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REVIEW PAPER

PHYSICAL, PSYCHOLOGICAL, AND SOCIAL ASPECTS OF QUALITY OF LIFE IN PATIENTS AFTER TOTAL LARYNGECTOMY

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Summary

Laryngeal cancer is one of the most common malignant tumors of the upper respiratory tract, and total laryngectomy remains the main method of treatment for its advanced stages. Although this procedure allows for the cure of cancer, it leaves the patient with numerous multidimensional difficulties that disrupt daily functioning and significantly reduce quality of life. These consequences involve both the physical sphere – loss of verbal communication ability, breathing disorders, coughing, dysphagia, and olfactory impairment – and the psychological and social spheres, associated with feelings of isolation, reduced self-esteem, and emotional disturbances. An important factor facilitating patients' adaptation to life after larynx removal is not only support from relatives but also comprehensive preoperative and postoperative patient education. Providing detailed information about anatomical and physiological changes, rehabilitation methods, and prosthesis care help reduce anxiety and enhances treatment adherence. The most effective method of voice rehabilitation, which also provides the best quality of life, is the use of tracheoesophageal voice prostheses, allowing for a rapid restoration of speech ability and improved psychosocial well-being.

Keywords: voice prosthesis, voice quality, tracheoesophageal fistula, laryngectomy, absence of voice

Introduction

Laryngeal cancer is one of the most common malignant tumors of the upper respiratory tract [1], representing nearly one-third of all head and neck malignancies [2]. According to the World Cancer Research Fund (WCRF), in 2022, the total number of new laryngeal cancer cases worldwide was 189,191, with an age-standardized incidence rate (ASIR) of 1.9 per 100,000 population [3]. The most common histological type of this cancer is squamous cell carcinoma (85-95%), which may originate from any of the three anatomical regions of the larynx: supraglottic, glottic, or subglottic [2,4].

Total laryngectomy remains the primary treatment method for advanced stages of laryngeal cancer [5]. While it enables complete cure from the malignancy, it is associated with numerous physical and psychological consequences that have a profound impact on patients' quality of life [5].

In modern medicine, therapeutic success is defined not only by the effectiveness of cancer treatment itself but also by the ability to ensure the highest possible quality of life after

therapy. Increasing emphasis is placed on a holistic approach, which takes into account patients' perceptions, needs, and perspectives regarding their own health and functioning.

Aim of the work

The aim of this paper is to provide a broader perspective on the lives of patients following oncological treatment, analyze the challenges they face after total laryngectomy, discuss the factors influencing their quality of life, and present potential strategies to facilitate their adaptation to new health conditions.

Methods

A literature search strategy was conducted using the PubMed database based on a combination of keywords: "quality of life after total laryngectomy", "voice rehabilitation after laryngectomy", "difficulties", "acceptance of disability", "tracheoesophageal voice prosthesis", "factors influencing quality of life", "laryngectomy". Additionally, references from selected publications were reviewed to identify related studies. After analyzing titles and abstracts, incomplete articles and those not directly related to the quality of life of patients after laryngectomy were excluded. The final analysis included 44 publications that met the inclusion criteria.

Literature review results

Patients undergoing total laryngectomy experience a number of physical and functional changes that significantly affect their somatic condition as well as their psychological and emotional well-being.

Physical consequences of the procedure

The loss of voice is considered the most significant factor lowering life satisfaction among patients after laryngectomy [6-8]. Total laryngectomy is a particularly mutilating procedure, as the removal of the larynx results in the loss of the ability to communicate verbally. The patient is deprived not only of speech articulation but also of the individual characteristics

of the voice-such as timbre, intensity, and accent [9], which form an integral part of one's identity and convey not only information but also accompanying emotions.

Accordingly, voice rehabilitation plays a crucial role in the process of adaptation to new functional conditions [9-11], as emphasized, among others, by Iwai et al. [9]. The aim of their study was to gain an in-depth understanding of the transition process from the selection to the adaptation phase of tracheoesophageal speech (TES). The authors noted that, despite successful restoration of verbal communication, changes in voice quality may lead to social stigmatization and difficulties in interpersonal interactions. Such experiences may contribute to feelings of frustration and helplessness, resulting in a decline in overall quality of life, which underscores the need for comprehensive postoperative support for these patients [9]. Studies further emphasize that improvement in quality of life depends not only on the implementation of rehabilitation but also on its earliest possible initiation [9]. In addition to the loss of speech, patients also report other postoperative difficulties affecting daily functioning due to anatomical changes following surgery. These include breathing and swallowing problems, chewing difficulties, cough, excessive bronchial secretion, fatigue, constipation, as well as olfactory and taste disorders [8,12-16].

