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Original scientific paper

Perceptual Evaluation of Alaryngeal Speech

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A B S T R A C T

The aim of this study was to compare the self-assessed vocal handicap of laryngectomees treated with three different communication methods: tracheoesophageal speech, esophageal speech and electrolarynx. Forty-eight patients, 40 males and 8 females, who had undergone total laryngectomy for laryngeal carcinoma were enrolled in the study. Depending on the voice restoration method, all patients were divided into three groups: 20 patients were tracheoesophageal speakers (group 1), 13 patients were esophageal speakers (group 2) and 15 patients were electrolaryngeal speakers (group 3). They autonomously completed the Croatian version of Voice Hendicap Index, a questionnaire that was developed to quantify the patient's perception of deficiency due to vocal dysfunction. Statistical analyses were performed using the Statistical Package for Social Sciences (SPSS 13.0), and the data obtained with each group and scale were formally compared. 31.25% of patients rated their voice disorder as a minimum handicap, 54.16% of patients rated their voice disorder as a medium handicap, and 14.58% of them rated their voice disorder as a significant handicap. There are differences between each group, but differences were not statistically significant. No single method is considered to be the best for every patient. Selection of a method should be based on the input from the patient, surgeon and speech pathologist.

Key words: *Voice handicap index, total laryngectomy, rehabilitation*

Introduction

Total laryngectomy still remains the procedure of choice for advanced laryngeal carcinoma. However, the procedure is associated with important consequences: loss of normal voice, loss of nasal function, permanent tracheostomy, changes in lung function, swallowing difficulties and psychological problems[1]. Difficulties in these areas could negatively impact a patient's perceived quality of life. Although improving survival remains the primary goal in treating patients with laryngeal carcinoma, functional rehabilitation of laryngectomized patients has become as important as cure and survival[2]. One of the most obvious consequences of total laryngectomy is the loss of laryngeal speech. Over the years, different methods of voice rehabilitation have been developed. The three basic options for voice restoration after total laryngectomy are tracheoesophageal speech, esophageal speech and electrolaryngeal speech. Understanding the potential of all methods of post-laryngectomy communication is essential for holistic patient management[3].

Evaluating their effectiveness and benefits by measuring quality of life became a major concern of voice rehabilitation after total laryngectomy, because of the importance of including the subjective parameters[4,5].

The objective of this study was to examine patient-perceived voice-related quality of life in patients treated with three major methods of post laryngectomy voice rehabilitation on the basis of results of Voice Handicap Index (VHI) questionnaires[6].

Subjects and Methods

Sample

Testing was conducted on a sample of 48 totally laryngectomized subjects of both sexes (40 men (83.33%) and 8 women (16.66%)), average age 62.2 years. Subjects were divided into three groups according to the type of alaryngeal speech. The first group of 20 respondents

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(41.66%) consisted of persons with voice prosthesis (tracheoeophageal speech). The second group of 13 respondents (27.08%) consisted of persons who learned esophageal speech. The third group of 15 respondents (31.25%) consisted of people who use speaking machine (electrolarynx). None of the patients had respiratory problems and no recurrence of a disease. Inclusion criterion for the study was minimum follow-up of 3 month since completion of oncological and voice rehabilitation treatment.

Measuring instruments and variables

The survey was conducted by the Croatian version of the scale Voice Handicap Index, which consists of 30 items, divided into three different subscales: functional, physical and emotional. Within each scale there are 10 items. Particles are separated (consisting of five levels of assessment: 0 -never, 1 – seldom, 2 – sometimes, 3 – often, 4 – always).

The manner of performing tests

Testing was conducted at the Department of Otorhinolaryngology and Head and Neck Surgery, Osijek University Hospital Center, individually and in different periods of time, as each participant was required to fill the scale. The scale was given to the respondents in written form and they did an assessment of their own replacement speech. Most of them wrote the scale alone and the subjects with different vision impairments may have responded verbally, after which the examiner recorded the answer.

Methods of data processing

After completing the test, the examiner has added up the scores on individual subscales and total score. The resulting data were analyzed in Statistical Package for Social Sciences (SPSS 13.0) computer program for statistical analysis. Testing normality of distribution was done by One-Sample Kolmogorov-Smirnov test, then frequencies and percentages wtre calculated and One-way analysis of variance was made.

Results

This study examines the voice handicap as experienced by laryngectomees in their functional, physical and social aspects of everyday life. The overall VHI scores are shows that 31.25% of patients rated their voice disorder as a minimum handicap, 54.16% of patients rated their voice disorder as a medium handicap, and 14.58% of them rated their voice disorder as a significant handicap (Table 1).

The minimum score on the functional scale was 3 (TES), and the maximum was 31 (ELS).The minimum score on the physical scale was 1 (TES, ELS) and the maximum was 33 (ES). The minimum score on the emotional scale was 0 (TES), and the maximum was 34 (ES, ELS). Total minimum score is 8 (TES, ELS) and the maximum is 83 (ES) (Table 2).

TABLE 1
ANALYSIS OF THE OVERALL VHI SCORES

	TES	ES	ELS	TOTAL	%
VHI_{min}	9	3	3	15	31.25
VHI_{med}	10	8	8	26	54.16
VHI_{sig}	1	2	4	7	14.58

TES – tracheoesophageal speech, group 1; ES – esophageal speech, group 2; ELS – electrolaryngeal speech, group 3; VHI_{min} – minimum voice handicap; VHI_{med} – medium voice handicap; VHI_{sig} – maximum voice handicap

TABLE 2
MINIMUM AND MAXIMUM VALUES OF THE RESPECTIVE LEVELS

scale	TES		ES		ELS	
	min	max	min	max	min	max
F	3	27	5	24	4	31
P	1	26	7	33	1	26
E	0	34	2	29	2	29
total	8	77	15	83	8	73

TES – tracheoesophageal speech, group 1; ES – esophageal speech, group 2; ELS – electrolaryngeal speech, group 3; min – minimum value; max – maximum value; F – functional scale; P – physical scale; E – emocional scale

TABLE 3
VARIABILITY WITHIN AND BETWEEN GROUPS

	mean	df	F	p
V_1	528,944	2	1.477	0.239
V_2	358,013	45		
total		47		

V_1 – coefficient of variation between groups; V_2 – coefficient of variation within groups

Variability between groups is greater than the variability within each group (Table 3).

