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Title: Evaluating the outcome of phonosurgery: comparing the role of VHI and VoiSS questionnaires in the Greek language.

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Keywords: VHI; VoiSS; benign laryngeal lesions; phonosurgery

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**Abstract:**

**Objectives/Hypothesis:** The objective was to study the role of the Greek version of Voice Handicap Index (VHI) in comparison with Voice Symptom Scale (VoiSS) in terms of measuring voice surgery outcome in patients with benign laryngeal lesions.

**Study design:** Non-randomized, prospective.

**Methods:** Forty-six patients operated for benign laryngeal lesions were enrolled in the present study. All patients were assessed according to the European Laryngological Society (ELS) guidelines. In terms of self-evaluation, patients answered the Greek versions of both VHI and VoiSS, pre- and 6 weeks post-operatively and the results were statistically analyzed.

**Results:** The strongest correlation was observed between the functional subscale of VHI and the impairment subscale of VoiSS, as well as, between the emotional subscales of both VHI and VoiSS, pre- and post-operatively. A statistical significant change in subscale scores, as well as in total score, was found. VHI and VoiSS subscales and total scores correlated with the stroboscopic and aerodynamic measurements in a variable manner. Perceptual measurements, as well as shimmer and Harmonic-to-Noise Ratio (HNR), showed significant correlation with both VHI and VoiSS subscale and total scores post-operatively.

**Conclusion:** VHI and VoiSS are considered useful tools in evaluating voice surgery outcome, in the Greek language.

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5 Voice Handicap Index (VHI) in comparison with Voice Symptom Scale (VoiSS) in  
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34 measurements in a variable manner. Perceptual measurements, as well as shimmer  
35 and Harmonic-to-Noise Ratio (HNR), showed significant correlation with both VHI and  
36 VoiSS subscale and total scores post-operatively.  
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50 outcome, in the Greek language.  
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## INTRODUCTION

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3 According to the European Laryngological Society (ELS) guidelines, functional  
4 assessment and evaluation of phonosurgery outcome include five elements:  
5 perceptual evaluation, videostroboscopy, acoustics, aerodynamics, and subjective  
6 rating by the patient.<sup>1</sup> The Phonosurgery Committee of the ELS has recently classified  
7 phonosurgery as primary and secondary, as reported by Friedrich et al.<sup>2</sup> In terms of  
8 self-evaluation of dysphonia, numerous Quality of Life (QoL) instruments have been  
9 developed and used.<sup>3</sup> Voice Handicap Index (VHI) remains the most popular and  
10 widely used instrument for evaluation of dysfunction/ handicap in dysphonic patients.<sup>4</sup>  
11 It is a 30 point-scale questionnaire, with 3 subscales (10-point each): functional (VHI-  
12 F), physical (VHI-P) and emotional (VHI-E) and was developed through a retrospective  
13 7-year period study of case histories. Each item is scored from 0 to 4, according to the  
14 impact of the statement in patient's everyday life (0 = never, 1 = almost never, 2 =  
15 sometimes, 3 = almost always, 4 = always). Subscale scores range from 0 to 40 and  
16 overall score from 0 to 120. VHI has been translated in numerous languages.  
17 Recently, the validation of the Greek version was published and VHI has been  
18 established as a reliable tool for the evaluation of dysphonic patients, in the Greek  
19 language.<sup>5</sup>

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46 In 2003, the Voice Symptom Scale questionnaire (VoiSS) was developed by  
47 Wilson et al.<sup>6</sup> Its structure was based initially on a prototype list of patients' voice  
48 complaints compiled by an open-sheet questionnaire study.<sup>7</sup> Its final form consisted of  
49 30 items and 3 subscales: impairment (VoiSS-I), physical (VoiSS-P) and emotional  
50 (VoiSS-E), with 15, 7 and 8 items respectively. Each item is scored in a similar way as  
51 in VHI, from 0 to 4 (0 = never, 1 = occasionally, 2 = some of the time, 3 = most of the  
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time, 4 = always). Subscale scores range from 0 to 60, 0 to 28 and 0 to 32, for VoiSS-I, VoiSS-P and VoiSS-E subscale respectively and overall score ranges from 0 to 120.<sup>6,7</sup> Its final 30-item form was further studied in comparison with VHI.<sup>8</sup> Eight questions were identical in both questionnaires. The authors argued in favor of VoiSS, as having better validated factor structure, as well as item coverage, than VHI. Moreover, VoiSS-P subscale had a novel content including pharyngeal symptoms not present in VHI, with question 2 of VoiSS-P (“throat clearing symptom”), being the most endorsed item, as extracted from factor analysis. In a study of Deary and Wilson, VoiSS was further studied by the Mokken scaling technique and it was concluded that there is dysphonia symptom hierarchy present in the structure of the questionnaire, from voice problems to social impairment and emotional distress.<sup>9</sup>

There are only few studies where VHI and VoiSS are used to evaluate phonosurgery outcome, none available for the Greek versions of the questionnaires.

