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SUBJECTIVE ASSESSMENT OF THE QUALITY OF LIFE OF LARYNGECTOMIZED PATIENTS BEFORE AND AFTER SPEECH REHABILITATION

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Abstract: Introduction: Total laryngectomy exposes the patient to a great deal of psychological stress, both because of the underlying disease and the loss of a very important organ in the overall functioning of the organism and organs, which enables an adequate communication process. Objective: The aim of this study is to conduct a subjective assessment of the quality of life of laryngectomized patients before and after vocal rehabilitation. Methods: The study involved 50 patients after total laryngectomy, ranging in age from 51 years to 83 years. A subjective assessment of speech and voice was conducted with the University of Michigan Quality of Life Instrument — HNQOL and Voice Handicap Index — VHI. These instruments provide information from the patient about the treatment or treatment applied, as well as the impact that vocal rehabilitation has on the quality of his or her life before and after treatment. Results: Prior to vocal rehabilitation of the HNQOL scale, patients experienced pronounced difficulties on all subscales, especially when it came to communication ($\bar{x} = 5.75 \pm 8.64$) and emotions ($\bar{x} = 16.66 \pm 15.17$); expressed, while chewing/food ingestion ($\bar{x} = 53.91 \pm 26.45$) and pain ($\bar{x} = 50.50 \pm 17.71$) had mean values. VHI scale (physical subscale $\bar{x} = 36.6 \pm 2.93$; emotional subscale $\bar{x} = 34.96 \pm 3.79$; functional subscale $\bar{x} = 35.64 \pm 3.37$) before vocal rehabilitation, all subjects (100%) belonged to the third category (severe handicap), which was a problem when it came to psychosocial functioning. After vocal rehabilitation, the mean values on the HNQOL scale were very highly expressed and statistically highly significantly improved (communication $\bar{x} = 93.37 \pm 10.28$; emotions $\bar{x} = 90.58 \pm 8.23$; chewing/swallowing food $\bar{x} = 96.66 \pm 5.77$; pain $\bar{x} = 92.25 \pm 6.98$) which indicated a good quality of life. On the VHI scale of low value (physical subscale $\bar{x} = 10.84 \pm 4.41$; emotional subscale $\bar{x} = 4.42 \pm 4.63$; functional subscale $\bar{x} = 21.32 \pm 13.29$) shows a statistically high significant improvement, ie good psychophysical and functional condition patient. Conclusion: Subjective assessment after vocal rehabilitation resulted in improvement of all parameters tested, especially in the domain of communications and emotions. Vocal rehabilitation has had a positive effect on improving the quality of life of these patients, integrating them into the family and the environment, as well as performing daily activities that we observe through their physical, emotional and functional state.

Keywords: Larynx tumor, Total laryngectomy, Quality of life, HNQOL scale, VHI scale.

INTRODUCTION

Total laryngectomy is a radical procedure that results in the permanent loss of the generator and part of the resonator of the voice, the larynx in which the underlying laryngeal tone is created [1]. Total laryngectomy is performed in advanced cases of laryngeal cancer with signs of deep laryngeal infiltration (T3) or in tumors that have spread to adjacent organs (T4), ie when all

the potential for partial surgery is exhausted (2, 3). The patient is exposed to a great deal of psychological stress, both because of the underlying illness and the loss of a very important organ in the overall functioning of the organism and the organ participating in the exercise of communication [4]. Total laryngectomy leads to physical and functional changes that can affect the emotional state and

some of the most basic life functions, including breathing, swallowing and communication [5]. Speech rehabilitation is a complex and active process that requires the involvement and cooperation of a laryngectomized person and speech therapist. Speech is an expression of social activity because it is realized in communication with other people. Rehabilitation of laryngeomized patients modifies the anatomy of the upper aerodigestive pathways, creating new anatomical conditions on which breathing, swallowing and phonation functions will have to be organized [3]. It is a very important form of rehabilitation, which in addition to successfully mastering one of the methods of speech increases confidence, creates a better sense of security and improves quality of life [6].

The basic possibilities of speech rehabilitation after total laryngectomy are the development of esophageal speech skills, treoesophageal puncture with the use of a vocal prosthesis, and the use of electrolarynx.

