

Schuster, Maria; Lohscheller, Jörg; Hoppe, Ulrich; Kummer, Peter; Eysholdt, Ulrich; Rosanowski, Frank:

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URN: urn:nbn:de:gbv:ilm1-2014210065

Published OpenAccess: September 2014

Original published in:

Folia phoniatica et logopaedica : international journal of phoniatrics, speech therapy and communication pathology ; official organ of the International Association of Logopedics and Phoniatrics (IALP). - Basel : Karger (ISSN 1421-9972). - 56 (2004) 1, S. 62-67.

DOI: 10.1159/000075329

URL: <http://dx.doi.org/10.1159/000075329>

[Visited: 2014-08-29]

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Voice Handicap of Laryngectomees with Tracheoesophageal Speech

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Key Words

Voice handicap · Laryngectomy · Prosthetic
voice restoration

Abstract

The evaluation of diagnostics and therapies includes more and more subjective, i.e. emotional and social aspects. Focussing on the handicap experienced by dysphonic patients, the Voice Handicap Index (VHI) has previously been found to be of significant clinical and scientific value for different voices. In this study the VHI questionnaire was applied to demonstrate the voice handicap of 20 male laryngectomees using tracheoesophageal voice (Provox®), aged 65.5 ± 8.7 years. Their VHI was 45.5 ± 24.1 , which was significantly higher than the score of patients with functional voice disorders, but differed only slightly from patients with organic laryngeal dysphonia. Focussing on

individual data, VHI scores ranged from values similar to persons without voice disorder to maximum handicap of 101. Comparing the VHI scores with the laryngectomees' gradual self-perception of voice disorder severity, no consistent relationship was found. Considering the large interindividual differences, the VHI may serve as a valuable instrument for the assessment of individual interventional needs rather than for the identification of a general laryngectomees' handicap.

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Introduction

Over the last years, outcome parameters in medicine have changed. Apart from biological aspects, emotional and social dimensions have become more and more important and can be quantified by an increasing number of specific instruments.

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1021-7762/04/0561-0062\$21.00/0

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Evaluation of health-related quality of life (QOL) describes the way an individual experiences her or his disease. Concerning laryngectomees, QOL has often been a particular topic of investigation besides studying physical limitations, e.g. tracheostoma, voice problems and others [1, 2]. Several publications comparing total laryngectomy with organ-sparing surgical techniques pointed out that patients after partial laryngectomy had a higher QOL than patients after total laryngectomy [3–5]. In previous investigations, we analyzed QOL data and coping strategies of laryngectomees with tracheoesophageal voice. While physical limitations and role limitations due to physical and emotional restrictions had a decreasing impact, we could not discover any social limitations of relevance for the laryngectomees' QOL. The design of previous investigations did not allow for sufficient information on the role of the restored voice in the social context [6, 7].

Therapists tend to overemphasize the role of speech after laryngectomy whereas patients themselves rated communication only in the third place on a scale of factors essential for their QOL [8]. However, there is obviously a lack of systematic information on how laryngectomees perceive their restored voice.

Following the WHO's definition of impairment, disability and handicap, disease-related aspects should be analyzed by specific tests. In laryngectomees, impairment commonly concerns the loss of the larynx and the resulting functional limitations and disabilities like the loss of laryngeal voice, stoma problems, loss of smell, and diminished sense of taste. Handicap is defined as 'a social, economic, or environmental disadvantage resulting from an impairment or disability'. Considering the handicap due to dysphonia, the Voice Handicap Index (VHI) was developed by Jacobson et al. [9] in 1997. It proved to be of significant value both for clinical and scientific purposes

[10–14]. In Europe, it has been recommended by the European Laryngeal Society to assess psychological and social consequences of dysphonia. Until now, only few data have been reported on the VHI of laryngectomees with restored voice [15]. This study focusses specifically on the voice handicap as measured by the VHI in laryngectomees with voice restoration by tracheoesophageal puncture.

Patients and Methods

Twenty male German laryngectomees aged between 50 and 86 years (65.5 ± 8.7 years) participated in the study. Informed consent was obtained from each test person. Laryngectomy had been performed at least 1 year prior to the investigation, and the voice had successfully been restored by Provox® voice prosthesis. The patients completed the VHI questionnaire in a quiet and comfortable room. The VHI forms were filled out during routine follow-up sessions. Fifteen age-matched male subjects without voice disorder, 15 with functional voice disorders and 29 with organic voice disorders (chronic laryngitis, benign tumors, vocal fold palsy) served as controls [16].

