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Quality of life in patients after total laryngectomy: a cross-sectional study in a Turkish cohort

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Abstract

Background Laryngeal cancer, representing 25% of head and neck malignancies, has a rising global incidence. Total laryngectomy (TL), while lifesaving, leads to profound physical, psychological, and social challenges, significantly impairing quality of life (QoL). This study aims to evaluate QoL in total laryngectomy patients using both general and disease-specific scales while examining associations with sociodemographic and clinical factors.

Methods A total of 55 patients aged from 48 to 78 years were included in the study. Eight participants used an electrolarynx device, 25 used the esophageal speech method, and the remaining 22 patients, unable to use any voice restoration method, communicated through manual signs and writing. The minimum time elapsed between total laryngectomy and study inclusion was at least 6 months. The QoL of patients with TL was investigated using the Patient History Form, including demographic and general health information, the World Health Organization Quality of Life Scale (WHOQOL-BREF), and Turkish FACT-H&N (Functional Assessment of Cancer Therapy—Head & Neck) scales.

Results There were statistically significant differences in patients' emotional, ear, nose, and throat (ENT) activity and physical health subscales with and without voice rehabilitation training. There was statistical significance in the emotional and total subscales when comparing the time after surgery with 2 years and above 2 years. The participants who received radiotherapy alone had worse scores compared to both those who received surgery alone ($p = 0.003$) and those who received chemoradiotherapy ($p = 0.029$).

Conclusions Results of this study indicate that QoL assessments should be routinely applied in clinics. Advice and support on the importance of voice rehabilitation training should be given, considering the psychological conditions of the patients, to support the voice management and rehabilitation of patients with TL.

Keywords Quality of life, Total laryngectomy, Speech, Cancer, Laryngeal cancer

Introduction

Laryngeal cancers represent the most common group of head and neck malignancies, accounting for approximately 30–40% of cases and 2–5% of all cancers. The

most important risk factors are smoking and alcohol use; therefore, the preventable aspect of the disease is also remarkable [1]. In Türkiye, laryngeal cancers constitute a significant public health burden, ranking eighth in the male population [2]. Increasing incidence rates emphasize the necessity of developing both primary prevention strategies (e.g., smoking cessation programs) and early detection methods.

The stage of diagnosis is the main determinant of laryngeal cancer treatment. The TNM classification states that total surgery and chemoradiotherapy are recommended for advanced-stage (T3–T4) cancers, although

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radiotherapy or partial surgery is frequently adequate for early-stage (T1–T2) tumors [3]. Total laryngectomy (TL) refers to the excision of the entire larynx, whereas partial laryngectomy simply removes the region containing the tumor. But occasionally, “extended TL” might be necessary because it extends to nearby structures such as the thyroid gland, hypopharynx, and hyoid bone [4].

The major disadvantage of total laryngectomy is the permanent tracheostomy and aphonia. Since air inhaled through a tracheostoma does not undergo normal physiological filtration and humidification processes, increased secretions, coughing, dyspnea, mucus plugs, and especially sleep disruptions are common [5]. Another significant issue relates to nutrition. Surgical procedures can lead to difficulty swallowing due to loss of glottic closure, while radiotherapy is more likely to cause dry mouth (xerostomia), painful swallowing, and tooth loss [6–8].

In addition to these functional losses, patients undergoing total laryngectomy face challenges in performing daily activities, such as bathing, communicating, and being in social settings. In particular, the loss of natural voice leads to social isolation and communication difficulties; rehabilitation using methods such as electrolarynx, esophageal speech, or tracheoesophageal prosthesis becomes necessary. However, each of these methods has limitations, and their success rates vary [9, 10].

In addition to all these physical consequences, patients also experience serious psychosocial effects [11, 12]. After TL, patients frequently report problems such as depression, anxiety, anger, feelings of worthlessness, deterioration in social relationships, and loss of work capacity. Approximately half of patients experience depression symptoms, and a significant proportion permanently leave their jobs [5, 10]. Therefore, total laryngectomy patients’ self-confidence decreases, and they face feelings of self-sufficiency and loss of independence. This multidimensional picture necessitates monitoring not only biomedical outcomes but also quality of life (QoL) [13].

