

Influence of Collective Esophageal Speech Training on Self-efficacy in Chinese Laryngectomees: A Pretest-posttest Group Study*

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Summary: Total laryngectomy affects the speaking functions of many patients. Speech deprivation has great impacts on the quality of life of patients, especially on self-efficacy. Learning esophageal speech represents a way to help laryngectomees speak again. The purpose of this study was to determine the influence of collective esophageal speech training on self-efficacy of laryngectomees. In this study, 28 patients and 30 family members were included. The participants received information about training via telephone or a WeChat group. Collective esophageal speech training was used to educate laryngectomees on esophageal speech. Before and after collective esophageal speech training, all participants completed the General Self-Efficacy Scale (GSES) to assess their perceptions on self-efficacy. Through the training, laryngectomees recovered their speech. After the training, the self-efficacy scores of laryngectomees were higher than those before the training, with significant differences noted ($P < 0.05$). However, family members' scores did not change significantly. In conclusion, collective esophageal speech training is not only convenient and economical, but also improves self-efficacy and confidence of laryngectomees. Greater self-efficacy is helpful for laryngectomees to master esophageal speech and improve their quality of life. In addition, more attention should be focused on improving the self-efficacy of family members and making them give full play to their talent and potential on laryngectomees' voice rehabilitation.

Key words: laryngectomees; esophageal speech; collective training; self-efficacy; quality of life

Laryngeal cancer is the most common malignancy in the head and neck, ranking 11th in terms of its morbidity in male tumors^[1]. Total laryngectomy (TL) is mainly required for advanced cases^[2]. It is used when organ-preservation treatment is not possible, or non-surgical treatment fails^[3, 4]. After TL, the patients face many issues, including loss of speech, breathing change, permanent tracheostoma, increase in sputum, olfactory impairment, and appearance change^[4]. The biggest obstacle for laryngectomees is loss of normal speech, and hence voice rehabilitation is one of the most difficult challenges for these patients^[5, 6]. Doctors and nurses have worked in cooperation to explore different methods for speech rehabilitation. At present, esophageal speech, electrolarynx, tracheoesophageal fistula, and voice prosthesis are the most common

approaches towards voice rehabilitation in total laryngectomees^[5]. The electrolarynx is the simplest solution that requires only an instrument and a note, and little training for laryngectomees to speak. However, the sound of the electrolarynx is mechanical and unclear^[7]. In contrast, use of the tracheoesophageal fistula is a surgical approach that laryngectomees need frequent prosthesis replacement, which may represent an economic burden for them, limiting access to its use^[8]. In contrast, esophageal speech is welcomed in developing countries because of its low cost^[5]. However, it is harder to learn esophageal speech than the other two approaches. Hence, it is necessary for laryngectomies to undergo esophageal speech training.

As mentioned, loss of the vocal organ is a heavy blow for laryngectomees and can negatively affect disease rehabilitation and quality of life of them and their families^[6, 9]. They can lose confidence and suffer self-denial once communication is hindered. For example, when they want to take interact at a party, voice deprivation can be a barrier for them. This kind of feeling is especially strong if the patient holds a high position in society or in a group. A study by Babin *et al*^[10] suggested that there were significant increases in feelings of solitude after TL, and that voice deprivation

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was a limiting factor in social relationships, tending to push individuals into social withdrawal. Voice is the main tool for human communication. Esophageal speech training aims to help laryngectomees regain their voice and self-confidence, and improve social relationships. Laryngectomees can conceal their history of surgery when they speak normally.