We studied the role of the well-established VHI questionnaire in measuring voice surgery outcome in patients with benign laryngeal lesions, compared to the less studied VoiSS questionnaire, in the Greek language.

## **MATERIALS AND METHODS**

Forty-six patients (18 women and 28 men), with a mean age of 47.9 years participated in the study. They all had either exudative lesions of Reinke’s space (vocal fold polyps, Reinke’s edema) or vocal fold cysts.

They were treated via direct endolaryngeal approach, with primary phonosurgery (focused to voice preservation e.g. in laryngeal polyps). The pathology was in all cases, removed with the single surgical treatment.

1 A thorough medical history was obtained for all participants. The profession of  
2 each patient was verified and they were characterized as professional voice users  
3 [(PVU) e.g. singers or salesmen], non-vocal professionals [(nVP): no use of voice in  
4 their work] and non-professional voice users [(nPVU): non-professional voice use e.g.  
5 work in a noisy environment]. Patients who have quitted smoking for at least one year  
6 are characterized as non-smokers. The basic characteristics of the participants are  
7 shown in Tables 1 and 2.  
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12 According to the ELS protocol, patients were assessed pre-operatively by  
13 videostroboscopy, aerodynamic measurements, acoustic analysis of the voice signal,  
14 perceptual grading by a logopedic, and self-evaluation questionnaires. In terms of self-  
15 assessment of voice symptoms all patients completed the Greek versions of both VHI  
16 and VoiSS questionnaires.  
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19 The same procedure was repeated 6 weeks post-operatively.  
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### 22 *Videostroboscopy*

23 Clinical examination was performed with videostroboscopy (70<sup>0</sup> rigid endoscope, type  
24 Xion endo STROB). A four-point analog scale was used to grade glottal closure,  
25 regularity, symmetry and mucosal wave (0 = no deviance; 3 = severe deviance).<sup>1</sup> The  
26 presence of concomitant pathology [e.g. posterior laryngitis] or residual disease was  
27 also noted. Examination was performed in all cases by the same expert.  
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### 30 *Perceptual examination*

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1 Grade-Roughness-Breathiness-Asthenity and Strain scale (GRBAS), as has been  
2 suggested by Hirano, was used by a trained logopedic in order to grade voice  
3 quality.<sup>10</sup> Grading was applied blindly to voice samples of the patients, containing  
4 conversational speech, counting from 1 to 10 and pronouncing the vowels “a/e/i/o/ou”.  
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### 10 *Acoustic analysis*

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13 The voice signal was recorded digitally, via a head microphone (~ 30 cm head - mouth  
14 distance) placed at 45<sup>0</sup> from the mouth axis, in a quiet room (ambient noise < 50 dBA)  
15 and saved in a computer, with a sampling frequency of 44100 Hz and  
16 resolution of 16bits per sample. It consisted of a sustained /a/, voiced 3 times, at  
17 comfortable pitch and loudness. Acoustic analysis was performed on voice samples by  
18 Praat system (University of Amsterdam, The Netherlands, [www.praat.com](http://www.praat.com)) and the  
19 mean score for jitter, shimmer and Harmonic-to-Noise Ratio (HNR) was calculated  
20 (mean duration of analyzed sample: 4 seconds).  
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### 33 *Aerodynamics*

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36 Maximum phonation time (MPT) was measured during a sustained /a/ after a deep  
37 inspiration at comfortable pitch and loudness (expressed in seconds). The best value  
38 out of 3 trials was considered as the valid one.  
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### 44 *Self-evaluation*

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47 Both Greek versions of VHI and VoiSS questionnaires were handed out to all patients  
48 pre- and post-operatively. Total score of 0-30 indicates mild dysphonia, 31-60  
49 moderate, 61-90 severe and 91-120 very severe dysphonia.  
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## Statistics

Summary descriptive statistics are presented as mean (SD) for continuous variables and as frequencies (%) for categorical ones.