QoL assessments aim to reveal both general health and psychosocial functioning as well as disease-specific effects. While the general QoL scale provides a broad assessment of an individual’s physical, psychological, social, and environmental well-being, the disease-specific quality of life scale aims to measure the effects of a specific disease or health condition on an individual’s quality of life in detail [14]. The World Health Organization Quality of Life Scale (WHOQOL-BREF), FACT-H&N (Functional Assessment of Cancer Therapy—Head & Neck), Short Form-36, and Hospital Anxiety and Depression Scale (HADS) are the most frequently used QoL scales in groups of diseases that significantly affect the life

of the individual, such as TL. Notably, there are no studies that simultaneously apply the WHOQOL-BREF (general) and FACT-H&N (disease-specific) scales to assess quality of life in the Turkish population. Most previous studies in the literature have used either only general or only disease-specific scales. Moreover, cross-cultural variations in sociodemographic and health-related characteristics necessitate further research.

In this study, we wanted to evaluate the quality of life for patients who have had a total laryngectomy by using WHOQOL-BREF and FACT-H&N; we aimed to answer the questions, “How does general and disease-specific quality of life (measured by WHOQOL-BREF and FACT-H&N) change for these patients?”, “What is the link between clinical treatment and quality of life?”, and “Do sociodemographic factors influence quality of life scores?”

Material and methods

This cross-sectional study was conducted between March 2019 and May 2019 at the Department of Otorhinolaryngology, Cerrahpaşa Faculty of Medicine, Istanbul University-Cerrahpaşa, and the Department of Otorhinolaryngology, Trakya University Faculty of Medicine Hospital. The patients were informed about the purpose of the study and signed a voluntary consent form. All patients provided the Patient History Form information, including demographic and health information. WHOQOL-BREF and FACT-H&N scales were applied in random order by face-to-face interview method. The answers of the participants were marked on the paper by the researcher.

Participants

Patients who underwent total laryngectomy (TL) were screened in the hospital database. We were able to reach only 62 individuals out of the total 134 records, due to factors such as incorrect numbers or death. Of these individuals, 55 patients (54 men, 1 woman) agreed to participate in the study. No additional female patients were found in the records that were accessed. The ages of the participants ranged from 48 to 78 years, with a mean age of 64.25 ± 6.58 years.

The inclusion criteria for the study were defined as (i) being 18 years of age or older, (ii) having undergone surgery at least 6 months prior, and (iii) having no recurrence or metastasis. Patients who did not meet the inclusion criteria were not included in the study.

The patients’ voice restoration methods varied. Thirty-three patients used a voice restoration method: 8 with an electrolarynx and 25 with esophageal speech. Some of these patients accepted postoperative voice rehabilitation training from experienced speech-language pathologists,

while others did not, resulting in varying success in implementing their chosen methods. The remaining 22 patients were unable to effectively use any voice restoration method despite some receiving training, and thus continued to communicate via manual signs, gestures, or writing. None of the patients had a voice prosthesis.

Measurements

Demographics and health measurements

Demographics and health-related measurements were obtained through the Patient History Form created by researchers for this study. The Patient History Form includes demographic information, general information, disease information, and current status information of the participants. The demographic information includes age, gender, marital status, education status, employment, working status, etc. General information consists of medical history, smoking status, alcohol consumption, and others. Information about the disease includes radiotherapy/chemotherapy history (adjuvant and or neoadjuvant), cancer stage, surgery date, presence/absence of postoperative infection, etc. The current situation information is which voice restoration method is used and whether voice rehabilitation training (electrolarynx training or esophageal speech training) is taken.