A German version of the VHI was used [16]. Data were analyzed according to Jacobson et al. [9] using Excel® and Matlab® software programs. Correlation analysis was performed using Wilcoxon rank sum test.

Results

The results are given in table 1. In a range of possible values from 0 (no voice handicap) to 120 (maximal voice handicap), the mean value in this study was 45.5 ± 24.1 with large interindividual differences (13–101). These interindividual differences were also seen in the three subscales (physical, functional and emotional handicap). There was no significant age dependency ($p > 0.5$). Self-perception of voice disorder severity ranged from a minimum of 1 (normal voice) to a maximum of 4 (severely disturbed voice). Between self-perception and VHI data of the three scales and

Table 1. VHI data of 20 laryngectomees using tracheoesophageal voice and mean values

Patient	Self-perception of severity	Functional scale	Physical scale	Emotional scale	Global VHI
1	2	24	19	21	64
2	2	11	12	8	31
3	3	15	15	9	39
4	1	24	17	13	54
5	4	1	19	9	29
6	2	11	5	11	27
7	1	1	9	2	12
8	3	20	18	18	56
9	2	14	14	16	44
10	4	36	30	35	101
11	1	4	7	2	13
12	4	29	21	19	69
13	1	10	6	5	21
14	1	4	11	8	23
15	3	29	25	17	71
16	1	8	6	6	20
17	3	17	23	16	56
18	1	22	18	21	61
19	4	11	19	12	42
20	2	20	30	26	76
Mean	2.25	15.55	16.2	13.7	45.45
SD	1.16	9.86	7.54	8.30	23.96

Table 2. Results of Wilcoxon rank sum test comparing laryngectomees with patients with laryngeal voice disorders and normal voices

p	No voice disorder	Nonorganic dysphonia	Organic dysphonia
Physical scale	<i><0.001</i>	<i>0.28</i>	<i>0.49</i>
Functional scale	<i><0.001</i>	<i>0.02</i>	<i>0.04</i>
Emotional scale	<i><0.001</i>	<i>0.01</i>	<i>0.09</i>
VHI	<i><0.001</i>	<i>0.036</i>	<i>0.10</i>

Significant differences are italicized.

global VHI no significant correlation existed (fig. 1).

In comparison to normal controls and functional voice disorders, the VHI score demonstrated a significantly higher voice

handicap for laryngectomees in each scale (fig. 2). A significant difference between laryngectomees and patients with organic voice disorders was detected only in the functional scale (table 2).

Fig. 1. Comparison between self-perception of the severity of a voice disorder and VHI scores. Severity of a voice disorder ranges from normal voice (1) to severely impaired voice (4) and shows no significant correlation to VHI scores.

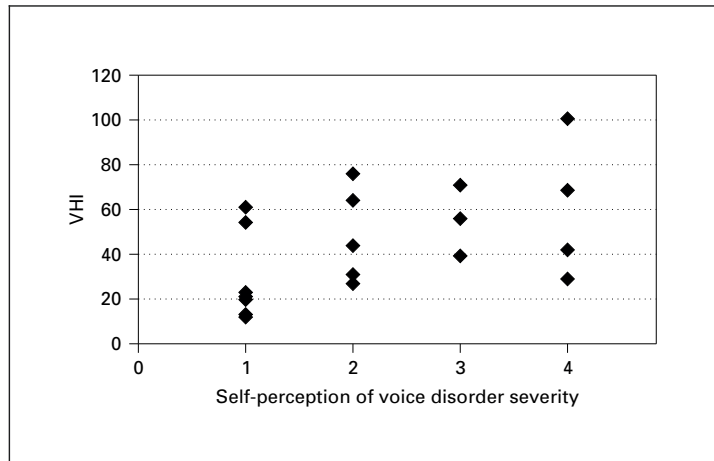
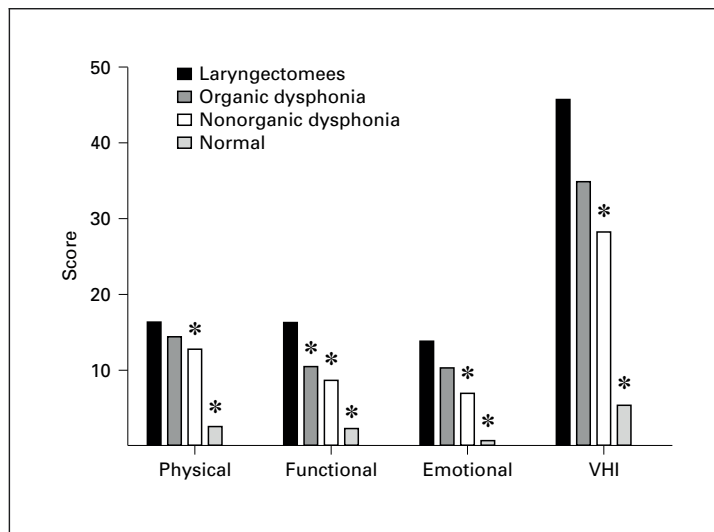


