



## RESEARCH

# VOICE HANDICAP INDEX (VHI) IN PARTIAL LARYNGECTOMY PATIENTS

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### SUMMARY

Voice handicap Index (VHI), This patient self-assessment consist of 10 items in three domains: emotional, physical and functional aspects. The functional subscale includes statements which describe the impact of a person's voice on his daily activities. The emotional subscale indicates the patient's affective responses to the voice disorder. The items in the physical subscale are statements that relate to either the patient's perception of laryngeal discomfort or the voice output characteristics, such as the pitch being too low or too high. The VHI was designed to assess all types of voice disorders. In our study, we applied the VHI to partial laryngectomized patients. Though surgical technics were different, we assessed the patient's perception of vocal handicap after surgery, and the functional, emotional or physiological impacts of their new-voices. There were no statistically significant difference between the VHI and VHI-F, VHI-P, VHI-E scores in 3 patient groups. All of the patients evaluated, that their new voices have similar functional, physical and emotional impact on their life. In all of our study group patients, the quality of voice was found to be sufficient to hold a normal individual conversation.

*Keywords: larinx cancer, Voice Handicap Index, Partial Laryngectomy*

### PARSİYEL LARENJEKTOMİLİ HASTALARDA SES HANDİKAP ENDEKSİ (VHI)

#### ÖZET

Ses handikap endeksi, hastanın kendi kendine değerlendirme yapabileceği her biri 10'ar sorudan oluşan duygusal, fiziksel ve fonksiyonel bölümlerden oluşmaktadır. Fonksiyonel kısımda hasta, kendi sesinin günlük aktivitelerine etkisini tanımlamaktadır. Duygusal kısımda, ses bozukluğuna hastanın verdiği afektif yanıtlar bulunmaktadır. Fiziksel kısımda ise hastanın larengeal rahatsızlığı algılamasına veya sesin karakteristik özelliklerine ilişkin ifadeler, örneğin sesin çok kaba veya tiz çıkması gibi, yer almaktadır. Ses handikap endeksi tüm ses bozukluklarını değerlendirebilecek şekilde hazırlanmıştır. Çalışmamızda ses handikap endeksi parsiyel larenjektomili hastalara uygulanmıştır. Cerrahi tekniklerin farklı olmasına rağmen, biz hastaların cerrahi sonrası ses handikaplarını nasıl algıladıklarını, ve yeni seslerinin onlar üzerinde bıraktığı fonksiyonel, duygusal ve fiziksel etkileri değerlendirmek istedik. Her 3 hasta grubunda da VHI ve VHI-F, VHI-P ile VHI-E skorları arasında istatistiksel olarak anlamlı bir fark bulunmamıştır. Hastalar yeni seslerinin, hayatlarına yaptığı fonksiyonel, fiziksel ve duygusal etkileri benzer olarak değerlendirmişlerdir. Çalışma grubumuzdaki tüm hastalar, ses kalitelerinin normal bir sohbeti sürdürmek için yeterli olduğunu belirtmişlerdir.

*Anahtar Sözcükler: ses handikap endeksi, parsiyel larenjektomi, larinks kanseri*

## INTRODUCTION

In 1998, Jacobson et al. proposed a measure of voice handicap known as Voice handicap Index (VHI)<sup>1</sup>. This patient self-assessment consists of 10 items in three domains: emotional, physical and functional aspects. Initially, it was an 85-item survey comprised of questions which were selected primarily from patient reports in order to ensure that the scale had had both content and face validity. The functional subscale includes statements which describe the impact of a person's voice on his daily activities. The emotional subscale indicates the patient's affective responses to the voice disorder. The items in the physical subscale are statements that relate to either the patient's perception of laryngeal discomfort or the voice output characteristics, such as the pitch being too low or too high. Later, this original 85-item test was reduced to a 30-item test (Table 1).

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VHI has been developed to help patients and clinicians quantify the amount of disability that a voice disorder is causing<sup>2</sup>. At the completion of the VHI, the score can be summed in a VHI score ranging from 0 to 120. The higher the number, the greater the amount of disability noted due to a voice-related problem. It is important to remember that the VHI score is only a small assessment tool and is not a substitute for a formal evaluation by a voice care specialist, nor does it provide diagnostic information. The sole purpose of the VHI is to provide some preliminary information regarding the severity of one's voice problem in regard to his or her most common activities in the daily life.

In our study, we applied the VHI to partial laryngectomized patients. Though surgical techniques were different, we assessed the patient's perception of vocal handicap after surgery, and the functional, emotional or physical impacts of their new-voices.

## MATERIAL & METHOD

Twenty nine male patients, aged between 48 and 67 were enrolled in the study. The average age



was 53.9 years. There were 8 patients with cricothyroidopexy (CHP), 10 patients with cordectomy (3 with arytenoidectomy) and 11 patients with fronto-lateral laryngectomy with epiglottic pull down reconstruction (Table 2). The time interval between the operation and VHI-test was between 4 months and 26 months. None of the patients have surgery-related problems at the time of VHI-test; that is, all of them were under the same circumstances.