QoL measurements

The FACT-H&N v4 is a valid and reliable disease-specific quality of life scale that adds 12 head and neck cancer questions to the general FACT-G questionnaire [15]. FACT-H&N encompasses five subscales: physical well-being (PWB), social/family well-being (SWB), emotional well-being (EWB), functional well-being (FWB), and head and neck cancer subscale (HNCS). FACT-H&N consists of 39 questions, 12 evaluating ear, nose, and throat (ENT) complaints and side effects. Each subscale is scored between 0 and 4. The total score of the FACT-H&N scale ranges from 0 to 148. Scores can be calculated individually or in total for each subscale, and a better score means a better quality of life.

The WHOQOL-BREF scale is a short 26-item version of the WHOQOL-100 scale. It was developed by the World Health Organization and 15 international centers in 1992 and translated into more than 20 languages [16]. Eser et al. [17] evaluated the validity and reliability of the Turkish WHOQOL-BREF scale. The WHOQOL-BREF has four domains: physical health, psychological, social relationships, and environment. The questions were rated on a 5-point Likert scale. There was no total score on this scale. Each domain is calculated independently from the other, from 0 to 100. A better quality of life was indicated by a higher score.

Statistical analysis

The data were analyzed using the software SPSS vs25. Descriptive statistics such as mean, standard deviation, and minimum and maximum values were calculated for the demographic and health characteristics and quality of life scores. Chi-square tests were used to compare independent dichotomous variables, and Student's *t*-tests were used to compare independent continuous variables. In cases where more than two independent variables were present, Kruskal–Wallis tests were used for non-parametric tests due to a small number of samples. For pairwise comparisons, the Dunn test was used. The Pearson correlation coefficient was calculated to determine the relationship between continuous values. The statistical significance value was set to $p \leq 0.05$. The Cronbach alpha coefficient of the scales was determined as 0.871.

Results

Patients' demographic and health characteristics are summarized in Tables 1 and 2. Due to the small number of patients that had graduated from middle school or higher ($n=17$), education was classified into elementary school and middle school and higher.

There were no statistically significant differences between education level and smoking history ($p=0.36$), between education level and receiving voice rehabilitation training ($p=0.36$), between education levels of the participants and FACT-H&N subscales ($p=0.06$), nor

Table 1 Patients' demographic characteristics

Patients' demographic characteristics	<i>n</i>
Age	
48–65	27
66–78	28
Sex	
Male	54
Female	1
Education level	
Elementary school	38
Middle school and higher	17
Marital status	
Married	49
Never married	1
Widowed	5
Employment	
Employed	6
Unemployed	49
Smoking (mean 63.18 ± 39.05 pack per year; min: 0, max: 200 pack per year)	
Smoked	53
Never smoked	2

Table 2 Patients' health characteristics

Patients' health characteristics	n
Non-surgical treatment	
Radiotherapy (RT)	11
Chemoradiotherapy (CRT)	27
None	17
Post-surgical period (mean 36.45 ± 28.0 months; min 7, max 124 months)	
2 years and below	24
Over 2 years	31
Voice rehabilitation training after surgery	
Yes	21
No	34

Table 3 The correlation values of the WHOQOL-BREF scale according to age

	p value	r value
Domain 1 (physical health)	0.025*	-0.302*
Domain 2 (psychological health)	0.035*	-0.285*
Domain 3 (social relationships)	0.939	-0.011
Domain 4 (environment)	0.137	-0.203

Pearson correlation coefficient, * $p \leq 0.05$

between age and all FACT-H&N subscales ($p=0.84$). No statistically significant differences were observed between patients under 65 years and those aged 65 years or older in either of the QoL scales ($p>0.05$). However, when the continuous effect of age was analyzed, the scores of the WHOQOL-BREF domains 1 (physical health) and

2 (psychological health) decreased significantly as age increased. A negative correlation was found between age and domain 1 ($p=0.025$; $r=-0.302$) as well as between age and domain 2 ($p=0.035$; $r=-0.285$) (Table 3). No significant correlation was observed in domain 3 and domain 4.

