

Assessment of voice related quality of life and its correlation with socioeconomic status after total laryngectomy

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Background: After total laryngectomy for laryngeal cancer, the major determinants of QOL is the patient's voice related quality of life (V-RQOL). The primary aim of this study was to assess the V-RQOL and impact of socioeconomic status over it in Indian population by using two validated scales [voice handicap index (VHI) and V-RQOL questionnaires].

Methods: Total 104 patients underwent total laryngectomy but 71 were eligible for study. Patients filled the VHI and V-RQOL questionnaires after completion of 1 year of usage of the TEP voice. The socioeconomic status of the patients was calculated according to various domains related to their life and were divided into lower and higher status.

Results: A total of 76.1% patients had VHI score between 0 to 30 (minimal voice handicap), 19.7% had score between 31 to 60 (moderate voice handicap) and only 4.2% patients had VHI score more than 61 (serious voice handicap). On V-RQOL scores, 16.9% patients had score between 10 to 15 (excellent), 40.8% patients, between 16 to 20 (very good), 22.5% patients, between 21 and 25 (good voice), 15.5% patients, between 26 and 30 (fair) and only 4.2% patients scored more than 30 with poor quality of voice. Patients with lower socioeconomic group had better V-RQOL than with high socioeconomic group.

Conclusions: VHI and V-RQOL scores in our series were superior to other studies due to major population with lower socioeconomic status and better social support which exists in our society.

Keywords: Voice related quality of life (V-RQOL); total laryngectomy; TEP; socioeconomic status

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Introduction

Total laryngectomy is the primary modality of treatment for laryngeal cancers and it has significant impact on the quality of life, especially the voice related quality of life (V-RQOL) (1).

After total laryngectomy individuals must learn a new method of verbal communication and cope up with changes to breathing and swallowing. Several post laryngectomy voice rehabilitation options are available including electro laryngeal speech (ELS), esophageal speech (ES) and tracheoesophageal speech (TES) (2).

Measures of function and quality of life have become

increasingly important end points as means of judging the overall effectiveness of treatment approaches and providing justification for added toxicities (3).

After total laryngectomy the major determinants of QOL is the patient's V-RQOL. There are several methods to assess the voice parameters which include various subjective and objective measures. Although these methods yield valuable data but they do not provide an insight into why patients with similar voice disorders experience different levels of handicap and disability (4).

One major initiative of contemporary research has been the development of patient centered outcome measures (3).

Several disease or condition specific patient questionnaires have been developed to examine V-RQOL. These patient's self-report symptom specific scales can provide valuable information about functional abilities, social and emotional domains and related QOL issues (5,6).

Two such validated scales—voice handicap index (VHI) (5) and V-RQOL questionnaires are available for the detailed assessment of this important parameter. The V-RQOL questionnaires are a 10-item questionnaires as opposed to the 30 items in VHI.

The primary aim of this study was to investigate the effect of the voice in patient using provox valve on different physical, emotional and functional parameters. Secondly, the correlation between the two scales was studied. We have also emphasized the impact of socioeconomic and social status of the patients on the results of the performance of the valved speech. This parameter has not been evaluated in the previous studies and provides insight into an important aspect in the rehabilitation of laryngectomized patients.

Materials and methods

This was the retrospective review and analysis of the V-RQOL database of total laryngectomy patients using TEP voice (provox). The data was collected during a 5 years of period between Jan. 2008 to Dec. 2012 for all eligible patients who had undergone total laryngectomy at the department of otolaryngology and head, neck surgery, Sir Ganga Ram Hospital, New Delhi. Patients with history of any comorbidity like brain stroke or other neurologic impairment that could lead to cognitive deficit, any psychiatric problem, patients with tumor recurrence, lost to follow up and who refused to participate in the study were excluded from the study.