Subscale and total scores for both questionnaires were calculated before and after surgical intervention.

Changes in scores before and after intervention were assessed with paired t- or Wilcoxon tests, as appropriate. To assess the association between VHI and VoiSS (subscales and total scores), Pearson correlation coefficients were computed. Spearman correlations were used to evaluate associations of VHI and VoiSS with ordinal clinical parameters.

According to the VHI validation study by Jacobson et al., a change of 18 points in total score and 8 points in subscale score was considered statistically significant.<sup>4</sup> Thus, we divided our patients in two groups, “improved” and “not improved” according to the difference between pre- and post-operative total scores (decrease by  $\geq 18$  and  $< 18$  points, respectively). Same grouping criterion was used for VoiSS, due to a lack of an established cut-off in the literature. In the Jacobson et al. study, 0-18 were considered normal values for VHI total score.<sup>4</sup> The same values were considered normal for VoiSS.

Odd’s ratios with 95% confidence intervals were used to assess the effects of age, smoking, voice profession and posterior laryngitis on outcome (improved, not improved).

All statistical tests were carried-out at the 2-sided 5% level of significance. Statistical analyses were performed with SPSS 17.0.

## RESULTS

The mean completion time for both questionnaires was 6.4 minutes (ranged according to patient's age, educational level and vision accuracy) and 11 out of 46 patients asked for help during completion.

### **Descriptive analysis**

Descriptive analysis for VHI and VoiSS subscale and total scores pre- and post-operatively are shown in Table 3. VHI-P and VoiSS-I subscales were graded higher pre- as well as post-operatively. According to the normative values for subscale and total scores for VHI, all mean values were pathological pre-operatively, with VHI-P and VHI total score slightly above normal values post-operatively. VoiSS mean total score was pathological pre-operatively. According to both VHI and VoiSS total scores, the majority of patients reported moderate dysphonia before surgery and mild dysphonia after surgical intervention.

Subscale and total scores of both VHI and VoiSS changed significantly post-operatively ( $P<0.05$ ). According to VHI total score, 63% of patients reported significant improvement after surgery, whereas 76.1% of them reported an improvement in VoiSS total score, using the same cut-off point (decrease by  $\geq 18$  points). Females scored better in both questionnaires. In VHI, 50% of males compared to 83.3% of females reported a significant improvement in total score. In VoiSS, 67.9% of males and 89% of females claimed a significant improvement in total score.

### **Possible risk factors for self-reporting no significant improvement after surgery**

#### **Age, smoking, voice profession and posterior laryngitis**

1 The unadjusted associations between age ( $\geq 50$  years), smoking, voice profession and  
2 presence of posterior laryngitis as risk factors for no-improvement in total scores after  
3 surgery, are shown in Table 4. None of these conditions can be safely considered as  
4 independent risk factor for no significant improvement reported after surgery.  
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### 10 **Correlation between VHI and VoiSS**

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13 Pre-operatively, significant correlation was found between VHI-P and VoiSS-I  
14 subscales ( $r = 0.83$ ,  $P = 0.001$ ), as well as between VHI-E and VoiSS-E subscales ( $r =$   
15  $0.9$ ,  $P = 0.001$ ). The same correlations were observed post-operatively ( $r = 0.82$  and  
16  $0.75$  respectively,  $P = 0.001$ ). Total scores of VHI and VoiSS correlated significantly  
17 pre- and post-operatively ( $r = 0.84$  and  $0.9$  respectively,  $P = 0.001$ ).  
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27 Scoring of the same items between VHI and VoiSS correlated in a variable  
28 manner. VHI-P and VoiSS-I subscales share 5 items, whereas VHI-E and VoiSS-E  
29 have 3 items in common. The scoring of these items pre- and post-operatively did not  
30 correlate significantly in all cases, indicating that patients grade the same items  
31 differently from VHI to VoiSS ( $r$  ranges from 0.21 to 0.80 and 0.74 to 0.90 pre-  
32 operatively for the pairs VHI-P/VoiSS-I and VHI-/VoiSS-E respectively and from 0.66  
33 to 0.84 and 0.52 to 0.98 post-operatively).  
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### 45 **Correlation between VHI and clinical measurements**

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48 No significant correlations of either subscale or total scores with stroboscopic features  
49 were observed pre- or post-operatively.  
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55 As far as perceptual measurements are concerned, a correlation between S  
56 (strain) of GRBAS scale with VHI-F, VHI-P and VHI total score was observed ( $\rho =$   
57  $0.4$ ,  $0.41$  and  $0.4$  respectively,  $P < 0.05$ ) pre-operatively. Post-operatively, significant  
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1 correlations were observed between GRBAS subscale and total score and VHI  
2 subscale and total score ( $\rho = 0.36$  to  $0.58$ ,  $P = 0.001$ ).