The patients were instructed that, these statements are that which many people have used to describe their voices and the effects of their voices on their lives. The patients marked the response that indicates how frequently they have the same experience. 0=Never 1=Almost Never 2= Sometimes 3=Almost Always 4=Always. Interpretation of the VHI scores was explained in table 3. Statistical analysis was carried out using analysis of variance (ANOVA) and Post-Hoc group comparisons after Bonferroni and Scheffé-procedure.

VHI-F	
1) My voice makes it difficult for people to hear me	0 1 2 3 4
2) People have difficulty understanding me in a noisy room	0 1 2 3 4
3) My family has difficulty hearing me when I call them throughout the house.	0 1 2 3 4
4) I use the phone less often than I would like to.	0 1 2 3 4
5) I tend to avoid groups of people because of my voice.	0 1 2 3 4
6) I speak with friends, neighbors, or relatives less often because of my voice.	0 1 2 3 4
7) People ask me to repeat myself when speaking face-to-face.	0 1 2 3 4
8) My voice difficulties restrict personal and social life.	0 1 2 3 4
9) I feel left out of conversations because of my voice.	0 1 2 3 4
10) My voice problem causes me to lose income.	0 1 2 3 4
VHI-P	
1) I run out of air when I talk.	0 1 2 3 4
2) The sound of my voice varies throughout the day.	0 1 2 3 4
3) People ask, "What's wrong with your voice?"	0 1 2 3 4
4) My voice sounds creaky and dry.	0 1 2 3 4
5) I feel as though I have to strain to produce voice.	0 1 2 3 4
6) The clarity of my voice is unpredictable	0 1 2 3 4
7) I try to change my voice to sound different	0 1 2 3 4
8) I use a great deal of effort to speak.	0 1 2 3 4
9) My voice is worse in the evening.	0 1 2 3 4
10) My voice "gives out" on me in the middle of speaking.	0 1 2 3 4
VHI-E	
1) I am tense when talking to others because of my voice.	0 1 2 3 4
2) People seem irritated with my voice.	0 1 2 3 4
3) I find other people don't understand my voice problem	0 1 2 3 4
4) My voice problem upsets me.	0 1 2 3 4
5) I am less outgoing because of my voice problem.	0 1 2 3 4
6) My voice makes me feel handicapped.	0 1 2 3 4
7) I feel annoyed when people ask me to repeat.	0 1 2 3 4
8) I feel embarrassed when people ask me to repeat.	0 1 2 3 4
9) My voice makes me feel incompetent.	0 1 2 3 4
10) I am ashamed of my voice problem.	0 1 2 3 4

**Table 1:** Voice Handicap Index VHI-F= VHI-Functional, VHI-P= VHI-Physical, VHI-E=VHI-Emotional<sup>1</sup>.

## RESULTS

Voice Handicap Index (VHI) and VHI-Functional (VHI-F), VHI-Physical (VHI-P), VHI-Emotional (VHI-E) mean values and standard deviations were given in Table 4. There were no

statistically significant differences between the VHI and VHI-F, VHI-P, VHI-E scores in all 3 groups (p=0,972). All of the patients have stated that their new voices had similar functional, physical and emotional impact on their life.

PATIENT	TNM	SURGERY PERFORMED	VHI	VHI-F	VHI-P	VHI-E
1	T2N0M0	Cricothyroidopexy+ Bilateral functional Neck Dissection	42	18	11	13
2	T2N1M0	Cricothyroidopexy + Bilateral functional Neck Dissection	62	21	19	22
3	T2N0M0	Cricothyroidopexy + Bilateral functional Neck Dissection	61	23	17	21
4	T2N0M0	Cricothyroidopexy + Bilateral functional Neck Dissection	55	22	11	22
5	T2N1M0	Cricothyroidopexy + Bilateral functional Neck Dissection	61	22	18	21
6	T2N0M0	Cricothyroidopexy + Bilateral functional Neck Dissection	42	11	13	18
7	T2N0M0	Cricothyroidopexy + Bilateral functional Neck Dissection	66	24	21	21
8	T2N0M0	Cricothyroidopexy + Bilateral functional Neck Dissection	72	19	27	26
9	T1aN0M0	Corpectomy	66	22	23	21
10	T1aN0M0	Corpectomy	49	17	10	22
11	T1aN0M0	Corpectomy with arytenoidectomy	51	27	14	10
12	T1aN0M0	Corpectomy	56	16	12	28
13	T1aN0M0	Corpectomy	77	22	29	26
14	T1aN0M0	Corpectomy	49	16	23	10
15	T1aN0M0	Corpectomy with arytenoidectomy	68	16	24	28
16	T1aN0M0	Corpectomy with arytenoidectomy	70	23	25	22
17	T1aN0M0	Corpectomy	100	30	30	40
18	T1aN0M0	Corpectomy	89	29	30	30
19	T1bN0M0	Fronto-lateral laryngectomy +EPD Rec.	75	26	23	26
20	T1bN0M0	Fronto-lateral laryngectomy + EPD Rec.	81	32	21	28
21	T1bN0M0	Fronto-lateral laryngectomy + EPD Rec.	61	15	34	12
22	T1bN0M0	Fronto-lateral laryngectomy + EPD Rec.	35	13	12	10
23	T1bN0M0	Fronto-lateral laryngectomy + EPD Rec.	45	30	11	4
24	T1bN0M0	Fronto-lateral laryngectomy + EPD Rec.	69	40	21	8
25	T1bN0M0	Fronto-lateral laryngectomy + EPD Rec.	54	22	14	18
26	T1bN0M0	Fronto-lateral laryngectomy + EPD Rec.	70	23	26	21
27	T1bN0M0	Fronto-lateral laryngectomy + EPD Rec.	61	19	18	24
28	T1bN0M0	Fronto-lateral laryngectomy + EPD Rec.	67	26	16	25
29	T1bN0M0	Fronto-lateral laryngectomy + EPD Rec.	47	18	21	8

