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### Angaben zur Veröffentlichung / Publication details:

Kasper, C., Maria Schuster, Georgios Psychogios, Johannes Zenk, A. Ströbele, F. Rosanowski, E. Gräsel, and T. Haderlein. 2010. "Voice handicap index and voice-related quality of life in small laryngeal carcinoma." *European Archives of Oto-Rhino-Laryngology* 268 (3): 401-4.  
<https://doi.org/10.1007/s00405-010-1374-0>.

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# Voice handicap index and voice-related quality of life in small laryngeal carcinoma

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**Abstract** Laryngeal cancer can affect the patients' voice. For assessment of the patients' self-perception of their voice, several tools were introduced into clinical routine. The voice handicap index questionnaire (VHI) is regarded as the "gold standard". However, in benign laryngeal pathologies and in functional dysphonia, the shorter voice-related quality of life questionnaire (V-RQOL) proved to be equivalent. This study examines the correlation of both questionnaires in patients who had been treated for small (T1 and T2) laryngeal cancer. It was performed during regular outclinic examinations. In total, 65 patients aged  $62.1 \pm 10.0$  years completed the German versions of the VHI and V-RQOL. Their average VHI total score was  $38.9 \pm 26.0$  points and the average V-RQOL score was  $70.1 \pm 24.4\%$ . The total scores correlated with  $|\rho| = 0.92$  and  $p < 0.01$ . Both questionnaires give quasi identical results, the shorter V-RQOL may be favoured for clinical application.

**Keywords** Voice-related quality of life · Voice handicap index · Laryngeal carcinoma · Partial laryngectomy

## Background

Laryngeal cancer is the most frequent malignant tumour of the head and neck. In Germany, incidence is 6.1 in men and 0.7 in women with a maximum at the age group of 70–75 years [1]. The disease itself and/or its treatment may cause disturbances in voice, swallowing, and respiration [2]. The focus of this paper is on dysphonia after treatment. Besides oncological and functional aspects, patient's self-perception has gained an increasing importance in both clinical and scientific medicine in recent years [3, 4]. The present study deals with methodical aspects of how to measure self-perception of dysphonia in patients who were treated for small laryngeal cancer, i.e. T1 and T2 tumour stages.

The European laryngological society (ELS) recommends a comprehensive assessment of impairment, disability, and handicap in patients with voice disorders including the measurement of patients' self-perception of their dysphonia [5]. Up till now, several assessment tools were introduced into clinical routine with the voice handicap index (VHI) as the "gold standard" [6–8]. It is a questionnaire with 30 items in its original version. However, shorter versions, such as the VHI-12 [9] present almost identical results. For patients with voice disorders of benign origin, the equivalence of the German version of the VHI [3, 5] was compared with the results of the Voice-related quality of life (V-RQOL) questionnaire [7]. The V-RQOL comprises 10 questions [10] only, and hence was regarded more suitable for clinical purposes due to its restricted number of items.

In this study, both the VHI and the V-RQOL questionnaire were applied to patients who had been treated for

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small laryngeal cancer. The questions to answer were whether both tools present similar results and whether the shorter V-RQOL can be regarded as equivalent and thus more applicable in clinical routine.

## Patients

In total, 65 patients aged  $62.1 \pm 10.0$  years (34.0–83.0 years) took part in the study after informed consent. The group consisted of 58 men aged  $62.6 \pm 9.4$  years (43.9–83.0 years) and 7 women aged  $60.8 \pm 12.4$  years (34.0–66.3 years). They had been operated for T1 ( $n = 35$ ) or T2 laryngeal cancer ( $n = 30$ ) using organ preserving techniques  $2.7 \pm 2.6$  years (0.1–12.1 years) prior before to the investigation. 10 of them (15.4%) had undergone postoperative radiochemotherapy, and 11 (16.9%) radiotherapy alone. At the time of examination, none of the patients suffered from recurrent tumour growth, cervical or other metastases, and none of the patients had a tracheostoma. More details concerning the test persons are shown in Table 1. All patients were native German speakers. Data were collected during regular outclinic follow-ups in a separate, quiet room before clinical examination by an experienced ENT surgeon.

The study respected the principles of the World Medical Association (WMA) Declaration of Helsinki on ethical principles for medical research involving human subjects. It was approved by the ethics committee of the University of Erlangen-Nuremberg.

## Methods

All test persons completed both the V-RQOL [7, 10] and VHI [11] questionnaire in previously described German versions [5]. High scores of the VHI (possible range 0–120 points) depict a severe subjective feeling of impediment whereas, in the V-RQOL questionnaire, low scores (possible range 0–100%) describe a severe handicap. Hence, both scales show opposite orientation.