Teruya et al. [12] highlighted that one of the most burdensome yet rarely discussed consequences of laryngectomy is constipation and defecation difficulty. These problems result from the loss of the glottis and the associated inability to increase intra-abdominal pressure, which is essential for normal defecation [12]. Similarly, Harada et al. [17] reported that the prevalence of constipation in patients after total laryngectomy is high, particularly during the early postoperative period. Teruya et al [12]. further explained that cough and dyspnea, frequently observed in post-laryngectomy patients, stem from a combination of factors, including smoking-related pulmonary changes and the non-physiological respiratory pathway created by surgery.

Another frequent and significant consequence of total laryngectomy, examined in the study by Xuan Quang et al. [18], is olfactory dysfunction, which results from the loss of nasal airflow and possible structural changes in the olfactory epithelium, leading to a marked deterioration in patients' quality of life [16,18]. For this reason, olfactory rehabilitation should be considered an integral component of comprehensive postoperative care. Currently, the most commonly used approaches are non-invasive rehabilitation techniques that allow for partial or complete restoration of olfactory function [16,19,20]. The best-studied and most widely implemented method is the Nasal Airflow-Inducing Maneuver (NAIM), which induces nasal

airflow by generating negative pressure through repeated “polite yawning” with closed lips, thereby enabling air to be drawn into the nasal cavity [16,19,20]. NAIM is a simple and cost-effective technique that, according to available studies, improves odor perception in up to 50% of patients who practice it regularly, with benefits that may persist long-term [16,19,20]. Another promising method is Olfactory Training (OT), which involves repeated exposure to selected odors. Regular olfactory stimulation promotes regeneration of olfactory receptor neurons by exploiting their neuronal plasticity [16,21]. OT has proven effective in other conditions, such as Parkinson’s disease and post-infectious olfactory dysfunction, and studies involving laryngectomy patients have shown that long-term, consistent odor training increases olfactory bulb volume and improves olfactory test scores, even many years after surgery [21]. Available evidence indicates that these rehabilitation techniques can significantly enhance olfactory function with minimal risk and low cost, and their implementation should be considered for all patients after total laryngectomy [16].

In some patients undergoing total laryngectomy, the advanced stage of the disease necessitates a concurrent neck dissection. Although essential from an oncological perspective, this procedure can significantly impair shoulder girdle function and, consequently, reduce postoperative quality of life [22-24]. The most common complication is accessory nerve shoulder dysfunction (ANSD) [22]. ANSD results from weakness or paralysis of the trapezius muscle caused by temporary nerve damage (traction, dissection, intraoperative devascularization) or permanent nerve resection [22]. Importantly, ANSD may develop even when the nerve is preserved, with reported incidence ranging from 5-20% to nearly 37%, depending on the type of neck dissection performed [22]. Symptoms of ANSD include pain, a sensation of heaviness, shoulder depression and anterior displacement, limited range of motion – particularly impaired arm abduction – and scapular winging [22,24,25]. Studies emphasize that preserving the spinal accessory nerve (SAN) and the sternocleidomastoid muscle (SCM), as well as limiting the extent of the dissection, markedly reduces the risk of these complications and improves upper limb function [24]. Early and targeted rehabilitation is a crucial component of postoperative management, aiming to restore range of motion, improve muscle strength, and prevent secondary soft-tissue injuries [22,24]. The strongest evidence supports progressive, supervised resistance training, including isotonic and isometric strengthening, mobilization, and stretching exercises [22]. Rehabilitation is particularly beneficial for patients who underwent SAN or SCM resection, leading to improved arm abduction, reduced pain, and enhanced functional capacity, all of which directly contribute to better quality of life [24,25].

