



Voice related quality of life outcomes following treatment of laryngeal cancer

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Abstract

This study aimed to investigate and compare the voice related quality of life in individuals treated with two different modalities for laryngeal cancer: total laryngectomy using tracheoesophageal speech (TES) and chemoradiotherapy using laryngeal speech (CRT). Twenty patients, who were divided into two groups- group I (TES) and group II (CRT) with ten in each, participated in the study. They autonomously completed the Voice Related Quality Of Life (V-RQOL), a questionnaire with 10-items for quality of life survey. Statistical analysis was performed and results revealed differences between the groups on domains and total scores of V-RQOL; however, the difference was not statistically significant. Thus, the study concluded that self-assessment is crucial and should be considered as a part of voice evaluation. Also, voice related problems occur not only for TES group but also for CRT patients which indicates the need of voice- and speech rehabilitation in both patient groups.

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Introduction

Laryngeal cancer and its treatment might have direct and significant decrements in the overall functional status, ability to communicate, and thereby, in the quality of life (QOL) of individuals, particularly on post-treatment voice changes or loss of voice. Even though the goal of any treatment protocol is to ensure a preserved voice or an optimized alaryngeal voice, it is ultimately the patient's perception of their post-treatment status that determines the success of a treatment outcome. Also, patient's self-perception has become an increasing importance in both clinical and scientific medicine in recent years besides oncological and functional aspects. Hence, the spotlight of this paper is on patient's perception of deficiency due to vocal dysfunction after treatment.

Quality of life (QOL) is a multidimensional construct that minimally comprises generally-defined assessments of the physical, psychological and social domains of functioning. Individuals with laryngeal cancer are rendered vulnerable to psychosocial problems. Use of QOL scales highlight the fact that treatment of the cancer is successful but participants continue to face problems in daily activities and social participation, regardless of the type of treatment (Sayed & Kazi, 2009). However, there has been a recent acknowledgment that the existing

Head & Neck cancer specific QOL measures may fail to identify important voice and communication related concerns in individuals who have had laryngectomy and also in those who are irradiated for laryngeal cancer (Op de Coul, Ackerstaff, Van-As-Brooks, Can Den Hoogen, Meeuwis, Manni et al., 2005). Thus, efforts that seek self-perceptions of the post-laryngectomy voice with tracheoesophageal speech and irradiated larynx with laryngeal speech may provide one step towards understanding the impact of the treatment for laryngeal cancer on one's communicative limitations.

Generally, the nature and intensity of a treatment for laryngeal cancer determines the degree of the voice-related problems experienced by the patient. The significance of these problems will have an impact on the voice and thereby, on the patient's voice related quality of life (VRQOL). Even studies have shown speech and verbal communication to be one of the biggest predictors of quality of life in individuals with laryngeal cancer (Eadie & Doyle, 2004; Meyer, Kuhn, Campbell, Marbella, Myers & Layde, 2004). Consequently, it is important from a clinical point of view, to seek answers, to what aspects of voice and speech might contribute to the communication problems in individual treated for advanced stage of laryngeal cancer with two different modalities- total laryngectomy using tracheoesophageal speech (TES) and chemoradiotherapy (CRT) using laryngeal speech.

Hence, on interest, more focus has been placed on the measurement of the impairment of voice related quality of life (VRQOL) by assessing treatment outcomes in laryngeal cancer patients. The two commonly used instruments for assessing VRQOL are Voice Handicap Index (VHI-30) and Voice-Related Quality of Life Measure (V-RQOL) which consist of various domains reflecting multiple specific communication related difficulties that are not explored well in the general health survey. However, V-RQOL questionnaire is easy to administer and concise. Even previous researches have explained that, the short questionnaires are practical and preferred to the larger questionnaires. And so, we have decided to use V-RQOL questionnaire to check the voice related quality of life in these patients.

This standardized self-assessment V-RQOL questionnaire was developed by Hogikyan and Sethuraman (1999) and is considered as a significant contribution to the field of voice pathology. Using V-RQOL, they conducted a study on 109 voice and 22 non-voice patients and stated that, the 10-item V-RQOL, performs well in tests of reliability, validity, and responsiveness, and it carries a low burden. As a result, they concluded that V-RQOL is an important addition in the evaluation of treatment outcomes in dysphonic patients.

A study with the V-RQOL tool on 15 male and 15 female speakers using tracheoesophageal speech following total laryngectomy for laryngeal cancer by Day and Doyle (2010) revealed no statistical significance on scores across gender and that, there were varied degrees of voice-related disability for both physical and social-emotional functioning, with generally better social-emotional scores in all the participants. They concluded that the V-RQOL is a valuable tool for this clinical population.