**Table 1** Location of the carcinoma among T1 ( $n = 35$ ) and T2 ( $n = 30$ ) tumour patients

	T1 tumour	T2 tumour
Both sides	2	6
Right side	15	11
Left side	18	13
Supraglottic	3	13
Glottic	30	16
Subglottic	2	1

Complete data sets were collected from all participants and the data were analyzed using the commercially available software SPSS version 15.0. Spearman's rank-order correlation coefficient was calculated to compare the total values of both questionnaires.

## Results

### V-RQOL

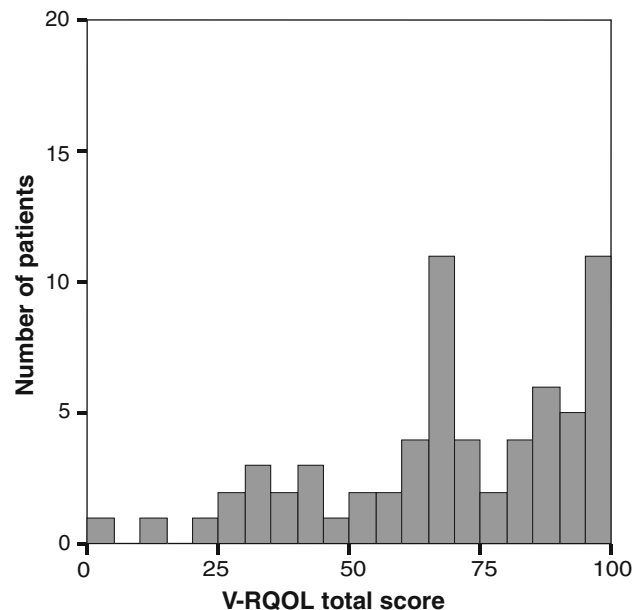
In patients with T1 carcinoma, the V-RQOL score was  $70.4 \pm 24.5\%$  (range 12–100%), and in T2 carcinoma, it was  $69.8 \pm 24.6\%$  (range 0–100%). As both values do not differ in a significant level, the V-RQOL score of the whole study group was calculated as  $70.1 \pm 24.4\%$  (range 0–100%) (see Fig. 1).

### VHI

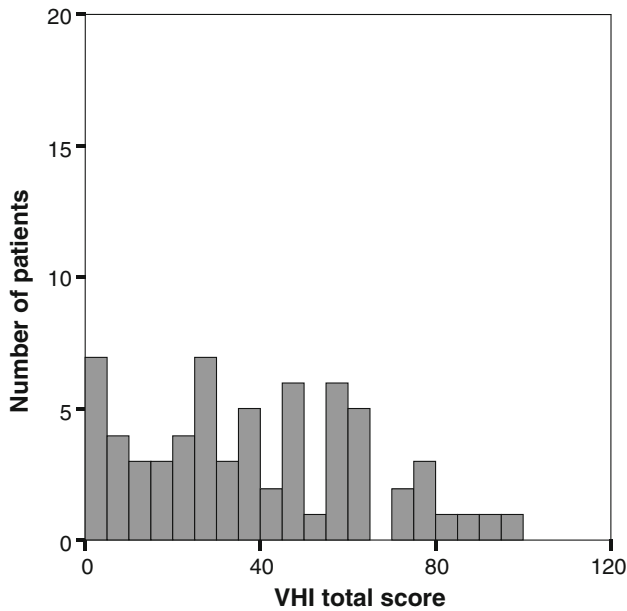
In patients with T1 carcinoma, the VHI score was  $39.0 \pm 26.7$  points (range 0–91 points), and in T2 carcinoma, it was  $38.8 \pm 25.6$  points (range 0–100 points). As both values do not differ on a significant level, the VHI score of the whole study group was calculated as  $38.9 \pm 26.0$  points (range 0–100 points) (see Fig. 2).

### V-RQOL vs. VHI

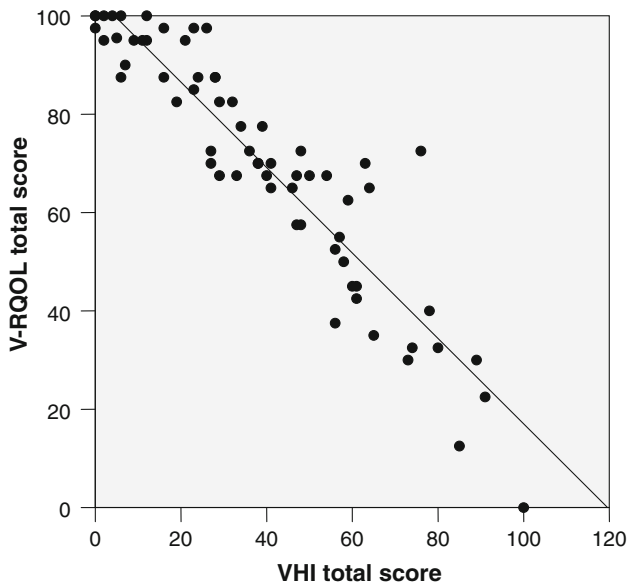
Spearman's rank-order correlation coefficient between the results of both questionnaires was  $-0.92$  ( $p < 0.01$ ) (see Fig. 3).