In the context of these considerations, the observations by Wulff et al. [26] are noteworthy. The authors emphasize that postoperative rehabilitation in laryngectomy patients frequently focuses almost exclusively on restoring speech, while other problems, such as dysphagia or olfactory dysfunction, are often overlooked, despite being direct consequences of laryngeal removal [26]. Therefore, postoperative care should adopt a comprehensive approach, incorporating additional supportive strategies, including heat and moisture exchange filters to reduce respiratory symptoms, exercises targeting communication and swallowing, as well as physical rehabilitation for patients following neck dissection [23]. The combination of these measures allows for more effective management of treatment sequelae and results in a meaningful improvement in the overall quality of life of patients after total laryngectomy.

Psychological consequences of the procedure

Patients after laryngectomy report not only physical complaints but also significant psychological changes. Impaired speech function contributes to limitations in interpersonal relationships, increased feelings of loneliness, and progressive social isolation – factors that are crucial components of overall well-being [14]. Patients who have undergone total laryngectomy are also considered a high-risk group for developing psychiatric disorders, such as depression and anxiety [5,12,27]. In their review, Covrig et al. [28] emphasized that patients with head and neck cancers have a four-fold higher risk of suicide compared with other oncology patients. The deterioration of mental health among laryngectomized patients is primarily influenced by the loss of the ability to speak, reduced quality of alaryngeal voice, and changes in body image resulting from the presence of a tracheostoma. These factors significantly affect self-esteem, self-confidence, and sense of personal identity and are often accompanied by feelings of shame, leading to social withdrawal and isolation [5,9,29].

Covrig et al. [28] further highlighted the devastating psychological impact of head and neck cancers, noting that this is largely related to the central role of the “face” in shaping personality, self-perception, identity, and interpersonal relationships [28]. In their study, Nogueira et al. [30] demonstrated that the association between facial disfigurement and quality of life was significantly stronger in women, particularly in domains related to social and family functioning. However, the study did not find a clear linear correlation between the degree of facial disfigurement or dysfunction and the impact on quality of life, suggesting that other

emotional and psychosocial factors may play an important role in shaping individual perceptions and coping responses [30].

An additional psychological burden for patients after laryngectomy is the sense of isolation in their disability. Because laryngeal cancer is a relatively rare malignancy, laryngectomized individuals form a small and geographically dispersed population, which limits opportunities for contact with others facing similar challenges. This lack of shared experience can deepen feelings of exclusion and misunderstanding. Support groups addressing this need can play a vital role by providing a safe space for sharing experiences, exchanging advice, and developing coping strategies. Such groups foster a sense of acceptance, belonging, and restored self-confidence in patients [5].

Total laryngectomy also negatively affects various aspects of sexual life. Despite being an important determinant of overall quality of life, this issue is often overlooked by both healthcare providers and patients, who are often reluctant to discuss it openly [31,32]. In a study conducted by Babin et al. [31], involving 1,511 patients after total laryngectomy, an average of 47% reported decreased sexual quality of life. Among men, erectile and ejaculatory dysfunction predominated, whereas in the general study population, the most common issues included decreased libido, reduced frequency of sexual intercourse, and diminished satisfaction. The factors associated with these impairments included the presence of a tracheostoma, advanced tumor stage, younger age, and coexisting depression. Furthermore, 23% of respondents reported a lack of postoperative support addressing sexual health [31]. In another study by Covrig et al. [28], sexuality was identified by patients as one of the three most burdensome areas of life following laryngectomy.

Factors influencing the quality of life of patients after total laryngectomy

Available publications identify various determinants of quality of life among patients after laryngectomy. One of the most important factors is the method of voice rehabilitation chosen by the patient. Currently, tracheoesophageal puncture (TEP) is considered the gold standard of voice rehabilitation [33]. This method provides the most natural-sounding voice, and it is relatively easy to learn, which facilitates rapid social reintegration. Numerous studies confirm that TEP offers a significant advantage over other rehabilitation methods in improving quality of life and reducing the degree of voice-related disability [5,33,34]. Moreover, TEP is more effective in alleviating additional difficulties frequently experienced by laryngectomized

patients, such as social interaction problems, psychological and emotional disturbances, and reduced self-esteem, while supporting the reconstruction of self-confidence [6]. Despite its proven superiority and high-quality voice outcomes, TEP is not without limitations. Voice prostheses require regular maintenance and follow-up, and users are exposed to several potential complications. The most common include periprosthetic leakage and recurrent granulation tissue formation around the prosthesis, both of which shorten device lifespan and require frequent medical or surgical interventions, leading to physical and psychological discomfort [10,35].