When the patients received treatment other than surgery, a statistically significant difference was found in the FACT-H&N HNCS, FACT-H&N total, and WHOQOL-BREF domain 2 subscales ($p \leq 0.05$) (Table 4). Specifically, patients who underwent adjuvant radiotherapy (RT) had worse HNCS scores compared with those who received surgery alone ($p=0.003$) and also worse scores compared with those who received chemoradiotherapy (CRT) ($p=0.029$). For the FACT-H&N total score, RT patients again scored lower than those who underwent surgery alone ($p=0.004$) and lower than those who received CRT ($p=0.013$). The PWB, SWB, EWB, and FWB subscales were not significantly different (Table 4). In addition, in WHOQOL-BREF domain 2, patients who received adjuvant radiotherapy (RT) had lower scores compared with those who underwent surgery alone ($p=0.016$) and also lower scores compared with those who received chemoradiotherapy (CRT) ($p=0.009$).

A statistically significant difference was found in the FACT-H&N EWB subscale ($p=0.003$) and in the total score ($p=0.026$) when participants' scores were compared according to the post-surgical period (Table 5), while no significant differences were found in the other FACT-H&N subscales. In contrast, no statistically significant differences were observed in any of the

Table 4 Comparison of FACT-H&N and WHOQOL-BREF scores according to non-surgical treatment

QoL scales	RT (N = 11)	CRT (N = 27)	None (N = 17)	p value (overall)	Post hoc comparisons
FACT-H&N					
PWB	20.55 ± 6.35	24.15 ± 3.66	24.06 ± 4.49	0.075	
SWB	20.35 ± 5.87	23.30 ± 3.96	24.34 ± 3.46	0.056	
EWB	13.91 ± 5.82	16.26 ± 4.12	17.41 ± 4.23	0.143	
FWB	17.18 ± 7.00	20.78 ± 5.24	20.88 ± 5.53	0.177	
HNCS	23.85 ± 7.83	28.44 ± 4.85	30.71 ± 5.49	0.011*	None vs RT ($p=0.003$) CRT vs RT ($p=0.029$)
FACT-H&N Total	95.83 ± 27.38	112.93 ± 14.41	117.40 ± 17.99	0.012*	None vs RT ($p=0.004$) CRT vs RT ($p=0.013$)
WHOQOL-BREF					
Domain 1 (physical health)	55.45 ± 13.60	60.56 ± 13.12	57.94 ± 14.33	0.557	
Domain 2 (psychological health)	59.18 ± 19.18	73.70 ± 12.87	73.53 ± 15.21	0.022*	None vs RT ($p=0.016$) CRT vs RT ($p=0.009$)
Domain 3 (social relationships)	66.00 ± 15.65	76.56 ± 8.75	72.82 ± 13.41	0.052	
Domain 4 (environment)	81.00 ± 14.72	83.56 ± 10.00	86.24 ± 10.25	0.472	

RT: Radiotherapy, CRT: Chemoradiotherapy, PWB: Physical well-being, SWB: Social life and family well-being, EWB: Emotional well-being, FWB: Functional well-being, HNCS: Head and Neck Cancer Subscale, Total: PWB+SWB+EWB+FWB+HNCS. Kruskal-Wallis test, post-hoc Dunn test, * $p \leq 0.05$

Table 5 Comparison of FACT-H&N subscales with post-surgical period

	2 years and below (N=24)	Over 2 years (N=31)	p value
PWB	22.58±4.60	24.03±4.72	0.259
SWB	21.82±5.37	23.96±3.30	0.074
EWB	14.13±4.94	17.71±3.70	0.003*
FWB	18.88±6.63	21.03±4.94	0.172
HNCS	26.76±6.04	29.35±6.03	0.120
Total	104.17±21.32	116.09±17.34	0.026*