Using the vibrations of the pharyngeal/esophageal mucosa as a sound source, the vibratory air column is channeled through the articulatory apparatus of the upper pharynx and oral cavity, where it can be modified and modulated to produce an understandable voice^[11]. The process of learning esophageal speech requires the willpower and persistence of laryngectomees. People with high levels of self-efficacy are inclined to respond well to the challenges of harder tasks and have much more confidence. Benight *et al*^[12] considered that the patient's self-perceived quality of life was correlated with functioning, psychological well-being, and self-efficacy. Self-efficacy is the core concept in Albert Bandura's social cognitive theory, defined as the belief in one's ability to succeed in specific situations or accomplish a task^[13]. One is more likely to be positive and active in life if he believes there will be good outcomes. Thus, we performed a study to learn whether collective esophageal speech training could improve laryngectomees' speech rehabilitation and self-efficacy.

1 MATERIALS AND METHODS

1.1 Ethics Statement

The study was approved by the Ethics Committee of Union Hospital of Tongji Medical College, Huazhong University of Science and Technology, and written informed consent was obtained from each participant.

1.2 Study Sample

All laryngectomees had undergone surgery at the Department of Otorhinolaryngology, and Neck at Union Hospital of Tongji Medical College, Huazhong University of Science and Technology (also called Wuhan Union Hospital, China) from December 2016 to April 2017. These laryngectomees received information with respect to training by telephone and a WeChat group (a kind of chat software) in May and June 2017. We set down the eligibility criteria for all patients. Patients were included who: (1) had a histopathological diagnosis of laryngeal cancer; (2) had undergone TL; (3) had received a rest period of at least 2 months after surgery, radiotherapy, or chemotherapy; (4) had voluntarily decided to participate in the study; and (5) had clear capacity to think and express ideas in the form of speaking, gestures, or writing. The exclusion criteria for all patients were as follows: (1) presence of severe systematic disease; (2) presence of mental illness; (3) unhealed wound after

surgery, radiotherapy, or chemotherapy; and (4) prior participation in esophageal speech training. Each laryngectomee needed to be accompanied by one or two family members who were healthy enough to look after them during the training.

1.3 Voluntary Training Team

We recruited a voluntary training team and established a WeChat chatting group named "Union Laryngeal Voice" to communicate with the laryngectomees. The team included 15 nurses, 15 doctors and 2 laryngectomees who had already mastered the esophageal speech well. All the members of the team were in the WeChat chatting group and some laryngectomees and one of their family members were selected to join it. Each member of the team has the division of labor. Three head nurses made overall plans for the project and drawn up the training handbook. Two ENT professors who were skilled in voice medicine evaluated the patients' phonatory function after esophageal speech training. There was an attending doctor who was responsible for assessing the time when the patients were suitable to participate in the training. A skilled nurse who got the certificate of the advanced language trainer and 2 skilled laryngectomees were the qualified teachers for the esophageal speech training. A nurse who got the certificate of national second-level psychologists was responsible for psychological counseling to patients. There were 12 resident doctors and nurses taking turns to be in charge of patients' safety, comfort and laryngectomy stoma care during training, collecting the questionnaires and answering patients' questions in the WeChat chatting group.

1.4 Collective Esophageal Speech Training

The collective esophageal speech training was held from Monday to Friday and continued for 4 weeks. The training was divided into 4 parts as follows.

1.4.1 Warm-up This part started from 2:00 p.m. to 2:30 p.m. and continued 30 min. When all the laryngectomees and their family members were present, they stood up. The training teacher played a rhythmic music and led the trainees to do some warm-up. It would improve the positivity of the trainees. Then, the laryngectomees needed to speak by using what phase of the esophageal speech they had mastered. If they made sounds, all members on the scene would applaud for them.

1.4.2 Content Explanation This part began from 2:30 p.m. to 3:30 p.m. and continued 60 min. Its content included 4 phases^[14]. Each phase lasted for one week. In the basic sound formation phase which was the most important, laryngectomees had to practice hiccups and master methods of air inhalation and insufflation into the esophagus. In the syllable pronunciation phase, laryngectomees practiced combining pronunciation and articulation, excised vowels, consonants, and

numbers. In the words and phrases training phase, laryngectomees practiced simple words and phrases, improving speech intelligibility step by step. In the sentence practice phase, laryngectomees learned to articulate short sentences and gradually improved pronunciation.