**Fig. 1** Voice-related quality of life (V-RQOL) total score in 65 patients who had suffered from T1 and T2 laryngeal cancer



**Fig. 2** Voice handicap index (VHI) total score in 65 patients who had suffered from T1 and T2 laryngeal cancer



**Fig. 3** Voice-related quality of life (V-RQOL) against Voice Handicap Index VHI total scores in 65 patients who had suffered from T1 and T2 laryngeal cancer

## Discussion

Dysphonia may affect communication and social integration and cause psychological and emotional problems and thus deteriorate quality of life [12, 13]. This counts both for dysphonia of benign and malignant origin. Therefore, in recent years, beside organic and functional aspects, dysphonic patients' self-perception of their voice became an equally important medical parameter [14].

Voice preservation and restoration in small laryngeal cancer is of outstanding importance as life expectancy is not diminished in these patients [1], and most of them need occupational reintegration [6]. Beside this clinical consideration, a scientific aspect alludes to this topic as well: Voice function and self-perception of dysphonia may be different in patients treated with different surgical and radiological regimes and voice outcome might be an important parameter for further evaluation of therapeutic strategies [4, 15, 16]. The voice function is assessed according to the consented structured recommendations [3, 7, 17]. Up till now, there is no consensus of how to measure the patients' self-perception of their dysphonia in cases of small laryngeal cancer.

Voice-specific aspects of quality of life were operationalized as voice-related quality of life [2] and as voice handicap [15], respectively. Several questionnaires proved to be valid and were introduced into clinical practice [3, 7, 10, 18]. Two of them, the V-RQOL and the VHI, were used in this study. The V-RQOL questionnaire comprises ten items. In its original version [7, 10], two factors were identified—a physical–functional and a social–emotional domain. However, for the German version, only one overall factor was found [6]. The VHI questionnaire comprises 30 items. In its original version [3, 17], three factors were identified, i.e. a physical, a functional, and an emotional domain. In its German version, the VHI is depicted one-dimensionally [3, 5]. For the purpose of this study, the sum scores of both questionnaires were compared. In case of identical results, both in clinical practice and for scientific purposes, the assessment of self-perception of dysphonia might be restricted to the shorter V-RQOL questionnaire.

The V-RQOL scores in this study covered the complete possible range with an obvious ceiling effect. Hence, it may be concluded that the questionnaire differentiates best in cases when patients perceive a diminished voice-related quality of life. For clinical purposes this seems suitable as it may be assumed that the V-RQOL questionnaire might adequately depict pre–post changes in cases when voice therapy is performed. At present, the reporting group conducts a prospective study on this topic in a clinical cohort with small laryngeal cancer. However, previous studies on patients with benign voice disorders revealed that the V-RQOL questionnaire is an appropriate tool to describe pre–post changes [5, 7, 10].

The VHI scores do not cover the entire possible range (0–120) with an obvious bottom effect. As high VHI correspond with low V-RQOL values, the result is identical with the V-RQOL measurement. It may equally be concluded that the VHI differentiates best in cases of a diminished voice-related quality of life, and it is assumed as well that the VHI will adequately depict pre–post changes in cases when voice therapy is performed [5, 15, 19, 20].

Both questionnaires correlated very high ( $|\rho| = 0.92$ ) on a significant level. Hence, the V-RQOL with 10 questions and the 30 item VHI questionnaire produce quasi-identical results and may replace each other. This corresponds with a result obtained in a cohort of patients with dysphonia of benign origin which is published earlier by the reporting group [5]. Data obtained in this study do not allow for conclusion that the V-RQOL is superior to the shorter VHI-12 version [9]; especially, concerning time consumption. As a consequence of this study, it is recommended to use the V-RQOL questionnaire in clinical practice rather than the 30-item original VHI version.

**Acknowledgments** This work was partially funded by the German Cancer Aid (Deutsche Krebshilfe) under Grant 107873.

**Conflict of interest** The authors declare that they have no conflict of interest.

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