**Table 2:** Patients, surgeries performed and their Voice Handicap Index scores. VHI= Voice Handicap Index, VHI-F= VHI-Functional, VHI-P= VHI-Physical, VHI-E=VHI-Emotional, EPD Rec= Epiglottic pull down reconstruction



Total score	
0-30	This is a low score and indicates that there most likely is a minimal amount of handicap associated with the voice disorder.
31-60	Denotes a moderate amount of handicap due to the voice problem.
61-120	This score represents a significant and serious amount of handicap due to a voice problem.

**Table 3:** Voice Handicap Index (1)

GROUP		VHI	VHI-F	VHI-P	VHI-E
CHP+ BFND (n=8)	Mean (SD)	57,63 (10,78)	20,00 (4,14)	17,13 (5,46)	20,50 (3,74)
Corpectomy (n=10)	Mean (SD)	67,50 (17,34)	21,80 (5,49)	22,00 (7,45)	23,70 (9,04)
Fronto-lateral laryngectomy + EPD Rec. (n=11)	Mean (SD)	60,45 (13,97)	24,00 (7,95)	19,73 (6,66)	16,73 (8,58)

**Table 4:** Number of patient groups and VHI, VHI-F, VHI-P and VHI-E mean values and standard deviations (SD). There were no statistically significant differences between the 3 groups ( $p=0,972$ ). BFND= Bilateral Functional Neck Dissection, EPD Rec= Epiglottic pull down reconstruction, VHI= Voice Handicap Index, VHI-F= VHI-Functional, VHI-P= VHI-Physical, VHI-E=VHI-Emotional.

## DISCUSSION

To our knowledge, though there were manuscripts about VHI, this is the first study in which VHI was applied to the partial laryngectomized patients.

A handicap, as described by the World Health Organization (WHO), is defined as a social, economic, or environmental disadvantage resulting from an impairment or disability<sup>3</sup>. The WHO considers health as a multi-dimensional concept which encompasses physical, mental, and social states of being. The VHI was designed to assess all types of voice disorders, even those encountered by tracheoesophageal speakers<sup>4</sup>.

Despite the development of treatment with irradiation and chemotherapy, the most effective treatment of laryngeal cancer is still surgery<sup>5</sup>. If untreated, laryngeal cancer will ultimately progress to death within several months to years. Fortunately, aggressive treatment is often curative. In general, small cancers (T1 or T2) limited to the glottis or supraglottis are curable with surgery. Surgery may be conservative, sparing most or some of the larynx. The primary goal in the treatment of laryngeal cancer is always the survival of the patient. The secondary goal is vocal preservation. Early diagnosis of a laryngeal cancer provides the means for carrying out conservative surgery, which allows for preservation of the basic functions of the larynx; namely respiration, phonation and most importantly protection of the airway<sup>5</sup>.

Vocal results after corpectomy and fronto-lateral laryngectomy may seem to be unsatisfactory,

since there is a glottic defect after removal of a considerable amount of tissue. After CHP, the results are even worse, since both vocal folds were excised and a neoglottis formation is anticipated at best. Interestingly, though statistically insignificant, cordectomy group have given the highest scores (mean= 67,50 SD=17,34) and the cricothyroidopexy group have given the lowest scores (mean=57,63 SD=10,78) to VHI-test in this study. It could be said that perceived voice is irrelevant with the laryngeal tissue excised. Another point of discussion is, according to this study results, it could be hypothesized, that the surgeon can perform more extensive laryngeal surgery without thinking the voice outcomes, since it is irrelevant with the laryngeal tissue excised, from the patients point of view. But, this hypothesis needs further investigation.

## CONCLUSION

In all of our patients, the quality of voice was found to be sufficient to hold a normal individual conversation, but the voice is defined as hoarse and dull. It is insufficient to make a conversation in a noise atmosphere, since it can not be raised satisfactorily.

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