PWB: Physical well-being, SWB: Social life and family well-being, EWB: Emotional well-being, FWB: Functional well-being, HNCS: Head and Neck Cancer Subscale, Total: PWB+SWB+EWB+FWB+HNCS. Student's t- test, * $p \leq 0.05$

Table 6 Comparison of FACT-H&N subscales with receiving voice rehabilitation training

	Yes (N=21)	No (N=34)	p value
PWB	24.38±3.94	22.79±5.05	0.225
SWB	23.84±4.67	22.52±4.24	0.285
EWB	17.10±4.04	15.56±4.89	0.233
FWB	22.10±3.72	18.85±6.50	0.042*
HNCS	30.96±3.12	26.52±6.89	0.007*
Total	118.38±15.51	106.26±21.08	0.026*

Yes: Group who received voice rehabilitation training, No: Group who did not receive voice rehabilitation training, PWB: Physical well-being, SWB: Social life and family well-being, EWB: Emotional well-being, FWB: Functional well-being, HNCS: Head and Neck Cancer Subscale, Total: PWB+SWB+EWB+FWB+HNCS. Student's t- test, * $p \leq 0.05$

WHOQOL-BREF domains with respect to the postoperative period ($p > 0.05$).

The patients who received voice rehabilitation training and those who did not were statistically different in regard to FWB, HNCS, and total subscales ($p=0.042$, $p=0.007$, $p=0.026$) (Table 6). No significance was observed in the other subscales. Specifically, functional abilities related to eating, breathing, and swallowing, which are components of the FWB and HNCS subscales, were better in patients who received voice rehabilitation training.

Patients were divided into three groups based on their voice restoration method after surgery: electrolarynx users, esophageal speech users, and patients unable to speak verbally who relied on manual signs, gestures, or writing for communication (nonverbal group). When comparing the groups' FACT-H&N scores, statistically significant differences were observed in functional well-being (FWB, $p=0.04$) and total score ($p=0.04$). Post hoc analysis showed that in FWB, the nonverbal group scored significantly lower than the esophageal speech group ($p=0.017$), and in the total subscale, the nonverbal group also scored significantly lower than the esophageal speech group ($p=0.018$) (Table 7). Similarly, in the WHOQOL-BREF scale, significant differences were observed in domain 1 (physical health, $p=0.001$). Post hoc analysis revealed that the nonverbal group scored significantly lower than both the esophageal speech group ($p=0.02$) and the electrolarynx group ($p=0.011$). No significant differences were observed in domain 2

Table 7 Comparison of QoL subscales according to the type of voice restoration method after surgery

QoL scales	Electrolarynx (N=8)	Esophageal speech (n=25)	Nonverbal (n=22)	p value (overall)	Post hoc comparisons
FACT-H&N					
PWB	24.63±3.16	23.96±4.41	22.32±5.36	0.36	
SWB	23.52±3.03	23.59±4.53	22.23±4.75	0.55	
EWB	16.75±2.12	17.44±4.27	14.45±5.22	0.07	
FWB	21.25±4.33	21.76±4.05	17.77±7.18	0.04*	Nonverbal vs esophageal: $p=0.017$
HNCS	30.13±4.09	29.61±5.48	25.95±6.88	0.07	
FACT-H&N Total	116.27±8.20	116.36±17.22	102.73±23.27	0.04*	Nonverbal vs esophageal: $p=0.018$
WHOQOL-BREF					
Domain 1 (physical health)	66.50±9.89	61.52±10.49	52.73±15.48	0.01*	Nonverbal vs esophageal: $p=0.021$ Nonverbal vs electrolarynx: $p=0.011$
Domain 2 (psychological health)	68.13±12.74	73.08±14.18	69.05±18.66	0.61	
Domain 3 (social relationships)	76.50±11.01	72.76±12.69	72.73±12.69	0.73	
Domain 4 (environment)	82.25±12.23	85.20±12.52	82.95±9.11	0.71	

PWB: Physical well-being, SWB: Social life and family well-being, EWB: Emotional well-being, FWB: Functional well-being, HNCS: Head and Neck Cancer Subscale, Total: PWB+SWB+EWB+FWB+HNCS. Kruskal-Wallis test, post-hoc Dunn test, * $p \leq 0.05$

(psychological health), domain 3 (social relationships), or domain 4 (environment).