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6 Considering acoustic measurements, jitter did not correlate with VHI scores pre-  
7 or post-operatively. The same observation was made for shimmer and HNR pre-  
8 operatively. However, post-operatively, HNR correlated significantly with VHI subscale  
9 and total scores ( $\rho = 0.27$  to  $0.583$ ,  $P < 0.05$ ). Shimmer correlated significantly with  
10 VHI-P and VHI total score ( $\rho = 0.485$  and  $0.45$  respectively,  $P < 0.05$ ).

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19 Finally, no significant correlations were shown between MPT and VHI subscale  
20 and total scores.

### 21 22 23 24 25 **Correlation between VoiSS and clinical measurements**

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28 No significant correlations of either subscale or total scores with stroboscopic features  
29 were observed pre- or post-operatively.

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34 As far as perceptual measurements are concerned, post-operatively GRBAS  
35 subscale and total score correlated significantly with VoiSS subscale and total score  
36 ( $\rho = 0.3$  to  $0.67$ ,  $P < 0.05$ ).

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43 Considering acoustic measurements, jitter and shimmer did not correlate with  
44 VHI scores pre-operatively. Post-operatively, HNR and shimmer seemed to correlate  
45 significantly with VoiSS subscale and total score, especially with VoiSS-I ( $\rho = 0.55$   
46 and  $0.47$  respectively,  $P < 0.05$ ).

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53 Finally, no significant correlations were shown between MPT and VoiSS  
54 subscale and total scores, either pre- or post-operatively.

## DISCUSSION

VHI and VoiSS are considered useful QoL instruments for self-evaluation of dysphonia. In this comparative study among patients who underwent voice surgery for benign laryngeal lesions, the two questionnaires seemed to correlate significantly pre- and post-operatively. Age, smoking, voice profession and posterior laryngitis did not influence self-rating, especially in patients that reported no significant improvement after surgery. Neither of the two questionnaires correlated with stroboscopic and aerodynamic measurements. GRBAS, as well as shimmer and HNR, correlated with both VHI and VoiSS subscale and total scores post-operatively.

It is the first time after its validation, that the Greek version of VHI is studied and compared with another QoL instrument. It has been used as gold standard to evaluate the use of VoiSS questionnaire, in its Greek version. Our group of patients was chosen to have strict characteristics in order to extract safer conclusions. Each questionnaire was studied along with the stroboscopic, perceptual, acoustic and aerodynamic measurements, according to the guidelines of ELS protocol for functional assessment of voice pathology of 2001.<sup>1</sup>

Only few studies are reviewed to test the validity of VHI in measuring treatment outcomes, comparing it with other clinical measurements.<sup>11-15</sup> In two recent studies, among patients with benign laryngeal lesions who underwent voice surgery, VHI scores decreased significantly after surgery but they were correlated insignificantly with the acoustic, aerodynamic, perceptual and stroboscopic measurements.<sup>11,12</sup> In the study of Hakkesteeft et al, where VHI was compared to Dysphonia Severity Index (DSI) for the evaluation of 122 patients who underwent voice therapy and/or

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phonosurgery, VHI did not change in concordance with DSI score in 37% of patients (78% had better VHI compared to 56% with better DSI post-operatively, in the surgery group).<sup>13</sup> Moreover, when the VHI was compared with a 3-item-outcome scale in a group of 77 dysphonic patients who were treated with voice therapy, before and after intervention, a significant improvement was shown after treatment, but no specific correlation with other clinical measurements.<sup>14</sup> Finally, in a study where the VHI was compared to Short Form-36 (SF-36) and Voice Outcome Scale (VOS), a significant improvement was shown after medialization surgery in patients with unilateral vocal fold paralysis.<sup>15</sup> In our study, perceptual and acoustic measurements (shimmer and HNR) correlated significantly with VHI subscale and total scores only post-operatively.