Fig. 2. VHI mean data of different groups of patients: laryngectomees, patients with organic and nonorganic voice disorder and those without voice disorder. Significant differences between laryngectomees and other groups are marked with an asterisk.



Discussion

This study examined the voice handicap experienced by laryngectomees with tracheoesophageal voice. In comparison with other alaryngeal phonation techniques such as esophageal speech or the use of an electrolarynx, tracheoesophageal speech shows several advantages: Since acoustic characteristics resemble those of original laryngeal speech [17],

medical professionals consider it to be the most acceptable alaryngeal speech for the patient. Yet, there are differences between tracheoesophageal speech and laryngeal speech, e.g. higher perturbation values, lower dynamic ranges and temporal differences [18, 19]. Comparisons between alaryngeal speakers and patients with organic voice disorders showed significant differences only in the functional subscale but not in other scales.

Obviously, the VHI does not depend on etiological factors of voice disorders such as laryngeal cancer, benign tumors or laryngitis.

Regarding data of laryngectomees with tracheoesophageal speech in the USA [15], the patients in our study showed a slightly higher handicap in every scale, which can also be seen when comparing other dysphonic patients of different cultural backgrounds [16]. The phenomenon of a slightly higher VHI might be attributed to sociologic and cultural differences in how patients experience their disease, and to possible oncological differences such as tumor site and stage and different therapies.

In this study, large interindividual differences of VHI scores were found: Some patients presented almost 'normal' scores, others nearly maximum values. These differences were also seen in self-perception of voice disorder severity, thus a significant relationship could not be found. In conclusion, no 'specific' voice handicap of laryngectomees exists. Surprisingly, more than a quarter of the patients denied having any voice disorder (self-perception of voice disorder severity), possibly due to different frames of reference concerning voice quality and due to the difficulty of judging abstract descriptions of their voice. Questions about everyday speech situations as applied by the VHI questionnaire avoid these difficulties and can give further details.

In our study group, we found no significant relationship between age and VHI, but a tendency to lower VHI in younger laryngectomees. This resembled the data obtained in previous QOL research where social subscores including speech skills showed the same dependency on age [7].

One question of the VHI focusses on economic disadvantages because of voice disorder. Two of 20 laryngectomees surprisingly reported a maximum disadvantage, whereas

18 did not suffer from economic disadvantages at all. Probably, the 2 of the 20 did not discriminate between their voice handicap and their malignant disease although only the latter was to blame for their economic disadvantages.

According to the concept of the VHI, which evaluates the subjective perception of handicap independent from objective factors, Stewart et al. [15] did not discover any simple relationship between VHI and acoustic voice parameters. We do not assume significant relations between VHI and simple acoustic voice analysis, either. Nevertheless, our future research will have to examine carefully whether there are any objective voice parameters of essential impact on the patients' positive perception of their own voice in order to optimize therapy.

This investigation shows that the VHI is a valid instrument to describe voice handicap also in laryngectomees. A single question or global rating of voice quality such as the self-perception of voice disorder severity does not describe voice handicap sufficiently. In clinical practice, the VHI's results may serve as a guide to individual therapeutic case management concerning the voice restoration of laryngectomees.

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