1.4.3 Vocalization Practice in Class This part started from 3:30 p.m. to 4:30 p.m. and also continued 60 min. The laryngectomees had 30 min of free practice. They could sit or stand when they practiced, which was better for breathing and pronunciation. Three teachers walked around and directed them individually. And in the next 30 min, the teachers selected the typical problem to explain. Then, every laryngectomee also needed to speak by using what they have studied on that day.

1.4.4 Practicing and Answering Questions through the Wechat Chatting Group This part started from 6:30 p.m. to 7:30 p.m. and also continued 60 min. The trainees received everyday homework including speaking out some Chinese characters, words and sentences with increasing difficulty, and sent the voice records into the WeChat chatting group. Their family members helped them practice and encouraged them. If they had any question, they could ask in the group during that time. There were medical staffs on duty.

1.5 Data Collection

Firstly, the questionnaire method was used to assess the self-efficacy of laryngectomees and their family members before and after the training. The questionnaire was divided into two parts, and comprised of the participants' general information and General Self-Efficacy Scale (GSES). The participants' general information included gender, age, years of education, and so on. The GSES is a self-administered questionnaire that is widely used to obtain subjective assessments of self-efficacy. The scale was developed by Luszczyńska *et al*^[15], translated to the Chinese version, and validated by Wang *et al*^[16]. The scale's Cronbach's α was 0.87, retest reliability was 0.83 ($P < 0.001$), and split half reliability was 0.90 ($P < 0.001$). The GSES consists of ten items, with each item scored by the Likert score method ranging from 1 to 4. If the participants consider that the item is absolutely incorrect, the score is 1, the score is 2 if the item is partially correct, a score of 3 is given for mostly correct item, and a score of 4 is given for absolutely correct item. The total scores of the GSES range from 10 to 40. Higher scores reflect a better perception of self-efficacy. The items of the self-efficacy scale are simple and understandable, which enables them to be completed in short time by laryngectomees.

Secondly, the laryngectomees' voice rehabilitation was assessed before and after training by two ENT professors who were skilled in voice medicine. There were four levels including dysphonia, uttering

syllables, articulating simple words and phrases, and speaking out short sentences.

Designated researchers explained the questionnaire and collected them on the spot. All data and paper documents were stored in the designated cabinet. Only the authors had right to gain access to the information, and the information did not reflect individual situations during or after data collection.

1.6 Statistical Analyses

An Excel table was used for processing data. SPSS version 20.0 was used for statistical analysis. Two researchers were responsible for data input and verification. The enumeration data were described by mean and standard deviation, and the measurement data were described by frequency and percentages. Then, the paired-samples *t*-test was performed to determine whether there were statistically significant differences in self-efficacy scores for laryngectomees and their family members before and after training. The laryngectomees' voice rehabilitation was tested by chi-square test. Results were evaluated at the 95% confidence interval and the level of significance was $P < 0.05$.

2 RESULTS

2.1 General Information

Data on general information of the laryngectomees are presented in table 1. One patient withdrew on the third day of the training for the health reason. Of the remaining 28 laryngectomees, 3 women and 25 men completed the training. They were aged 44–78 years, with 75% aged between 46 and 65 years. For 67.86% of the laryngectomees, years of education was ≤ 9 . None of them were current smokers, and three of the laryngectomees were drinkers. Fifteen of them had

Table 1 General data on the participants (n, %)

General information	Laryngectomees (n=28)	Family members (n=30)
Gender		
Male	25 (92.86%)	8 (26.67%)
Female	3 (10.71%)	22 (73.33%)
Age		
≤ 35 years	0	6 (20.00%)
36–45 years	1 (3.57%)	4 (13.33%)
46–55 years	9 (32.14%)	13 (43.33%)
56–65 years	12 (42.86%)	6 (20.00%)
≥ 66 years	6 (21.43%)	1 (3.33%)
Years of education		
≤ 9	14 (50.00%)	15 (50.00%)
12	5 (17.86%)	2 (6.67%)
≥ 15	9 (32.14%)	13 (43.33%)
Smokers	0	6 (20.00%)
Drinkers	3 (10.71%)	4 (13.33%)
Postoperative radiotherapy	15 (53.57%)	/
Nausea	2 (7.14%)	/

undergone postoperative radiotherapy. During the training, two laryngectomees had slight symptoms of nausea; none had any other discomfort. The discomfort diminished as the laryngectomees rested and did not recur.