A second method of voice rehabilitation is esophageal speech (ES). Its greatest advantage is the absence of any external device, making it an independent technique that does not generate equipment-related maintenance costs [5,36]. When mastered correctly, ES can provide a relatively natural-sounding voice. However, its major limitation is the high level of difficulty – only about 60% of patients achieve functional proficiency [36]. Furthermore, studies show that ES users report a lower quality of life compared with TEP users, particularly in the emotional and social domains [5,6,36]. This indicates that, despite its independence from prosthetic devices, ES does not ensure optimal postoperative functioning.

The third method used to restore verbal communication is the electrolarynx (EL). It is the easiest technique to learn, allowing for its use even in the early postoperative period [37]. The device provides rapid speech production regardless of the condition of the TEP or esophagus [36]. However, a key drawback is the robotic, monotone, and unnatural sound quality, which negatively affects patients' self-esteem and social interactions [37]. Additionally, the visible use of the device during speech contributes to a heightened sense of stigmatization, resulting in a lower overall quality of life compared with the other methods [36].

Another factor evaluated in the study conducted by Woodard et al. [38] was age. Younger individuals rated their quality of life as lower and perceived their voice disability as more severe compared with older patients. This pattern likely results from the generally higher baseline levels of occupational, social, and communicative activity among younger patients, making postoperative limitations appear more drastic and burdensome. In contrast, older patients – who often lead less active lifestyles prior to treatment – experience less profound functional changes after surgery [38].

Gender has also been identified as an important factor influencing post-laryngectomy outcomes. Studies have shown that women tend to perceive their voice-related disability as greater and are less satisfied with the quality of a prosthetic voice [23]. A likely explanation is

the lower pitch of the prosthetic voice, which deviates from the naturally higher registers characteristic of female speech [29]. In the study by Gresham et al. [39], it was additionally observed that men and women experience the adaptation process after laryngectomy differently. Men described this process as a transition from physical disability to gradual recovery of function, whereas women depicted it as an emotional journey involving loss and the rediscovery of life's meaning [39]. The research conducted by Woodard et al. [38] also demonstrated that, among patients using voice prostheses, the timing of prosthesis placement is a significant determinant of quality of life. Patients who received primary prostheses (implanted during laryngectomy) reported higher quality of life, better overall functioning and swallowing outcomes, and greater motivation to learn prosthetic speech compared with those who underwent secondary puncture (performed during a subsequent procedure) [38].

A proportion of patients undergoing total laryngectomy require additional adjuvant treatment, including radiotherapy (RT), chemotherapy (CT), or combined chemoradiotherapy (CRT). These interventions, due to their numerous adverse effects, have a substantial impact on quality of life. The most frequently observed complications of RT, whose severity is proportional to the number of sessions, include mucositis, fibrosis, and tissue necrosis, which lead to pain, swallowing difficulties, and restricted soft-tissue mobility [40]. RT also increases the risk of TEP-related complications, such as periprosthetic leakage and enlargement of the TEP tract [41]. Evidence indicates that CRT results in a marked exacerbation of swallowing dysfunction [42]. Management of these impairments typically involves a combination of swallowing therapy and nutritional interventions, which significantly reduce dysphagia-related symptoms, improve the patient's nutritional status, and enhance overall quality of life [43].

Patient education and quality of life

Patient education constitutes an essential element of both treatment and rehabilitation. Providing patients with comprehensive and reliable information about the course of therapy, surgical procedures, possible complications, and coping strategies promotes a better understanding of their health condition [44]. Education has a positive impact not only on treatment effectiveness but also on patients' psychological well-being and quality of life. A deeper understanding of the disease and therapeutic process reduces anxiety, uncertainty, and stress, while enhancing self-acceptance, sense of control, and overall daily functioning [12]. Studies confirm these observations, showing that the most common methods of delivering such

information include educational platforms and websites containing accessible materials. These resources address the difficulties reported by patients and their families in finding reliable information and serve as an effective supplement to standard medical consultations, during which there is often insufficient time to discuss all aspects of the proposed treatment in detail [45].

