 patients with vocal nodules

Table 4 shows the raw score of the acoustic measures before and after treatment.

Table 4. Acoustic measures of 4 patients with vocal nodules

subjects	session	acoustic measures			
		F_0	Jitter	Shimmer	NNE
7	1	222.1	0.95	10.32	-6.13
	7	208.4	0.32	5.54	-12.98
8	1	204.5	0.34	6.51	-11.50
	18	234.7	0.16	4.09	-16.79
9	1	258.0	0.18	3.82	-12.57
	20	219.2	0.21	4.53	-15.06
10	1	218.6	0.22	5.19	-10.14
	20	213.3	0.13	3.59	-17.14

There was a strong tendency that voice quality in patients with vocal nodules was improved after voice therapy using Seo Dong-Il's technique.

3.3 Degree of improvement of voice quality

The data was subjected to a t-test. Table 5 shows the results.

Table 5. Results of t-test in 10 subjects' voice quality before and after treatment

parameter	pre- and post-test	df	M	SD	t-value
F_0	pre	9	205.22	50.24	2.01
	post		191.61	45.25	
Jitter	pre	9	0.37	0.24	2.12
	post		0.19	5.793E-02	
Shimmer	pre	9	5.72	1.94	4.06**
	post		3.68	1.13	
NNE	pre	9	-10.67	2.86	4.88***
	post		-15.15	2.29	

**: p<.01 ***: p<.001

A t-test showed that there was a significant difference between pre- and post-treatment in shimmer ($p < .01$) and NNE ($p < .001$) while there was no significant difference between pre- and post-test in F_0 and jitter. There was a strong tendency that jitter was improved although it was not statistically significant. Given the fact that the number of subjects was only 10, the jitter might have shown the significant difference if more subjects participated in the experiment.

4. Discussion

The present study attempted to investigate the effects of Seo Dong-Il's technique on voice quality in patients with phonasthenia and vocal nodules. Our results suggested that Seo Dong-Il's technique was effective on improving voice quality in both of patients with phonasthenia and vocal nodules.

It is well-known that vocal nodules result from vocal abuse and misuse, and that they usually can be treated with modification of vocal behavior (voice therapy). Generally, the patients with vocal nodules usually speak heavily in their job environment, such as a classroom. Teachers may have a greater risk of developing organic laryngeal pathology than individuals who use their voices to a lesser extent. In addition, many people with an inappropriate pitch complain of vocal fatigue (worsening of the voice with prolonged vocal usage), odynophonia (soreness or pain in the throat with prolonged vocal usage) and suffer from dysphonia.

Faulty use of the voice appears to be associated with vocal fatigue of vocal mechanism, as well as the majority of benign voice disorder. As a result, individuals who experience fatigue of the vocal mechanism may be at risk of developing dysphonia and organic laryngeal pathologies such as vocal nodules, polyps, or contact ulcers. Among the population of individuals with voice disorders, classroom teachers may be especially susceptible to vocal fatigue due to the extensive daily use of the voice (Kostyk, 1998).

The present study using Seo Dong-Il's technique aimed at optimizing breath supports and establishing efficient voice production. The relaxation, breathing and phonation exercises used in the study were similar to the exercises in the accent method and the vocal function exercises.

Seo Dong-Il's technique and the vocal function exercises focus on strengthening and balancing the laryngeal musculature and creating a balance among airflow, the laryngeal effort, and the tone placement and converting aerodynamic energy into optimal acoustic energy in common. Namely, through these holistic voice therapy techniques, appropriate breath support for phonation is accomplished and laryngeal muscular tone and mobility are improved.

The vocal function exercises consist of four steps; 1) Warm-up (sustain /i/ as long as possible on a comfortable note). 2) Stretching (glide from the lowest to the highest note in the frequency range, using /o/). 3) Contraction (glide from the highest to the lowest note in the frequency range, again using /o/). 4) Adductory power exercises (sustain the notes C, D, E, F, and G (still using /o/) as long as possible). In comparison, in the exercise of Seo Dong-Il's technique, the patient is asked to glide smoothly from low to high to low note in various chords (i. e., C-E-G-E-C) repeatedly.

These two exercises aim at maintaining the appropriate breath support and maximizing laryngeal muscular strength and elasticity.

Stemple et al. (1994) studied the effects of vocal function exercises (4 weeks) on the voice of 12 adult women. The post-therapy measurement showed significant changes in phonation volume, flow rate, maximum phonation time, and frequency range. They concluded that vocal function exercises have a pronounced effect on the phonation system of healthy, young female adults without laryngeal pathology.