Total 104 patients underwent total laryngectomy but 79 patients were the users of TEP voice. Out of 79 patients, 71 were eligible for the study because 3 patients had developed some psychological and neurological problems, 2 patients refused to fill the questionnaires and rest 4 patients lost to follow up so they were excluded from the study. Seventy-one patients were called up for follow up and were provided to fill the VHI and V-RQOL questionnaires after completion of 1 year of the usage of the TEP voice.

Institutional research ethical clearance was taken for the study. The VHI is a self-administered long form patient report instrument that was developed to quantify the patient's perception of disability due to vocal dysfunction (5). It has good test-retest reliability, construct validity and

is sensitive for a wide variety of voice disorders (5,7). It consists of 30 statements on voice -related aspects in three subdomains measuring emotional, physical, and functional issues. Each patient responds according to the suitability or closeness of each item (ranging from 0= none to 4= always) to his situation. It is scored from 0 to 120 with the latter representing the maximum perceived voice disability. The VHI overall score is then categorized as a minimal amount of handicap when the score is from 0 to 30, a moderate amount of handicap with score between 31 to 60 and finally a serious amount of handicap when the score is more than 60 (5).

The V-RQOL questionnaires are a self-administered short form patient report instrument that measures the subjective burden elicited by a voice disorder. As with VHI, the V-RQOL has been shown to have good reliability and validity for a range of voice disorder (8,9). It consists of only ten statements on voice related aspects across emotional, physical and functional domains. Each patient responds according to the suitability or closeness of each item (ranging from 1= not a problem to 5= the problem is "as bad as it can be") to his situation. The overall VR-QOL score ranges from 10 to 15 (excellent), 16 to 20 (very good), 21 to 25 (good), 26-30 (fair) and scores more than 30 and up to 50 is poor.

The socioeconomic status of the patients was calculated according to various domains related to their life and were divided into lower and higher status (10).

High socioeconomic status—patients having scores between 16-29 and low socioeconomic status—patients having scores between 0-15 (kuppuswamy scores) (10).

Statistical analysis—statistical analysis was performed by the SPSS program for Windows, version 17.0 (SPSS, Chicago, Illinois, USA). Continuous variables are presented as mean \pm SD, and categorical variables are presented as absolute numbers and percentage. Categorical variables were analyzed using either the chi square test or Fisher's exact test. Pearson correlation was also used between V-RQOL and VHI score. $P < 0.05$ was considered statistically significant.

Results and analysis

Our database included 104 patients who had undergone total laryngectomy for the laryngeal cancer from Jan. 2008 to Dec. 2012 at our tertiary care center, only 71 (68.2%) patients were eligible for the study. Out of 71 patients, 52 (73.2%) were males and 19 (26.8%) were females with the

Table 1 Sociodemographic and other details of the patients

Characteristics	No. of patients	Percentage (%)
Sex		
Male	52	73.2
Female	19	26.8
Socioeconomic status		
Low	54	76.1
High	17	23.9
Social support		
Good	57	80.3
Poor	14	19.7
Chemotherapy	11	15.5
Radiotherapy	45	63.3
Reconstruction	12	16.9
Pharyngoesophageal closure		
Circumferential	16	22.5
Horizontal	55	87.5
Postop. complications	9	10.2
Tracheoesophageal puncture		
Primary	47	69.7
Secondary	24	30.3
Voice prosthesis (provox)	71	100.0

mean age of 60.77 years (SD-8.634). All patients were the users of TEP (provox). We included those patients who were using TEP but we also followed those patients who were not using TEP because of cost of prosthesis, lack of motivation etc. These patients had poor VR-QOL as compared to patients using TEP.

The sociodemographic and treatment details are shown in *Table 1*.

VHI scores

The mean overall score for the VHI scale was 24.65 with SD-18.11. Therefore mean VHI was <30 and most of the patients had minimal voice handicap. The individual domain or subscale score revealed a mean functional score of 12.8 with SD-10.4, a physical score of 11.81 with SD-8.2 and an emotional score of 10.6 with SD-7.4. The overall VHI scores for the patients are shown in *Table 2*.