Role of social support in improving quality of life and adaptation after total laryngectomy

Research findings emphasize the critical role of family involvement and social support in facilitating patients' return to daily life in the new postoperative reality. The presence and assistance of relatives are key to rebuilding self-esteem and accepting the newly acquired disability [28,44,46]. The significance of social support as an essential component of rehabilitation for laryngectomized patients was highlighted by Kotake et al. [46]. The authors demonstrated that social support strengthens patients' sense of control and self-efficacy – defined as the "recognition of oneself as a voluntary agent" – and thereby facilitates their psychological adaptation [46]. According to Kotake et al. [46], the main areas of support include: access to information about life after surgery and practical assistance, emotional support, expressed through empathy, understanding, and care, and active social participation, encouraging patients to engage with others. The authors also emphasize the necessity of implementing a structured follow-up training program as part of continued medical care, ensuring that rehabilitation does not rely solely on voluntary group sessions organized by patient associations [46]. The positive impact of contact with other patients after total laryngectomy (TLE) was also highlighted by Singer et al. [11]. In their study, they demonstrated that individuals who received preoperative counseling from members of TLE patient associations exhibited a significantly more positive attitude toward their treatment outcome. These findings suggest that patients qualified for total laryngectomy should be actively informed about the availability of this form of support and encouraged to take advantage of it [11].

Evolution of quality of life in the postoperative period

Numerous studies have shown that the quality of life of patients after laryngectomy gradually improves over time. A progressive stabilization of emotional status is also observed, with a decrease in the prevalence of depressive symptoms and an increase in self-acceptance. Patients learn to function with their acquired disability and modify daily habits and activities to match their current capabilities [12,23]. In their long-term study, Mukoyama et al. [47] demonstrated that levels of anxiety and depression among patients after laryngectomy decreased, while quality of life improved within one year after surgery and remained stable for up to five years.

Adaptation to life after laryngectomy is a long and complex process, determined by numerous biological, psychological, and social factors. It poses a substantial challenge for patients, particularly in the context of low levels of social acceptance, discrimination, and stigmatization. Insufficient public knowledge about laryngectomy and its consequences leads to negative reactions toward these patients, further hindering their return to social life. This situation underscores the need to intensify efforts aimed at raising public awareness and fostering empathy toward individuals with communication disorders [5,29].

Impact of total laryngectomy on the patient's family and close environment

Most available publications focus on the effects of laryngectomy and its consequences on the patient's physical and mental condition. However, a study by Offerman et al. [48] highlights that these consequences also affect close relatives, particularly the patient's life partner. The changes primarily concern social life and mutual communication. Partners report frustration related to the exclusion of laryngectomized individuals from social gatherings and their omission in conversations, often based on assumptions about an inability to communicate [48]. They also note a reduction in participation in social events since surgery. Furthermore, partners emphasize the negative impact on sexual life and intimacy, which may stem from patients' perceived loss of physical attractiveness, fears that breathing difficulties may interfere with intercourse, or limitations in expressing emotions through alaryngeal speech [48]. The study also showed that partners may experience mental health problems as frequently as the patients themselves, and anxiety disorders may develop even more often among partners [48]. The most common sources of distress are fear of losing a loved one and a sense of helplessness

due to limited ability to provide tangible help in the fight against cancer [48]. For these reasons, it is crucial that the patient's partner be actively involved from the outset in the treatment and subsequent rehabilitation process [48]. The same issue was emphasized by Kotake et al. [46].

Conclusions

Total laryngectomy, while an effective treatment for advanced laryngeal cancer, is associated with numerous consequences that affect patients' physical, psychological, and social functioning. These sequelae significantly reduce quality of life, with the loss of verbal communication being the main determinant of this decline. Factors influencing life satisfaction include, among others, age, the treatment modality used, and the method of voice rehabilitation. Individuals after laryngectomy constitute a group at elevated risk of mental health disorders, including anxiety, mood instability, depression, and, in extreme cases, suicidal ideation and attempts. Adaptation after laryngectomy is a long-term, multidimensional process that requires support from close relatives, as well as comprehensive medical care, education, and rehabilitation aimed at improving patients' quality of life.

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