Sabol et al. (1995) studied the effects of vocal function exercises, practiced regularly for 4 weeks, on parameters of voice production in 20 healthy singers. Experimental subjects demonstrated significant improvements in post-treatment aerodynamic measures of flow rate, phonation volume, and maximum phonation time, suggesting an increase in glottal efficiency.

Though it is somewhat difficult to directly compare the results of the 2 studies, in the present study, there was a significant difference between pre- and post-treatment in shimmer ($p < .01$) and NNE ($p < .001$). There was a strong tendency that jitter was

improved although it was not statistically significant. Furthermore, the patients reported that throat/neck pain, sensation of an alien matter, difficulty of phonation, throat fatigue, and lack of vocal carrying power were improved satisfactorily.

We used body movement as a method of facilitating appropriate voice production. The body movement was useful in relaxing shoulders, trunk, neck, larynx and producing proper rate and loudness of speech.

In the following studies, in order to substantiate the effects of Seo Dong-Il's technique more objectively, it will be advisable to include a videostroboscopic examination as well as aerodynamic, and physiologic measurements.

In the study, subjects with no history of voice disorders or laryngeal pathology did not participate as a control group. In future studies, it is necessary to identify the effect of this technique on improving voice quality in subjects with normal voice.

Finally, on the basis of principles of Seo Dong-Il's technique, speech-language pathologists should consider the importance of appropriate breathing and efficient ways in using airflow.

Singing teachers and speech-language pathologists often pay too much attention to respiratory training when teaching singers and patients with voice disorders. It would appear that an excessive emphasis on abdominal and diaphragmatic breathing may result in respiratory dysfunction.

Abdominal and diaphragmatic breathing is an important breathing pattern for speaking and singing. The diaphragm is a large muscle which is located between the chest and the abdomen. In a deep inhalation, the diaphragm moves down and the abdomen moves forward, and in an exhalation the diaphragm moves up and the abdomen moves in. A newborn child breathes with the abdomen. As the child gets older, breathing becomes partially intercostal (i. e., chest breathing). In adulthood most of us breath only through the chest(Sataloff, 1997).

Quiet breathing for biological needs is a cyclic phenomenon that has a relatively short and shallow inspiratory phase followed by an expiratory phase of an equal length. This biological breathing occupies a greater part of respiratory activities. Breathing for communicative purposes and singing is distinctively different from biological breathing. It consists of a quick deep inspiration followed immediately by a long expiration that varies in length (Kotby, 1995).

Abdominal and diaphragmatic breathing is effective for speaking and singing in terms that it is useful for exchanging bigger volumes of air, having a better chance for a more proper timing between exhalation and the onset of phonation, reducing tension in the neck and shoulder, ensuring general relaxation, and alleviating unnecessary tension and so on.

In voice therapy, speech-language pathologist should aim at improvement of coordinating between respiratory and phonatory musculature as well as producing a healthy and

clearer voice through breath control exercise. Namely, it should be emphasized on improving of laryngeal efficiency.

The idea that voice is producted from the abdomen is not scientific. Voice production is a series of vocal mechanism that consists of breath (generate air stream), phonation (converting aerodynamic energy into acoustic energy), and resonance (increasing loudness and pitch).

In order to change behavior, it is necessary to change one's thinking. Repeated incorrect phonation can induce faulty phonatory habits which can be a cause of voice disorders. Consequently, in order to correct faulty phonatory habits with voice therapy, holistic voice therapy techniques dealing with breathing, phonation, articulation, and resonance may be ideal. Especially, for patients who complain of vocal fatigue, a holistic voice approach is effective on strengthening vocal folds.

Reference

Kostyk, E. B. & P. A. Rochet. 1998. "Laryngeal Airway Resistance in Teachers with Vocal Fatigue: A Preliminary Study." *Journal of Voice,* 12(3), 287-299.

Kotby, M. N. 1995. *The Accent Method of Voice Therapy.* San Diego, CA: Singular Publishing Group Inc.

Sabol, W. J., L. Lee & C. J. Stemple. 1995. "The Value of Vocal Function Exercises in the Practice Regimen of Singers." *Journal of Voice,* 9(1), 27-36.

Sataloff, T. R. 1997. *Professional Voice: The Science and Art of Clinical Care (2nd.).* San Diego, CA: Singular Publishing Group Inc.

Stemple, C. J., L. Lee, B. D'Amico & B. Pickup. 1994. "Efficacy of Vocal Function Exercises as a Method of Improving Voice Production." *Journal of Voice,* 8(3), 271-278.

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