Critical Review:
Does Quality of Life Differ in Older or Younger Individuals Post-Laryngectomy?

Julia Lizzi & Zoey Pulles
M.Cl.Sc (SLP) Candidates
University of Western Ontario: School of Communication Sciences and Disorders

This critical review examines the evidence regarding age-related general quality of life (QoL) post-laryngectomy in head and neck cancer patients. The studies evaluated include two cross sectional studies, two longitudinal studies, one retrospective cohort follow up study, and one qualitative study. Overall, this review provides suggestive evidence that general QoL differs with age and that younger individuals (<65 years) experience reduced QoL in comparison to older individuals (>65 years) post-laryngectomy.

Introduction

Each year, approximately 5400 Canadians are diagnosed with head and neck cancer (The Terry Fox Research Institute, 2019; Canadian Cancer Society, 2019). This type of cancer typically affects males over the age of 45 (The Terry Fox Research Institute, 2019). As a preventable cancer often resulting from lifestyle and behaviour choices, there can be a significant emotional impact (Canadian Cancer Society, 2019). Occasionally, these patients require a laryngectomy to treat the cancer which removes the individual's larynx and their ability to communicate in traditional ways. The larynx, a critical component for speech, houses the vocal folds and connects the trachea to the oral cavity which brings together air flow, voicing, and the appropriate articulators for the production of speech (Sharpe et al., 2019).

Research has shown that the survival rate in advanced cancer remains at approximately 50% with efforts now being directed to reducing the impact of the disease in terms of functioning and health related QoL (Llewellyn et al., 2005). It is known that an inability or adjusting to an altered form of communication can have a significant effect on quality of life (Sharpe et al., 2019). With regards to the system impacted, drastic changes through removal of the larynx are expected to impact general QoL. In this review, general QoL refers to an individual's perception of their position in life, which can be complexly affected by physical health, psychological state, level of independence, social relationships, personal beliefs, and their relationship to salient features of their environment (WHO, 1997). Evidence suggests that all of these areas are impacted for patients having undergone laryngectomies. One study found that 40% of individuals who had undergone a total laryngectomy reportedly withdrew from social conversations and 70% did not take part in regular social activities (Danker et al., 2010). This review aims to investigate the individual's age as a contributing factor for QoL outcomes. Evidence reveals that older adults (>64 years of age) are less likely to be affected by psychiatric disorders (Bussian et al., 2009) and are the most resilient with strong emotional regulation and coping strategies, such as utilizing social support as compared to other age demographics (Gooding et al., 2011). Post-laryngectomy, it is important to consider quality of life outcomes relevant to age as it relates to commitment, goals, expectations, motivation, concerns, and the need for counselling with health care providers striving to provide individualized patient centered care.

Objectives

The primary objective of this paper is to critically evaluate existing literature regarding any differences in general QoL post-laryngectomy that relate to the age of the patient (younger than 65 years of age or older than 65 years of age). The secondary objective is to discuss the clinical implications of QoL after laryngectomy and review recommendations for future research.

Methods

Search Strategy

Articles related to the topic of interest were found using the following computerized databases: Pubmed, JAMA, and Google Scholar. Keywords used for the database search included: [(laryngectomy) OR (post-laryngectomy) OR (total laryngectomy)] AND [(rehabilitation) OR (quality of life) OR (psychiatric outcomes) OR (mental health)]. The search was limited to articles in English.

Selection Criteria

Studies included in this critical review were required to investigate QoL post-laryngectomy with the age of participants as an additional required variable. Studies included were those that included a scale or questionnaire as completed by the patient, hospital staff, family, or the Head and Neck Cancer Inventory. QoL refers to general QoL and as a result, studies that primarily focused on swallowing or voice related QoL outcomes were not included in the review. Studies

where patients had additional diagnoses beyond head and neck cancer were excluded from the review.

Data Collection

Results of the literature review yielded the following types of articles congruent with the aforementioned selection criteria: cross sectional study (2), longitudinal study (2) retrospective cohort follow up study (1), and qualitative study (1).

Results

Cross Sectional Studies

Eadie and Bowker (2012) used a cross-sectional survey to investigate how traditional variables, such as age, sex, stage of disease, and time post-laryngectomy and patterns of coping predict QoL after a total laryngectomy. Ninety-nine questionnaires were sent out to participants recruited through support groups, professional email lists, and professional contacts. The survey was delivered to participants on a secure website or by mail. Part of the survey contained the University of Washington Quality of Life (UW-QOL) Version 4 questionnaire. The surveys were completed by 67 individuals (51 males, 16 females) ranging between 44-89 years of age (mean=63 years). Eadie et al., 2012 found moderate overall quality of life scores. Results of the study showed a significant but weak relationship between age and QoL, with older individuals having better scores than younger individuals.