A significant difference was found in domain 2 of the WHOQOL-BREF scale when the education level of the patients and WHOQOL-BREF domains were compared ($p=0.032$) (Table 8). No significance was observed among other domains.

The parameters of both QoL scales were positively correlated with each other (Pearson correlation coefficient, $p=0.00$). In addition, there were no statistically significant differences between the groups of smoking below 50 packs/year and above 50 pack/year on either QoL scale ($p>0.05$).

Discussion

One of the most critical functional outcomes of undergoing a total laryngectomy is the loss of natural voice. In this study, the quality of life of patients who underwent total laryngectomy was assessed using the FACT-H&N and WHOQOL-BREF scales. Statistically significant differences were found in the functional and physical health subscales between the group using electrolarynx and esophageal speech voice restoration methods and the nonverbal group. These findings are consistent with studies in literature. Eadie and Bowker [18] showed that patients with TL who could only write had a much lower quality of life than those who could speak. In another study, da Silva et al. [19] evaluated how 34 patients with TL were impacted by alaryngeal speech methods using the EORTCQLQ-C30, SECEL, and HADS scales. They emphasized that non-vocal patients had higher dysfunction scores compared to those using esophageal speech or tracheoesophageal speech. Although this study did not include patients using the tracheoesophageal speech method, the finding that patients using voice restoration methods achieved better outcomes than nonverbal patients is consistent with these researches. In this study, the patients who received voice rehabilitation training were also compared with the patients who did not, and the group receiving training were better in their activity,

especially in situations requiring communication with the environment. Additionally, this patient group demonstrated improved functions in areas like eating, breathing, and swallowing. The findings of this study are in line with the findings of da Silva et al. [19]. In the same study by da Silva et al., it was further emphasized that patients receiving speech therapy performed better on all scales and that alaryngeal speech methods (esophageal speech or tracheoesophageal speech) are indispensable for speech and communication. This consistency highlights the critical role of rehabilitation and alternative speech methods in post-laryngectomy recovery.

The most significant changes in QoL occur within the first few months of laryngectomy. In our study, emotional scores were found to be lower in patients who had undergone surgery less than 2 years prior compared to the group with a longer postoperative period. While patients may be more psychologically affected in the first few months after surgery, physical recovery and changes in social activities may occur more slowly and later. Therefore, while emotional scores are prominent in the early period, no significant differences may be observed in other areas. This finding indicates that TL has more negative effects on QoL, especially in the first few years. In comparison with the literature, Hammerlid et al. [20] indicated QoL changes in head and neck cancer patients during the first and third years after surgery and stated that the emotional function scores (indicating depression and anxiety) of the first year were significantly higher than the emotional function scores of the third year. They concluded that the greatest influence of the procedure occurred in the first year, but there were no significant changes in QoL after the first 2 years. Eadie and Bowker [18] evaluated 67 patients who had undergone the TL for at least 9 months, and the QoL after surgery was directly proportional to the post-surgical period. Leemans et al. [21] showed that patients who had a TL 2 years before and were aged under 60 had lower QoL scores. Our findings are consistent with these studies.