Quality of life has been conceptualized as a multidimensional concept in which health, well-being, health comprehension, functional status and life choices overlap [7, 8]. Some define quality of life in cancer patients as the difference between patient expectations and low achievement that affect quality of life improvement [9]. Quality of life is a general well-being that encompasses objective factors and a subjective evaluation of physical, material, emotional and social well-being, including personal development and purposeful activities [10].

Basic aspects of quality of life are health, functional ability, life satisfaction and independence [11]. It can be measured using a variety of questionnaires, which are mostly completed by patients and thus gives an opinion on the experience of their speech and voice when it comes to physical, emotional and functional state. The quality of life of patients after total laryngectomy is studied within the oncology of head and neck tumors, because of all malignant tumors of the head and neck, laryngeal cancer is the most common cause of oral cancer and oropharynx.

The aim of this study is to examine the quality of life of laryngectomized patients before and after vocal rehabilitation.

METHODS

The study involved 50 patients after total laryngectomy, ranging in age from 51 years to 83 years. The research was conducted at SWU "SvetiVračevi" Hospital in Bijeljina and the Military Medical Academy in Belgrade from April 2014 to November 2015. Data on gender, age, education, smoking experience, time when rehabilitation was initiated, vocal rehabilitation model, and length of treatment were collected through a questionnaire and interview with a patient.

A subjective voice assessment was conducted with University of Michigan Quality of Life Instrument instruments — HNQOL, Terrell et al. [12] and the Voice Handicap Index — VHI, Jacobson et al. [13]. University of Michigan Quality of Life Instrument — HNQOL scale is used to evaluate the quality of life of patients with head and neck cancer. It has been translated into many languages and adapted to different cultures. It was adapted for our speech area by Petrovic-Lazic, Bunijevac in 2014. The scale contains 30 questions, 20 of which are used to score four domains of quality of life assessment: communication (4 points), chewing/swallowing food (6 points), pain (4 points) and emotions (6 points). Respondents were tasked with selecting the answer given for each of these questions, expressing their feelings and opinions about the possibility or success of communication, the possibility of chewing / swallowing food, pain and emotional state. The HNQOL scale can also be used to assess a patient's satisfaction with treatment or treatment, as well as the impact of speech rehabilitation on the quality of his or her life before and after treatment.

Voice Handicap Index — The VHI scale is used to measure the therapeutic outcome of vocal rehabilitation as well as to evaluate the severity of a voice problem. The VHI scale covers three areas, namely: P — physical, E — emotional, F — functional. Each area contains 10 questions. Respondents were tasked with selecting the answer given for each question: "never", "almost never", "sometimes", "almost always", "always". In this way, they expressed their opinions about the experience of their voice and speech when it comes to physical, emotional and functional state. The VHI scale can provide information about the degree of speech disability experienced by the patient himself and the impact that vocal rehabilitation has on the

quality of his or her life before and after treatment. Data were collected on two occasions. Patients completed the questionnaire the first time they came to the speech therapist, before starting treatment and the second time after completing the treatment.

Descriptive measures, arithmetic mean with associated standard deviation, as well as minimum and maximum were used in the statistical data processing. Frequency and percentages, and t-test for dependent samples were used. Statistical analysis and analysis were

done in the SPSS version 20 (Statistical Package for the Social Sciences) computer program.

RESULTS

The study involved 50 patients after total laryngectomy, 47 male subjects and three female subjects, as shown in Table 1. All subjects in this study were smokers. The most frequently represented respondents were pensioners, slightly fewer were persons in employment, and these were mostly persons with secondary education. The examiners came from both urban and rural areas.

Table 1. Structure of the sample by gender, smoking status, education and place of residence

		Frequency	Percentage
Gender	Male	47	94.0
	Female	3	6.0
Smoking status	Smoker	50	100
	Non-smoker	—	—
Education	Primary school	4	8.0
	High School	31	62.0
	VS more	15	30.0
Employee	Employment	13	26
	Pensioners	26	52
	Farmere	11	22
City life	The countryside	17	34.0
	City	33	66.0

f - frequency, % - percentage.

The age of the respondents ranged from 51 to 83 years (Table 2). The length of smoking experience ranges from 20 to 55 years, and the

length of treatment ranges from one month to 12 months.