Oridate, Homma, Suzuki, Nkamaru, Suzuki, & Hatakeyama et al. (2009) found the mean V-RQOL and VHI-10 scores for total laryngectomy patients (n=27) to be lowest among the various methods such as radiotherapy (n=63), chemoradiotherapy (n=29), laser surgery (n=14) and total laryngectomy and they concluded that V-RQOL and VHI-10 are important tools in judging the overall effectiveness of treatment options for laryngeal cancer.

In India, Deshpande et al. (2008) studied VRQOL in 132 patients undergoing total laryngectomy with primary TEP using V-RQOL questionnaire and they found that median V-RQOL total score was 76.2 indicating excellent VRQOL. As a result, they concluded that V-RQOL questionnaire can be used to reliably assess VRQOL and is found to be excellent in Indian patients undergoing TEP.

Thus, review of literature published in the last few years, in Western as well as in Indian contexts reveals studies on VRQOL of either total laryngectomy patients or of irradiated patients alone with dearth of studies comparing the VRQOL of these two patient groups, especially in Indian context. Therefore, there is a need to study the voice related quality of life of Indian patients treated for laryngeal cancer with total laryngectomy using tracheoesophageal speech (TES) and those with chemoradiation therapy (CRT) using laryngeal speech to facilitate an understanding of the patient's perception of the deficiency due to vocal dysfunction and the extent to which the deficiency affected the VRQOL in these two patient groups. Also, comparison between the two treatment groups will facilitate pre-operative and post-operative counseling to patients undergoing treatment for laryngeal cancer.

The purpose of the present study was to investigate the voice related quality of life using V-RQOL measure in Indian patients treated for laryngeal cancer with total laryngectomy using TES and with CRT using laryngeal speech. A second aim was to compare and determine the quantifiable differences between domain and total scores of V-RQOL of both the patient groups.

Table 1: Details of characteristics of group-I participants

Characteristics	No. of participants
Total (n)	10
Age range, years	51-83
Mean age, (SD) years	65.2, (12.5)
Gender Male	10
<i>Radiation therapy (RT)</i>	
Pre-operative (RT)	5
Post-operative (RT)	5
Chemotherapy (CT)	5/10
<i>Time elapsed since surgery</i>	
Range, in years	1-14
Mean, (SD), in years	6.8, (5.1)

Method

Participants

A total of 20 individuals (17 male and 3 female) who were diagnosed and treated for laryngeal cancer participated in the study. These participants were in the age range of 34-83 years. They were divided into two groups based on the type of treatment for laryngeal cancer. All the participants were treated for the advanced stages (T3 and T4) of laryngeal cancer. The first group (group I) consisted of 10 participants (10 males) who had undergone total laryngectomy using tracheoesophageal speech

(TES). Also, all the participants had undergone primary tracheoesophageal puncture. Among the 10 participants, 5 each had pre-operative radiation therapy and post-operative radiation therapy while only 5 out of 10 participants had chemotherapy as a part of their treatment programme. All the participants have been using Provox-2 indwelling voice prosthesis between 1 to 14years. The second group (group II) consisted of 10 individuals, (7 male and 3 female) who had undergone chemoradiation therapy (CRT) as their primary and final treatment for laryngeal cancer and using laryngeal speech participated in the study. They had received 25-40 cycles of radiation therapy as their treatment and 3-6 cycles of chemotherapy. These individuals were outpatients in various cancer hospitals in the Hyderabad city. Tables 1 and 2 give the details of the characteristics of both the patient groups. Table 3 gives details of tumor sites and tumor staging of group II participants.

The inclusion criteria was that all the participants of both the groups should have basic reading abilities as the study includes patient-rated scales and should be free from any cognitive problems at the time of study. All the group I participants should be tracheoesophageal speakers at least 2 months prior to the study and group II participants should have completed chemoradiation therapy as their primary treatment at least 2 months prior to the study. However, individuals who did not have basic reading abilities, those who were undergoing treatment for laryngeal cancer at the time of study and those who had undergone other types of surgical treatments for laryngeal cancer other than total laryngectomy such as partial laryngectomy, pharyngolaryngectomy, and radical neck dissection were excluded. Also, those participants of group I who have had their voice prosthesis removed on account of factors such as leakage and the participants of group II who had any surgical treatment other than organ-preserving treatment were also excluded from the study.

Material

Voice Related Quality Of Life (V-RQOL): V-RQOL questionnaire was developed by Hogikyan and Sethuraman in 1998 at University of Michigan. It is a self administered questionnaire and has two domains: socio-emotional (SE) and physical functioning (PF). It consists of 10 questions and each question is assigned a score of 1 to 5 (1= not a problem, 5= severe). Of these 10 questions, SE domain includes six questions and PF domain includes four questions. These 2 functional domains are reported as scores, with each reflecting one component of how a patient’s deficit can influence his/her daily life with regard to vocal communication. The scores from those 2 domains are supplemented by a final total V-RQOL score. The scoring ranges from 0 to 50 with higher V-RQOL score indicating

better voice outcome and vice-versa. These total scores are interpreted as percentages to determine the severity. Table 4 shows interpretation of V-RQOL scores.