There are differences between each group, but differences were not statistically significant. Estimates of the variance for the groups determined that the variability between groups are greater than variability within each group (Table 4).

Discussion

The history of voice rehabilitation following laryngectomy is as long as the history of laryngectomy itself, since the first operation was performed by Billroth in 1873[7]. Effective voice restoration is critical to the successful prevention of psychological, social and economic consequences of postlaryngectomy aphonia. Development in post-laryngectomy speech rehabilitation has led to substantial improvements in quality of life[8,9]. Tra-

TABLE 4
DESCRIPTIVE STATISTICS

	min	max	mean	SD	α_3		α_4	
					s	s_x	s	s_x
N (48)	8	83	39.895	19.112	0.272	0.343	-0.4	0.674

N – total number of respondents; min – minimum score; max – maximum score; mean – arithmetic mean; SD – standard deviation; α_3 assimilation coefficient; α_4 – flattening coefficient; s – standard error of measurement

cheoesophageal speech using voice prosthesis has revolutionized voice rehabilitation after total laryngectomy, and it has become the most preferred method in the past decades. A majority of laryngectomy patients at the Department of Otorhinolaryngology and Head and Neck Surgery, Osijek University Hospital Center use tracheoesophageal speech to communicate. Some of them successsfully learn esophageal speech. Candidates for electrolarynx are patients who have falled other methods. Our patients use it in the early postoperative period or in addition to other methods.

Tracheoesophageal voice sounds natural and is of good quality, and major disadvantages are complications associated with tracheoesophageal fistula, and voice prosthesis must be cleaned and removed regullarly[10]. Esophageal speech has historically been the method of choice, but speech acquisition is usually delayed because of the learning curve[11]. The major advantage of electrolarynx is that it is learned quickly, but voice quality is distinct and sounds mechanical. It can be useful in the early post operative period or in addition to other methods[12]. All these methods have many advantages and disadvantages, and none is the best for everyone.

In this study, patient-perceived voice-related quality of life in patients treated with this three major methods of post laryngectomy voice rehabilitation, on the basis of the results of Voice Handicap Index (VHI) questionnaires, show no significant differences in functional, physical and emotional aspects. The differences in the three studied groups of patients for the VHI total score, as well as for the three subscales, were not statistically significant, demonstrating the similarity of voice related quality of life. We expected that tracheoesophageal speech is superior to other techniques of alaryngeal speech. It is generally expected that live without larynx is really big handicap, and patient satisfaction with alaryngeal speech is not so good.

It is interesting that most of the laryngectomee assessed voice disorder as a medium handicap. A possible explanation for this result is that all respondents usually used speech only for everyday communication, and 89.58% of them are unemployed or retired.

It is well accepted that tracheoesophageal speech is better than other alaryngeal phonation techniques, and there can be a difference between the physician and patient understanding and assessing the impact of voice quality and speech on quality of life after total laryngectomy. A possible explanation could be that the patients consider the voice impairment after laryngectomy an inevitable consequence which is less important than the cure of malignant disease.

Conclusion

Although, the tracheoesophageal puncture has become the preferred method in the past decades, no single method is considered to be the best for every patient. Selection of a method should be based on the input from the patient, surgeon and speech pathologist. Whatever speech rehabilitation method is used, it is important that the patient is motivated and encouraged by a multidisciplinary team.

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PERCEPTIVNA PROCJENA ALARINGEALNOG GOVORA

S A Ž E T A K

Cilj ovog istraživanja bio je usporediti vlastitu procjenu govornog nedostatka laringektomiranih osoba rehabilitiranih trima različitim metodama govorne rehabilitacije: traheoezofagealnim govorom, ezofagealnim govorom i govorom pomoću elektrolarinksa. Četrdeset i osam pacijenata, 40 muškaraca i 8 žena, kod kojih je učinjena totalna laringektomija zbog raka grla uključeni su u studiju. Ovisno o metodi govorne rehabilitacije, pacijenti su podijeljeni u tri skupine: 20 bolesnika koristi traheoezofagealni govor (skupina 1), 13 bolesnika govore ezofagealno (skupina 2), a 15 bolesnika koristi se elektrolarinksom (skupina 3). Samostalno su ispunili hrvatsku verziju Indeksa vokalnih teškoća (Voice Handicap Index), upitnika koji je osmišljen u svrhu ocjene vlastite percepcije vokalne disfunkcije. Statistička analiza provedena je korištenjem Statističkog paketa za društvene znanosti verzija 13,0 (SPSS 13,0), a uspoređivani su dobiveni podaci za svaku skupinu. 31,25% ispitanika ocijenilo je svoj poremećaj glasa kao minimalni hendikep, 54,16% ispitanika ocijenilo je svoj poremećaj glasa kao umjereni hendikep, a 14,58% ih je ocijenjeno svoj poremećaj glasa kao značajan hendikep. Postoje razlike između svake skupine, no nisu statistički značajne. Niti jedan metoda govorne rehabilitacije nakon totalne laringektomije nije najbolja za svakog pacijenta. Izbor odgovarajuće metode treba se temeljiti na procjeni pacijenta, kirurga i logopeda.