Table 2. Structure of the sample by age of the respondent, length of smokers' time and length of treatment

	N	Min	Max	M	SD
Age	50	51.00	83.00	62.6	7.32
Smoking duration (years)	50	20	55	35.82	6.16
Duration of treatment (months)	50	.00	12.00	3.29	1.79

N - number of subjects, Min. - minimum, Max. - maximum, \bar{x} - arithmetic mean (mean), SD - standard deviation.

Patients mastered two models of speech, namely esophageal and electro-laryngeal speech (Table 3).

Table 3. Structure of the sample according to vocal rehabilitation model

	N	%
Patients that managed esophageal speech	44	88,0
Patients that are using electrolarynx	6	12,0
Total	50	100,0

N - number of subjects, % - percentage.

Prior to vocal rehabilitation, the HNQOL subscales had low levels of expression on the HNQOL subscale, especially with regard to communication and emotion subscales, whereas the subscales related to food ingestion and chewing and pain had medium levels. Using the t-test for dependent samples after vocal rehabilitation, statistically significant

improvement was found on all subscales of the HNQOL scale (Table 4). A statistically significant difference on the HNQOL scale also exists in the total score before and after treatment, which means that better overall functioning of patients in all examined domains after treatment compared to the pre-treatment period, which also indicated a better quality of life.

Table 4. HNQOL scale — before and after vocal rehabilitation

HNQOL	Application Time	\bar{x}	SD	t	p
Chewing/swallowing food	Before treatment	53.91	26.45	-12.07	0.00
	After treatment	96.66	5.77		
Communication	Before treatment	5.75	8.64	-43.28	0.00
	After treatment	93.37	10.28		
Emotion	Before treatment	16.66	15.17	-31.94	0.00
	After treatment	90.58	8.23		
Pain	Before treatment	50.50	17.71	-15.96	0.00
	After treatment	92.25	6.98		
Total	Before treatment	52.50	17.71	-16.06	0.00
	After treatment	93.57	6.36		

\bar{x} - arithmetic mean, SD - standard deviation, t - t-test, p - statistical significance
Statistically significant values are highlighted (bold)

Prior to vocal rehabilitation on all subscales of the VHI scale, subjects had high mean values, which negatively affected their quality of life. Using the t-test for dependent samples after vocal rehabilitation, statistically significant improvement was found on all subscales of the VHI scale, that is, the patients' physical,

emotional and functional condition improved after treatment (Table 5).

A statistically significant difference on the VHI scale also exists in the total score before and after treatment, which means that the overall functioning of patients after treatment is better compared to the pre-treatment period.

Table 5. VHI scale — before and after vocal rehabilitation

VHI	Time of using	\bar{x}	SD	t	p
Physical subscale	Before treatment	36.6	2.93	32.7	0.00
	After treatment	10.84	4.41		
Emotional subscale	Before treatment	34.96	3.79	39.9	0.00
	After treatment	4.42	4.63		
Funcional subscale	Before treatment	35.64	3.37	35.4	0.00
	After treatment	6.06	5.25		
Total	Before treatment	107.2	8.46	39.10	0.00
	After treatment	21.32	13.29		

\bar{x} - arithmetic mean, SD - standard deviation, t - t-test, p - statistical significance
Statistically significant values are highlighted (bold)

DISCUSSION

Laryngeal cancer accounts for 1-3% of all malignant tumors and has increased significantly in recent years. About 20% are present in head and neck tumors. They occur more frequently in males (94%) than in females (6%), which has been reported in studies by other authors [14, 15]. It has been observed that men consume more alcohol and cigarettes than women.

The age structure influences its frequency, so a sharp increase is observed after the age of 40. The age of the respondents in our study ranged

from 51 to 83 years ($\bar{x} = 62.6 \pm 7.32$). The results in this study are comparative with the results of a number of studies that state that laryngeal cancer occurs from 4 to 7 decades, with most cases occurring in the sixth decade of life [16, 17].

One of the leading causes of laryngeal cancer is smoking. In our study, all subjects were active smokers with an average length of smoking time of 35.8 ± 6.16 years. Other authors also highlight the negative effects of smoking when it comes to the occurrence of laryngeal cancer [18, 19, 15], as well as the combined effect of smoking and alcohol consumption [20].