Procedure

Testing was conducted in a quiet room. A written consent was obtained from all the participants prior to the study. Demographic details were collected from all the participants of both the groups. Thereafter, each participant was provided with the V-RQOL questionnaire and was given a detailed explanation of it. They were asked to go through the instructions and fill accordingly. Most of them filled the form alone. The data thus obtained was tabulated for statistical analysis.

Statistical Analysis

After completing the test, the examiner has added up the scores on two domains and total score for all the participants. Statistical Package for Social Sciences (SPSS 17.0) was used to test the differences between domains scores as well as between total scores of V-RQOL between TES and CRT groups and also, to measure the difference between domain scores within each group. Repeated measures of ANOVA was used to compare VRQOL between the groups (between subject factor) and between the PF, SE domains and V-RQOL scores (within subject factors) in both the groups.

Table 2: Details of tumor sites and tumor staging of group-II participants

Characteristics	No. of participants
Tumor sites	
Glottis	5
Supra-glottis	1
Post-cricoid	2
Hypopharynx	2
Tumor stage	
T2	2
T3	6
T4	2
Nodal staging	
N0	6
N1	3
N2	1
Metastasis	
M0	7
M1	-
Mx	3

Table 3: Details of characteristics of group-II participants

Characteristics	No. of participants
Total (n)	10
Age range, years	34-68
Mean age (SD) years	53.3, (10.9)
Gender	
Male	7
Female	3
Time elapsed since treatment	
Range, in months	2-12
Mean (SD),in months	5, (3.0)

Table 4: V-RQOL Score interpretation

TOTAL SCORE	V-RQOL SCORE
10	100 (Excellent)
20	75 (Fair to Good)
30	50 (Poor to Fair)
40	25 (Poor)
50	0 (Worst)

Results and Discussion

The following results were obtained based on the objectives:

Voice related quality of life in TES and CRT groups

To investigate the voice related quality of life in patients who had undergone total laryngectomy using tracheoesophageal speech (TES) and in those who had undergone chemoradiation therapy using laryngeal speech (CRT). Table 5 gives the mean and SD values for domains and total scores of V-RQOL in TES and CRT groups.

The above table suggests that, in both TES and CRT groups, the mean Physical Functioning (PF) value is higher when compared to that of mean Social Emotional (SE) value which indicates that PF domain is more affected than SE domain. However, the mean difference is small in CRT group when compared to that of the TES group. Whereas, on comparing mean values between the domains of both the groups, the mean PF of TES is higher than that of the mean PF of CRT which suggests that the PF is more affected in TES group. On the other hand, the mean SE of TES is lower when compared to that CRT indicating that SE domain is more affected in CRT group. Figure 1 demonstrates the mean scores of PF and SE domains of TES and CRT groups. On the whole, the mean V-RQOL score of TES is lower compared to that

of CRT which indicates that the voice related quality of life is slightly more affected in TES. Figure 2 represents the mean V-RQOL scores of TES and CRT groups.

In a study conducted by Day and Doyle (2010) on tracheoesophageal speakers following total laryngectomy for laryngeal cancer using V-RQOL questionnaire, they found that different degrees of voice-related disability were seen for both physical and social-emotional functioning, with generally better social-emotional scores in all the participants. Also, Oridate et al. (2009) investigated the voice related quality of life in patients treated with laryngeal cancer and found that the mean PF value in CRT group is higher compared to that of mean SE value. The results of these studies are in agreement with the findings of the present study.

Thus, in TES group, PF domain is more affected than SE domain probably because of obvious loss of larynx which affected the physical functioning aspects of the individual. In CRT group, the PF domain is more affected than SE domain probably because of the late adverse effects of radiotherapy as research suggests that it takes longer period for various acoustic parameters to become normal. Even Kazi, Venkitaraman, Johnson, Prasad, Clarke and Rhys-Evans et al. (2008), in their study, reported superior voice outcomes with improvement over a 12-month period in the chemoradiotherapy group.

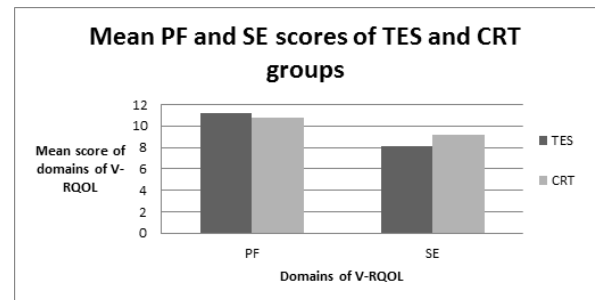


Figure 1: Mean scores of PF and SE domains of TES and CRT groups.