A total of 54 (76.1%) patients had VHI score between 0 to 30 and were categorized as minimal voice handicap, 14 (19.7%) patients had score between 31 to 60 and were categorized as moderate voice handicap and only

Table 2 Overall analysis of the VHI scores

VHI score	No. of patient	Percentage (%)
Minimal voice handicap [0-30]	54	76.1
Moderate voice handicap [31-60]	14	19.7
Severe voice handicap [61-120]	3	4.2

VHI, voice handicap index.

3 (4.2%) patients had VHI score more than 61 so categorized as serious voice handicap.

Impact of socioeconomic status on V-RQOL (VHI scores)—total 54 (76.1%) patients were classified in lower socioeconomic group and 17 (23.9%) in to high socioeconomic group. A total of 45 (83.3%) out of 54 patients (lower socioeconomic group) had minimal voice handicap with score between 0 to 30, 9 (16.7%) had moderate voice handicap with scores between 31 to 60 and none of the patients had severe voice handicap. Out of total 17 (23.9%) patients with high socioeconomic status, 9 (64.3%) patients had minimal voice handicap, none of the patient had moderate voice handicap but 3 (17.6%) patients had severe voice handicap with scores between 61 to 120.

The correlation of socioeconomic status of the patients with VHI scores is shown in *Table 3*.

V-RQOL scores

The mean V-RQOL score was 20.23 with SD-5.53. Overall analysis of V-RQOL scores is given in *Table 4*.

A total of 12 (16.9%) patients had score between 10 and 15 and they were categorized as patients with excellent voice quality, 29 (40.8%) patients had scores between 16 and 20 and categorized as with very good voice, 16 (22.5%) had scores between 21 and 25 and were categorized as with good voice, 11 (15.5%) patients had scores between 26 and 30 and categorized as patients with fair voice and 3 (4.2%) patients scored more than 30 with poor quality of voice.

Impact of socioeconomic status over the V-RQOL (V-RQOL scores)—10 (18.5%) patients with low socioeconomic status had scores between 10 to 15 (excellent), 27 (50%) of patients between 16 to 20 (very good), 11 (20.3%) of patients between 21 to 25 (good), 5 (9.25%) of patients between 26 to 30 (fair) and only 1 (1.85%) had score more than 30 with poor voice. In high socioeconomic group, 2 (11.7%) patients had scores between 10 to 15 (excellent), 2 (11.7%) scored between 16 to 20 (very good), 5 (29.4%) had scores between 21 to

Table 3 The impact of socioeconomic status of the patients over the V-RQOL on VHI scale

VHI score	Low socioeconomic status		High socioeconomic status		P value
	No. of patients	Percentage (%)	No. of patients	Percentage (%)	
Minimal voice handicap [0-30]	45	83.3	9	64.3	0.010
Moderate voice handicap [31-60]	9	16.7	5	30.4	0.249
Severe voice handicap [61-120]	0	0	3	17.6	0.002
Total	54	76.1	17	23.9	

V-RQOL, voice related quality of life; VHI, voice handicap index.

Table 4 Overall V-RQOL scores

V-RQOL score	No. of patients	Percentage (%)
10-15 (excellent)	12	16.9
16-20 (very good)	29	40.8
21-25 (good)	16	22.5
26-30 (fair)	11	15.5
>30 (poor)	3	4.2
Total	71	100.0

V-RQOL, voice related quality of life.

25 (good), 6 (35.3%) had scores between 26-30 (fair) and 2 (11.7%) patients scored more than 30 with poor voice.

The correlation of socioeconomic status with V-RQOL scores is shown in *Table 5*.

Comparison of VHI and V-RQOL scales

When the scores for the two questionnaires were compared there was a strong correlation for the interpretations of both questionnaires as well as between the V-RQOL score and VHI score (Pearson correlation was used and $P < 0.05$ was considered as significant)

Comparison between two scales showed in *Tables 6, 7* and *Figure 1*.