Non-surgical treatments such as RT and CRT are other factors negatively affecting the QoL of patients with TL. In our study, patients who received RT or CRT had significantly lower scores on the FACT-H&N HNCS, FACT-H&N total, and WHOQOL-BREF domain 2 (psychological health) subscales compared to patients who underwent surgery alone ($p\leq0.05$). Patients receiving RT, in particular, had lower HNCS and FACT-H&N total scores than both the surgery and CRT groups; RT patients also scored lower on WHOQOL-BREF domain 2 than the surgery and CRT groups. These findings indicate that adjuvant therapies such as RT and CRT may have a negative impact on TL patients' quality of life, especially in psychological and ENT-related domains. The

Table 8 Comparison of WHOQOL-BREF with education levels

	Elementary school (N=38)	Middle school and higher (N=17)	p value
Domain 1 (physical health)	57.74 ± 14.92	60.94 ± 9.58	0.420
Domain 2 (psychological health)	67.71 ± 16.66	77.53 ± 11.50	0.032*
Domain 3 (social relationships)	71.55 ± 11.90	77.18 ± 12.69	0.118
Domain 4 (environment)	82.42 ± 12.29	87.12 ± 6.99	0.148

Student's t- test, * $p\leq0.05$

magnitude of this effect appears to vary among patients, making the overall impact of RT and CRT on QoL a complex and still debated issue. In the literature, findings are somewhat conflicting. Paleri et al. [22] evaluated the QoL of patients with TL who received RT and those who did not and reported a tendency toward higher scores in the group that had received RT, despite there being no significant difference between the groups. They concluded that long-term side effects caused by RT did not adversely affect the QoL of patients with TL. Robertson et al. [23] included 179 patients with TL in their study and showed that patients who had not received RT had better health than those who had and argued that RT was more harmful. Batioğlu-Karaaltın et al. [24] studied 108 laryngectomy patients and found that depression and anxiety levels of those who did not receive CT or RT after surgery were better than those who received only RT or both treatments. The number of those who received adjuvant and neoadjuvant treatment could not be compared. Still, when ENT and psychological effects were considered together, patients who underwent surgery alone generally fared better than those receiving RT. These observations are consistent with our findings and further support the conclusion that adjuvant therapies can negatively influence the psychological and ENT-related aspects of QoL in TL patients.

In our study, no significant difference was found between the QoL scores of patients under and over 65 years of age. However, a negative correlation was observed between age and QoL scales, particularly in terms of physical activity and psychological status. These findings suggest that the effect of age on the QoL of TL patients may be limited and related to certain areas. In the literature, the effect of age on QoL remains debated. Some studies have reported that older patients have better QoL results [22, 25], while others have found no difference between younger and older patients [26–28]. Palmer and Graham [29] examined the relationship between communication and QoL using the FACT-H&N scale in 170 patients who had TL and stated that age was not associated with QoL parameters, despite being weakly related to a physical condition. Similarly, education level showed weak correlations with emotional and functional status and was not significantly associated with overall QoL.

Most patients in this study were at the primary school level, and a significant difference was observed between patients with only primary education and those with higher education. However, education level had little effect on overall QoL parameters, suggesting that while educational status may influence certain aspects of QoL, its overall impact is limited in this cohort. Education levels may vary among countries or cultures. Over half of

the patients studied by Eadie and Doyle [26] had graduated from a university, but no significant relationship was recorded between education level and QoL. According to Mallis et al. [30], the psychological aspect of laryngeal cancer patients may be even worse in regions or countries with low educational levels. These findings are consistent with our results, indicating that while education may contribute to some differences, it does not strongly affect QoL outcomes in general.

Smoking and alcohol consumption, major risk factors for laryngeal cancer, were highly prevalent among the patients in our cohort. In this study, 96% of the participants reported a history of smoking, with an average duration of 37.8 years. These findings are consistent with Akduman et al. [31], who reported that 88.4% of the patients had smoked for 28.6 years and 18.6% for 20 years.

Changes in socioeconomic status after the TL also affect QoL. In this study, 60% of the patients with TL had to leave their jobs after surgery, primarily due to communication difficulties or disability related to loss of natural voice. These findings are consistent with previous reports on post-surgical employment changes: retirement or job loss rates after surgery have been reported to increase from 26.7% to 80% [32]. Taylor et al. [33] reported a retirement rate of 52%, Vartanian et al. [34] a rate of 32.9%, and Antin et al. [35] a rate of 53.5%.