The clinical application of VoiSS has been less studied. VoiSS was studied along with GRBAS scale for the assessment of dysphonia severity in 60 adults with primary complaint of dysphonia and it was found to correlate significantly with perceptual rating, which coincides with our results.<sup>16</sup> Moreover, VoiSS was studied in comparison with Vocal Performance Questionnaire (VPQ) and VHI as voice specific QoL outcome measures in 53 patients with early glottic cancer who underwent either radiotherapy or endoscopic resection and its emotional scale showed a significant better score for the radiotherapy group.<sup>17</sup>

In the present study, we tried to estimate whether VHI and VoiSS are able to reflect patients' evaluation of voice surgery outcome. Patients were divided in two groups according to whether they reported significant improvement in VHI total score (decrease of  $\geq 18$  points) after surgery. Although there is a lack of an established cut-off in the literature, we used the same method for VoiSS total score, considering that it is also a 30-point questionnaire, there are no related available data in the literature,

1 and that VHI and VoiSS total scores correlate significantly ( $r= 0.93$  pre- and  $0.9$  post-  
2 operatively,  $P = 0.001$ ). We concluded that the majority of patients were satisfied with  
3 the operation outcome according to both VHI (63%) and VoiSS (76%). Age  $\geq 50$  years,  
4 smoking, voice profession and posterior laryngitis cannot be considered as  
5 independent risk factors for no significant improvement (decrease  $< 18$  points in total  
6 score). However, by grouping further the patients according to total score pre- and  
7 post-operatively, we found that the group of “no significant improvement” includes  
8 patients with normal scores before and after operation, which were 20.7% and 10.3%  
9 in VHI and VoiSS respectively. In addition, patients seem more familiar with both  
10 questionnaires and scored more precisely post-operatively, estimating the difference in  
11 their symptoms before and after the operation.  
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27 Scoring of VoiSS was higher preoperatively (57 versus 44.5) and showed a  
28 stronger decrease postoperatively (mean value 19.3 comparing to 23.1 for VHI).  
29 Higher mean scores were observed in VHI-P and VoiSS-I subscales, pre- and post-  
30 operatively, which coincides with the correlation between them, as they have 5 items  
31 in common. The difference in scoring was attributed to the fact that VHI-P has 8 items  
32 compared to VoiSS-I which has 15. The interesting observation that patients did not  
33 rate same items equally from VHI to VoiSS, can be attributed to the length of the  
34 questionnaires (2 pages each). However, this doesn't seem to affect the overall  
35 scoring or the correlation between them.  
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51 VoiSS-P subscale scoring contributed strongly to total score (second after VHI-I).  
52 This subscale has a novel content, including items related to concomitant pathology  
53 (e.g. symptoms of LPR). Assessing further the scores of the emotional subscale in  
54 both questionnaires, low mean values, especially postoperatively, correlated weakly  
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1 with the total score. It seems that Greeks usually do not report any emotional impact of  
2 their voice problems and they rather express anxiety for the possibility of a malignancy  
3 than embarrassment for the quality of their voice. Furthermore, as expected after  
4 operation, they often scored emotional subscale with 0.  
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10 Considering the limitations of our study, we did not include patients with other  
11 organic pathologies, such as unilateral vocal fold paralysis, as such patients are not  
12 treated in our department. Furthermore, the “cut-off” points for reporting significant  
13 improvement after the operation used for VoiSS may be considered biased, however  
14 there were no available related data in the literature.  
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23 However, according to the present study, VHI seems to be a reliable tool in  
24 expressing patients’ self-evaluation after the operation. This outcome was expected in  
25 a group of patients with benign lesions and a satisfactory operation result from the  
26 surgeon’s point of view. VHI scores were in agreement with the logopedic’s evaluation  
27 post-operatively. Although, stroboscopic evaluation did not correlate with any of the  
28 scores, acoustic measurements (HNR and shimmer) which are considered as  
29 objective tools seemed to be in agreement with self-evaluation results.  
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42 VoiSS scores perform more or less in the same pattern, making the two  
43 questionnaires equal regarding the evaluation of patients’ dysphonia and its impact in  
44 their everyday life. This can be explained by the fact that they are not questionnaires  
45 strictly related with voice performance and quality (acoustic and perception) but they  
46 reflect a broader impact of a voice problem. Finally, although the Greek version of  
47 VoiSS has been proven trustful, further validation is needed to establish its reliability.  
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## Conclusion

Both VHI and VoiSS are considered useful in evaluating voice surgery outcome for benign laryngeal lesions, showing significantly better scores after surgical intervention. However, none of the two seems to preponderate, in correlation with other clinical measurements.