The length of vocal rehabilitation ranged from one month to one year. In patients who successfully mastered esophageal speech, vocal rehabilitation lasted longer, while patients who successfully mastered electro-laryngeal speech had three to five treatments. According to other researchers, continuous speech rehabilitation lasted from three to eight months [21], and mastering esophageal speech from six to twelve months [15]. Vocal rehabilitation should take as long as necessary to achieve optimal results.

Before vocal rehabilitation based on the results obtained on the HNQOL scale, patients had impaired quality of life in all domains. Neilson et al. [17] state that in patients after total laryngectomy there is a generalized sense of diminished quality of life.

Inability to speak in our study adversely affected the quality of life of patients after total laryngectomy, which is consistent with other studies [22, 23, 24, 15, 25].

Prior to vocal rehabilitation, laryngectomized patients exhibited emotional distress related to their condition. Other authors' research findings [22, 26, 15] also highlight the negative impact of

physical appearance on patients' emotional state, leading to a decline in quality of life.

On the subscale, chewing/ingesting food prior to vocal rehabilitation, subjects experienced moderate interference with taste loss and chewing / ingestion of food, which negatively affected their quality of life, consistent with other studies [27, 28].

Pain is one of the most common symptoms in cancer patients and is a common cause of depression, fear, hopelessness and declining quality of life [29]. In our study, the presence of pain in the subjects was of moderate intensity. They mostly had shoulder pain, which negatively affected their quality of life.

Based on the results obtained on the VHI scale, all subjects belonged to the group of severe speech handicap prior to vocal rehabilitation, which is understandable because laryngeal cancer is a chronic disease that causes emotional and psychological problems in the patient [30]. Multiple studies have shown that total laryngectomy has a negative impact on the physical, emotional and functional state of the patient leading to a decline in quality of life [31, 32]. The physical consequences of total laryngectomy limit the patient in social activities as well [6]. In patients after total laryngectomy, social functions and roles in the environment in which they live are impaired, the disease prevents them from performing family, social and professional activities [6]. Inclusion in different types of treatment has a positive impact on reducing these problems, with vocal rehabilitation being the primary one, as shown in our study.

After completing vocal rehabilitation, mastering one of the methods of speech had the positive effect of neglecting physical appearance, enhancing self-confidence and a sense of security, and thus improving the quality of life. Vocal rehabilitation in patients after total laryngectomy affects their emotional, social and psychological functioning, as well as a better quality of life [33, 26, 15].

Involvement of patients after total laryngectomy in the process of vocal rehabilitation and speech control is one of the important factors for improving quality of life, facilitating return to normal life activities and positively influencing the improvement of emotional state of these patients [34]. Which method will be used in the vocal rehabilitation process varies from patient to patient. Tracheoesophageal speech is one of

the most preferred methods [35], with electro-laryngeal speech the most commonly adopted allaryngeal phonation [36], while esophageal speech is the best and most natural way of establishing speech function.

The goal of vocal rehabilitation is to enable patients to successfully communicate with the environment using some of the models of alaryngeal speech, and thus improve their quality of life. The success of vocal rehabilitation is judged by the patient's subjective experience, that is, his / her self-assessment of how successful he / she is in daily activities and how satisfied he / she is with his/her quality of life.

CONCLUSION

Subjective assessment after vocal rehabilitation led to an improvement in all parameters examined, especially in the domain of communication and emotions. Vocal rehabilitation is of great importance in patients after total laryngectomy and is aimed at successfully mastering one of the speech methods, which is strongly associated with improving quality of life. It allows the return to normal life activities and improves the

emotional state of these patients, thus reducing the consequences of total laryngectomy. The positive effect of vocal rehabilitation is achieved by strengthening self-confidence and creating a sense of security. The success of vocal rehabilitation is judged by the patient's subjective experience, that is, their self-assessment of how successful they are in their daily activities and how satisfied they are with their quality of life. In the future, improving the quality of life of laryngectomized patients should be one of the main goals that can be achieved through a multidisciplinary treatment approach and vocal rehabilitation, enabling them to return to the social and work environments more quickly.

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