The scores of the two QoL scales used in the study were compared with each other. A remarkable result of the comparison is that the parameters FACT-H&N-PWB and WHOQOL-BREF domain 1 had different significances among patients. The physical condition assessment of both scales seemed different from each other. However, both scales include similar questions. For example, the first question of the FACT-H&N PWB is “I have a lack of energy,” and the tenth question of the WHOQOL-BREF scale is “Do you have enough energy for everyday life?” which have a similar meaning. When similar questions in the scale were examined, the answers of the patients seemed compatible with each other. Additionally, a positive correlation was recorded between the two areas ($p=0.000$; $r=0.611$). However, in general, the question contents and number of questions regarding physical condition differed between the two scales. Only in one of the scales was the physical condition statistically different. Thus, such differences between the scales seem to explain the lack of statistical significance in the other scale. Similarly, there are also differences between the subscales FACT-H&N-EWB and WHOQOL-BREF domain 2. The answers of the patients to similar questions on both scales are compatible with each other. Additionally, a positive relationship was recorded between these two as well. However, since the distribution and number

of questions in similar subscales were different, the results of the two subscales also differed.

This study has several limitations. The study only includes the Turkish population; therefore, the findings may not be directly generalizable to populations in different countries or with different cultural structures. Furthermore, the absence of patients using the tracheoesophageal speech method in the study prevented a comprehensive comparison of voice rehabilitation methods. The limited number of participants in the electrolarynx and esophageal speech groups further complicated the comparison of voice rehabilitation methods. Furthermore, the study only included participants who received adjuvant therapy; patients who received neoadjuvant therapy were not included. These limitations may restrict the generalizability of the findings to specific patient groups and may have prevented some effects from emerging statistically.

However, the study also has significant strengths. Two reliable assessment instruments (FACT-H&N and WHOQOL-BREF) were used in the study to examine the QoL following TL. Since the WHOQOL-BREF scale evaluates general QoL and the FACT-H&N scale measures disease-specific QoL, a more thorough analysis was obtained by examining both general and disease-specific QoL dimensions simultaneously. Furthermore, it provides a multifaceted view of the experiences following total laryngectomy in the Turkish population by examining the impact of adjuvant therapies, voice rehabilitation, and demographic factors on QoL.

Conclusion

Although survival is the primary goal after total laryngectomy (TL), quality of life assessments are of great importance in treatment planning. In this study, it was observed that patients who received radiotherapy (RT) alone had lower HNCS, FACT-H&N total, and WHOQOL-BREF domain 2 (psychological health) scores compared to patients who underwent surgery or CRT alone. Voice rehabilitation methods, however, provided meaningful improvements in emotional and functional domains. Age and education level had a limited effect on overall QoL, but socioeconomic factors like job loss had a significant impact.

In line with these findings, routine QoL assessments should be performed to address the psychological and social needs of TL patients, and voice rehabilitation and speech therapy support should be provided in the early stages. Future studies with larger and more diverse populations are important to validate these results and plan interventions to improve the quality of life of TL patients.

Abbreviations

TL	Total laryngectomy
QoL	Quality of life
WHOQOL-BREF	World Health Organization Quality of Life Scale
FACT-H&N	Functional Assessment of Cancer Therapy—Head & Neck
PWB	Physical well-being subscale
SWB	Social life and family well-being subscale
EWB	Emotional well-being subscale
FWB	Functional well-being subscale
HNCS	Head and neck cancer subscale
ENT	Ear, nose, and throat
RT	Radiotherapy
CRT	Chemoradiotherapy

Authors' contributions

All authors contributed to the study, including conceptualization, data collection, analysis, manuscript writing, and review.

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Data availability

No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate

The study was approved by the Clinical Research Ethics Committee at the Istanbul University-Cerrahpaşa with the number 83045809-604.01.02. The patients were informed about the purpose of the study and signed a voluntary consent form.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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