The data on general information for the family members are also presented in table 1. There were 30 family members accompanying the laryngectomees in the training. Eight were men and 22 were women. They were aged 43–63 years, with 43.33% aged between 46 and 55 years. In terms of education, 50% had received <9 years, and 43.33% had received >15 years. Six were smokers and four were drinkers.

2.2 Laryngectomees' Voice Rehabilitation

Only two laryngectomees could utter a few syllables and 26 of them were dysphonia before training. After training, all laryngectomees could utter syllables, 15 of them could articulate simple words and phrases, and five of them could speak in short sentences. Hence, there was a significant difference in voice rehabilitation before and after training, and the chi-square value was 41.89 ($P<0.05$)

2.3 Participants' Self-Efficacy

After training, the participants' self-efficacy was improved. However, only laryngectomees showed significant differences in scores ($P<0.05$). The scores of family members did not appear to change after training. The self-efficacy scores of family members were only higher than those of laryngectomees' before training ($P<0.05$, table 2).

3 DISCUSSION

Based on the general information, most laryngectomees were male aged between 46 and 55 years, indicating that this population is vulnerable to laryngeal cancer. Most of them had solely completed 9 years of compulsory education, or had not finished at all, representing low education levels. These patients had greater needs with respect to esophageal speech training. The reasons may be due to limited learning ability or an inability to find other ways to recover their voice. All or most laryngectomees did not smoke or drink because they had partly lost their capacity to do so, and many knew the harm of these activities. Most of the family members who accompanied the laryngectomees were female and slightly younger than the laryngectomees. Few of them smoked or drank, and they had education levels similar to those

of laryngectomees. These characteristics may be attributed to the fact that most of laryngectomees were men, and the family members were their wives, sisters, or daughters who wanted to accompany them.

From the point of view of restoration of vocalization, most laryngectomees recovered their voices after collective training. This indicates that even though esophageal speech is very difficult for laryngectomees to learn, laryngectomees can recover their voices through the collective training. The successful collective training is partly attributed to the improvement in self-efficacy of participants^[17]. Self-efficacy improves the individual's self-confidence with respect to thinking, feeling, self-motivation, and behavior. Good self-efficacy can help persons to achieve their goals^[18].

The results of our study showed that laryngectomees' self-efficacy scores were improved after collective esophageal speech training. The difference in scores was significant. Laryngectomees who had undergone TL had difficulties and concerns that were largely functional and psychological^[19]. Excluding functional difficulties, there were psychological concerns including depression, regret, and lack of personal resolution^[19]. Hence, in our study, while the laryngectomees who participated in training expressed their strong willingness to learn esophageal speech at the beginning, their test results implied that this was not the case. After training, laryngectomees who recovered their voices had improved self-efficacy. This was because the esophageal speech closely resembled a normal voice, and was easily accepted by others. Practice helped laryngectomees pronounce longer sentences and enabled them speak normally^[20]. A study of 128 patients with TL on achieving voice rehabilitation reported that patients who mastered esophageal speech obtained lower scores in the Perceived Stress Scale and Voice Handicap Index-10, reflecting a better quality of life^[21]. An advantage of esophageal speech is that patients may speak without any tools, which is another reason for the laryngectomees' persistence.