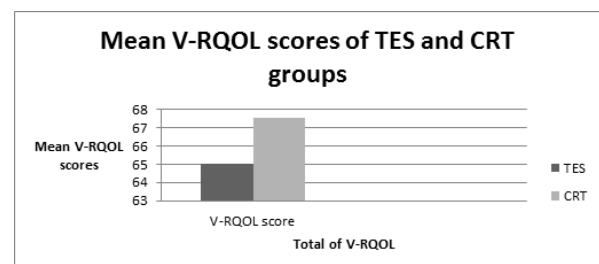


Figure 2: Mean V-RQOL scores of TES and CRT groups.

Table 5: Mean and SD values for PF, SE domains and V-RQOL score in TES and CRT groups

Parameters	TES		CRT	
	Mean(Max score)	SD	Mean(Max score)	SD
PF	11.2/20	3.0	10.8/20	3.0
SE	8.1/30	3.6	9.2/30	3.0
V-RQOL Score	65.0/100*	12.9	67.5/100*	12.0

*For V-RQOL max. score details, refer Table 4

Comparison of VRQOL between TES and CRT groups

To compare the voice related quality of life in individuals who had undergone total laryngectomy using tracheoesophageal speech (TES) and in those who had undergone chemoradiation therapy using laryngeal speech (CRT). Results of repeated measures of ANOVA are shown in Table 5.

The Table 5 indicates the mean square and F values of both the groups on the two domains and V-RQOL total scores obtained through repeated measures of ANOVA. Results indicated that a highly significant difference between the domains as well as domains and V-RQOL total scores in each group was observed i.e., the difference between the mean PF and mean SE value; mean PF and mean V-RQOL score as well as mean SE and mean total V-RQOL score is statistically significant in both TES and CRT groups. However, the F-value for both the domains and mean V-RQOL score shows a non-significant difference between the groups i.e., neither the difference between the mean PF and mean SE values nor the difference between mean PF and mean V-RQOL score nor the mean SE and mean V-RQOL score is statistically significant.

Table 6: Results of repeated Measures of ANOVA

Source	Mean square	F value
Domains	21252.8	279.5**
Groups	17.0	0.68

**indicative of p<0.01

In a study conducted by Terrell, Susan, Fisher, Gregory and Wolf (1998) on 46 patients with advanced laryngeal cancer using Head and Neck Quality of Life (HNQOL) questionnaire, they found that there was no significant difference for speech scores on the HNQOL survey between the chemoradiation group and total laryngectomy group. Rather, the scores were almost similar which is in accord with the findings of the present study.

However, Oridate et al. (2009) reported a significant difference in the V-RQOL scores between CRT (n=29) and TL groups (n=27) which is in contradiction with the findings of the present study probably because of inclusion of various types of laryngeal speakers in their study whereas the

present study enrolled only the tracheoesophageal speakers. Also, the experience of tracheoesophageal speakers in TES group (Table 1 for details) dominated the time elapsed since chemoradiotherapy (Table 2 for details) for the CRT group in the present study.

Hence, this non-significance between the groups on both the domains and total scores of V-RQOL was probably because of the success of TES group who appeared to be satisfied with the new voices they managed to achieve when compared to individuals who had undergone chemoradiation therapy using laryngeal speech. This success of TES group might, in part, be due to the modern techniques of speech rehabilitation (tracheoesophageal prosthesis) following total laryngectomy. On the other hand, it could also be because of the combined persisting side effects of both radiation therapy (RT) and chemotherapy (CT) that resulted in continued speech disturbances that are associated with post-treatment edema and fibrosis as even studies stated that voice and speech degenerated during radiotherapy, improved again 1-2 months after treatment and exceeded pre-treatment levels after 1 year or longer. Nevertheless, despite the non-significance between the groups, there are slight differences between the mean values of domains and V-RQOL total scores between TES and CRT group which could be because of the effects of post-operative RT and/or chemotherapy along with the effects of aging in TES group.

Conclusions

This is the first study in Indian context to throw light on the voice related quality of life in patients treated with two different modalities for laryngeal cancer. From the study, it can be concluded that patients with advanced stage of laryngeal cancer have fair to good voice related quality of life regardless of the modality of treatment received. Also, there are no significant differences between the domains of V-RQOL as well as total V-RQOL scores between individuals who had undergone total laryngectomy using tracheoesophageal speech and those who had received chemoradiation therapy using laryngeal speech. This data can be used as a base to facilitate pre-operative and post-operative counselling for Indian patients undergoing treat-

ment for laryngeal cancer.

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