Discussion

In the India, head and neck cancers are most prevalent cancers with a high incidence amongst the males. The laryngeal cancer is one of the most common cancers which is seen in head and neck region.

Total laryngectomy or laryngo-hypopharyngectomy is still the procedure of choice for the stage-III/IV (AJCC/ UICC) advanced laryngeal cancers. However, the procedure is associated with important consequences. Disease free

survival rate and V-RQOL are the prime concerns of these patients. Vocal rehabilitation of these patients has long been a major challenge but it has only in the last three decades that the emphasis on restoration of function and quality of voice has become as important as cure and survival.

Tracheo esophageal prosthetic voice is still the gold standard method of voice rehabilitation in total laryngectomized patients (11). Due to prime concern of V-RQOL in patients with total laryngectomy, we decided to conduct a study to determine the V-RQOL in total laryngectomy patients.

The study examined the V-RQOL in total laryngectomized patients using the TEP voice (provox) in their physical, social and functional aspects of everyday life. Though there are several subjective and objective scales are available to assess the V-RQOL, we chose the VHI (long form) and V-RQOL (short form) scales primarily on the ground that they have been widely used as validated and reliable questionnaires (5,6). The VHI has been recommended by the European laryngeal society for use in dysphonic patients (8).

Both questionnaires were provided to the patients at the end of 1st year post laryngectomy who were using the provox voice prosthesis and were filled by the patients. All patients in our study were using the provox type of voice prosthesis in line with departmental policy.

In the follow up of our subjects, a subjective assessment of the quality of voice was done 3 months after the valve insertion in all patients. Eighty percent of the valve recipients were not satisfied with the performance of the valve and with the quality of voice. During the subsequent follow-up of the patient the subjective score improved regarding the voice quality.

At the end of 1st year patients were subjected to the questionnaires which included both VHI and V-RQOL. More than 75% of subjects had minimal voice handicap on VHI scale whereas about 80% of the patients had well to

Table 5 The impact of socioeconomic status of the patients over the V-RQOL scores

V-RQOL score	Low socioeconomic status		High socioeconomic status		P value
	No. of patients	Percentage (%)	No. of patients	Percentage (%)	
10-15 (excellent)	10	18.5	2	11.7	0.517
16-20 (very good)	27	50	2	11.7	0.005
21-25 (good)	11	20.3	5	29.4	0.437
26-30 (fair)	5	9.25	6	35.3	0.010
>30 (poor)	1	1.85	2	11.7	0.076
Total	54	76.1	17	23.9	

V-RQOL, voice related quality of life.

Table 6 Correlation between VHI scores and V-RQOL scores

VHI/V-RQOL scores	VHI score	Score/overall V-RQOL
VHI score		
Pearson correlation	1	0.746**
Sig. (2-tailed)		0.000
N	71	71
Overall V-RQOL scores		
Pearson correlation	0.746**	1
Sig. (2-tailed)	0.000	
N	71	71

** , correlation is significant at the 0.01 level (2-tailed). V-RQOL, voice related quality of life; VHI, voice handicap index.

excellent voice on V-RQOL scale.

This high rate of patient's satisfaction may reflect the successes of valve speech which is superior to other technique of alaryngeal speech (11). The multidisciplinary team at our center was a major attribute at improving the result of the patients post laryngectomy with regards to the V-RQOL. Presurgical counselling, detailed explanation about the consequences and final results of the surgery and post-surgical rehabilitation are major steps towards the success of the procedure.

Socioeconomic status was one of the important factors which influenced the V-RQOL in our patients. Interestingly the patients who belonged to the lower socioeconomic status and level III/IV voice use (12) were happier than the patients with higher economic status and level I/II voice use (12) because their professional and daily work was not significantly affected.