Kresić *et al*^[17] concluded that success in mastering esophageal speech did not depend on whether the patients were trained individually or collectively. However, our study showed that collective practice may have a relationship with scores of self-efficacy and help the laryngectomees to master esophageal speech. One reason may be that this collective training includes

Table 2 Self-efficacy scores for participants ($\bar{x}\pm s$)

Participants	Before training	After training	<i>t</i>	<i>P</i>
Laryngectomees (<i>n</i> =28)	25.57±2.300	27.11±2.629	-5.695	0.000
Family members (<i>n</i> =30)	26.87±2.360	27.13±2.360	-1.610	0.118
<i>t</i>	2.114	0.040		
<i>P</i>	0.039	0.968		

medical staffs, patients and their family members who had the same disease experience. Firstly, knowledge of caretakers plays a role in the speech rehabilitation options that can be offered^[22]. In the study, a voluntary training team was recruited and patients experienced a standardizing training. Standardizing training strategies can improve their knowledge and self-efficacy^[23]. Secondly, peer support can help cancer patients and relatives cope in and outside the hospital in several ways^[24]. Laryngectomees experience a sense of belonging when meeting other laryngectomees with the same disease, with the same willingness to learn speech, and who have the same teacher. This kind of belongingness strengthened laryngectomees' confidence and gradually eliminated their negative feelings. Thirdly, family support is also the a key to patients' recovery^[25]. Family members were able to express their concerns about laryngectomees, exchange information on caring methods, learn from each other, and help laryngectomees to master techniques after class to make them feel more confident in continuing the training. Another reason may be that collective training occurred in small social groups, so laryngectomees would have courage to take part in the social activity after training, and that may have improved the self-efficacy of laryngectomees. The collective training was a public service activity organized by medical staffs who showed the human caring to the discharged laryngectomees. As we all know, human caring is important for patient satisfaction and nurse-patient relationship. If patients experience the human caring showed by the medical staff^[26], self-efficacy, which is correlated with patient satisfaction and nurse-patient relationship^[27], will be improved.

With respect to the self-efficacy of family members, a slight improvement after training was observed, but it was not significant. One reason is that family members were in good health, and due to their lack of medical knowledge, they considered that it was not difficult for laryngectomees to learn esophageal speech. Another reason may be that the training paid little attention to family members. However, many studies reported that family support was important for patients with chronic diseases^[25]. Also, family members with good self-efficacy was related to improvement in the patients' self-efficacy^[28]. So in the future study, more attention should be focused on the education for family members to make them give full play to their talent and potential on laryngectomees' voice rehabilitation.

On comparing, the family members' levels of self-efficacy were higher than those of laryngectomees' before training. Most of the laryngectomees were male, while over two-thirds of the family members were female. It is contrast to one study which showed that the self-efficacy of men was higher than that of women^[29]. The reason may be that TL is a physically and

mentally exhausting experience. After laryngectomy, even with two months of rehabilitation after surgery or radiotherapy, most male laryngectomees' self-efficacy scores were lower than those of their female family members at the beginning of training. However, after training, laryngectomees' feeling of self-efficacy were similar to those of their family members. Hence, training provided a chance for laryngectomees to regain their confidence and motivation.

It is important to point out that this study has some limitations. On one hand, the sample of the study was small, and, as such, may not represent the overall characteristics of this group of the population. On the other hand, the investigators were the members of the medical staff who participated in the training, which may have affected laryngectomees' and their family members' answers in the questionnaire, causing bias. In any case, it was found that collective esophageal speech training is a good way to enhance laryngectomees' self-efficacy and help them return to normal social activity in China. However, further studies are needed to elucidate these results more conclusively.

The results of the questionnaire provide a clear distinction before and after the laryngectomees' esophageal speech training. Levels of self-efficacy in laryngectomees become higher once they have the chance to speak again. Higher self-efficacy promotes greater confidence, which is helpful for rehabilitation and enables a better quality of life. For laryngectomees, regaining speech can lead to less stress, better communication, and improve satisfaction and outcomes.

Conflict of Interest Statement

The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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