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**TABLES****TABLE 1.** Distribution of pathologies among patients.

Patients' diagnosis	Men (n = 28)	Women (n = 18)	Total (n = 46)
Vocal fold polyps	19	8	27
Reinke edema	6	11	17
Cysts	0	2	2

**TABLE 2.** Patients' characteristics.

Patients' characteristics	Men (n = 28)	Women (n = 18)	Total (n = 46)
Smokers	23	11	34
PVU	15	12	27
nPV	4	7	11
Posterior laryngitis	9	7	16

PVU: professional voice users, nPV: non-professional voice users

**TABLE 3.** Mean (SD) and median (min, max) values of VHI and VoiSS subscale and total scores pre- and post-operatively.

	Preoperatively				Postoperatively			
	V H I - F	V H I - P	V H I - E	VHI total	V H I - F	V H I - P	V H I - E	VHI total
Median(min,max)	11.5(0.31)	19.2(0.42)	13.7(0.37)	44.4(2.105)	3.5(0.33)	6.5(0.29)	0(0.27)	8.5(0.78)
Mean (SD)	11.5(9.4)	19(11.5)	13.7(11.7)	44.55(28.9)	6.2(7.4)	9.3(9.6)	3.7(6.3)	19.3(21.3)
	Preoperatively				Postoperatively			
	VoiSS-I	VoiSS-P	VoiSS-E	VoiSS total	VoiSS-I	V H I - P	VoiSS-E	VoiSS total
Median(min,max)	40(2.60)	17(2.25)	5(0.32)	57(11.105)	9.5(0.42)	5(0.18)	0.5(1.20)	18(0.80)
Mean(SD)	35.1(15.4)	13.9(6.9)	8.8(10.1)	57.9(28.2)	13.8(14.1)	6.5(5.4)	2.7(5.1)	23.1(22.2)

VHI-F=VHI-functional, VHI-P=VHI-physical, VHI-E=VHI-emotional, VoiSS-I=VoiSS-impairment, VoiSS-P=VoiSS-physical, VoiSS-E=VoiSS-emotional subscales

**Table 4.** Unadjusted associations between risk factors and no significant reported improvement in VHI and VoiSS total scores post-operatively.

Risk factor	VHI			VoiSS						
	% not significantly improved with risk factor	% not significantly improved without risk factor	Unadjusted odds ratio and 95% CI	Chi square	P value	% not significantly improved with risk factor	% not significantly improved without risk factor	Unadjusted odds ratio and 95% CI	Chi square	P value
Age (≥50 years)	41.2%	58.8%	3.3(0.8, 13.1)	3.1	0.78	27.3%	72.7%	1(0.2, 4.9)	0.01	0.92
Smoke	64.7%	35.3%	2(0.54, 7.9)	1.2	0.28	81.8%	18.2%	0.55(0.13, 2.4)	0.46	0.48
Posterior laryngitis	17.6%	82.4%	3.1(0.89, 16)	3.4	0.05	0%	100%	1.84(1.3, 2.4)	7.7	0.01
Voice profession	64.7%	35.3%	0.67(0.19, 2.3)	0.4	0.32	54.5%	45.5%	1.2(0.3, 4.8)	0.103	0.8

CI= Confidence Interval

**Table 5.** Mean values of perceptual, acoustic and aerodynamic measurements pre- and post-operatively.

	<b>Preoperatively [Mean(SD)]</b>	<b>Postoperatively [Mean(SD)]</b>
<b>Jitter</b>	1.3(2)	0.96(1.8)
<b>Shimmer</b>	0.82(0.4)	0.5(0.3)
<b>HNR</b>	12.6(5.9)	14.4(4.4)
<b>MPT</b>	12.6(4)	14.4(3.3)
<b>GRBAS total</b>	6.1(4.4)	2.9(3.8)
<b>G</b>	1.48(1)	0.78(0.8)
<b>R</b>	1,8(0.7)	0.8(0.8)
<b>B</b>	1(0.7)	0.48(0.9)
<b>A</b>	0,59(0.9)	0.46(0.8)
<b>S</b>		

HNR=Harmonics-To-Noise Ratio, MPT=Maximum Phonation Time, GRBAS=Grade, Roughness, Breathiness, Asthenity, Strain