Another crucial contributes to the results was the social support to the patients, having a strong support from the

Table 7 Overall V-RQOL/VHI scores (comparison)

Score/overall V-RQOL	VHI score			Total
	0-30	31-60	>60	
10-15 (excellent)				
Count	12	0	0	12
Within VHI score (%)	22.2	0	0	16.9
16-20 (very good)				
Count	28	1	0	29
Within VHI score (%)	51.9	7.1	0	40.8
21-25 (good)				
Count	10	6	0	16
Within VHI score (%)	18.5	42.9	0	22.5
26-30 (fair)				
Count	3	7	1	11
Within VHI score (%)	5.6	50	33.3	15.5
>30 (poor)				
Count	1	0	2	3
Within VHI score (%)	1.9	0	66.7	4.2
Total				
Count	54	14	3	71
Within VHI score (%)	100	100	100	100

V-RQOL, voice related quality of life; VHI, voice handicap index.

family and counselor were exhibiting better outcomes. The most important difference between low and high socioeconomic status is in their family and society support. In Indian society most of the patients belong to low socioeconomic status have combined family which fully supports emotionally and motivate the patient as contrary to patients belong to high socioeconomic status who live in nuclear family and mostly alone so they do not have strong

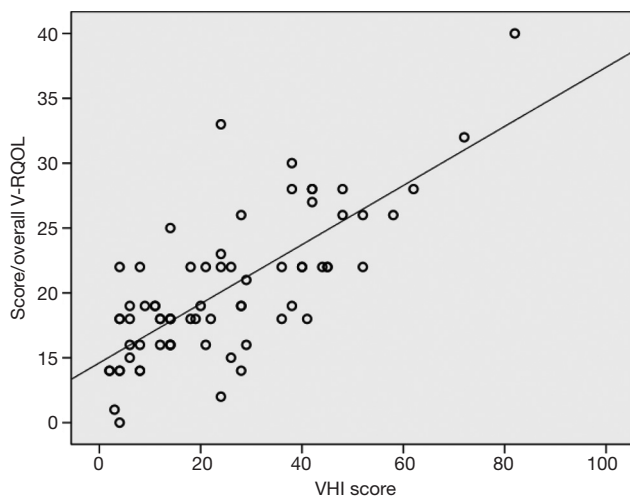


Figure 1 Shows comparison between two scores.

family and society support.

Demographic factors like age and sex of the patient did not have a significant effect on the voice handicap except for the tone of the voice in female patients. The low tone of prosthetic speech was frequently identified as cause for some discontent.

The treatment modality including the surgical procedure and its details such as neck dissection and pharyngeal reconstruction did not have any significant influence on the V-RQOL scores. Postoperative radiotherapy was initially associated with a higher level of voice handicap in our patients but during follow-up the level of handicap was significantly reduced. The higher level of voice handicap in the early post radiotherapy duration could be attributed to the decreased tissue pliability.

The long form VHI scale is more structured, comprehensive and organized but more time consuming and may provide a degree of redundant information (13), on the other hand the short form V-RQOL scale is brief, concise and yet correlates well with the VHI on all three domains. Short form scales like V-RQOL are more attractive to the busy clinician and long form scales like VHI are more useful in the research settings where the greater details offered may be more valuable (13).

Conclusions

The introduction of voice prosthesis for patients of laryngectomy has significantly improved the V-RQOL in such patients. This provides better functional and social

voice usage and a significant decrease in voice associated emotional distress in these patients.

This study has found that VHI and V-RQOL scores in our series of patients with voice restoration after total laryngectomy were superior. The more population with lower socioeconomic status and better social support which exists in our society is a major attribute for the emotional emergence and better V-RQOL.

Only the socioeconomic status and social support significantly affects the long term V-RQOL of patients, rest other criterias like age, sex and treatment factors does not affect long term V-RQOL rather may affect short term V-RQOL.

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Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

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