With participant inclusion criteria described, the sample size of this study is adequate, enhancing the validity of the study. However, this study is not representative of a diverse population as the ethnic groups in this study consisted of mainly Caucasians (96%). The remaining 4% were Asian (1%) and Indigenous (3%). The study included a greater number of males than females, however this is representative of the head and neck cancer population. One limitation of the study is that the participants had a large range post laryngectomy of 9-333 months (mean= 84 months). The study was not longitudinal making it difficult to determine at which time post-laryngectomy the QoL measures truly represented. Eadie et al., (2012) failed to mention the age range of older individuals versus younger individuals. A strength of the study includes the use of numerous correlation analyses in order to determine the relationship between QoL and traditional variables. Additionally, self-administration of the standardized questionnaire allowed for no interviewer bias.

Overall, this study provides suggestive evidence that older individuals may have better QoL than younger individuals as seen in the results of the UW-QOL.

Vilaseca, Chen, and Bachsheider (2006) conducted a cross-sectional study to examine long-term QoL more than two years after laryngectomy. A total of 49 patients attending the Annual Meeting of the International Association of Laryngectomees met the eligibility criteria and were between 44 and 88 years of age (mean=62.77). The University of Washington Quality of Life (UW-QOL) version 4 questionnaire was self-administered by participants along with the Short Form-12 version 2 questionnaire. A logistic regression was used to determine results for a total of 40 patients. Relevant to age, younger patients were more likely to be dissatisfied with their appearance and reported anxiety impacting their QoL.

The study included a relatively large, geographically diverse (23 different states and 2 countries), and gender equal (54.2% men and 45.8% women) sample size with a high percentage of participants completing all key measures as strengths of the study. With head and neck cancer primarily occurring in males, the gender equal sample provides an opportunity for broader generalization. A limitation is attributed to the majority of participants being Caucasian (91.5%). Patient inclusion criteria is briefly mentioned. The sample included patients who were at least 2 years post-laryngectomy (ranging from 2-36 years), although the results did not further divide time post-surgery as a comparable variable. It is unclear if time post-surgery has an impact on QoL. Furthermore, the research failed to indicate the actual age range of ‘older adults’ and ‘younger adults’. The methods and particularly, the statistical analysis, were thoroughly explained indicating replicability. The use of standardized questionnaires allowed for patient comparison to normative data which the authors referenced in the article as a strength. Self-administration of the questionnaires ensured elimination of interviewer bias as an additional strength. Although two questionnaires were used to determine general health and disease specific QoL, there is a query about whether the questionnaires selected are too broad and brief. With the questionnaires given out to attendees of the Annual Meeting of the International Association of Laryngectomees in Atlanta, most of the participants are active members of support groups and are highly motivated. This is a limitation as the results may not represent all patients having undergone total laryngectomy. With the aim of considering long term effects on QoL, a longitudinal study would have been more indicative of overall outcomes.

This study provides suggestive evidence for long term QoL outcomes two years or more post-laryngectomy. Regarding age as the primary variable of interest for this

review, there are concerns for validity with no disclosed age ranges as a limitation that impacts interpretation of results and clinical significance.

Longitudinal Studies

Derks, de Leeuw, Hordijik, and Winnubust (2004) completed a longitudinal study which explored the QoL in older and younger patients with cancer in the oral-cavity, pharynx, or larynx using the European Organization for Research and Treatment of Cancer (EORTC) Core Quality of Life Questionnaire, and the EORTC Head and Neck Quality of Life Questionnaire. The study included 51 patients aged 70 and older and 70 patients aged 45-60. The questionnaires were administered before, three, six, and twelve-months post treatment. The data was analyzed using SPSS 10.0 and chi-square tests were used to compare scores between the questionnaires. Results of the study found that aside from older patients feeling more physical pain, QoL did not significantly differ between older and younger patients during treatment of head and neck cancer.

As a longitudinal study, data collected from participants over time increases the reliability and the generalization of the findings. These types of studies often result in smaller sample sizes with inclusion criteria prioritizing participants that complete each of follow up questionnaires. However, the large sample size is a strength of this study that further increases validity of the results. Regarding the sample, there was a different sample size at each of the time intervals depending on how many questionnaires were completed. This is a limitation of the research as it lessens the reliability of the results. One strength of the study is the inclusion of confounding variables such as normal aging. It is important to consider additional variables that can influence results, especially when applying the findings to clinical work. Overall, the study included in-depth explanations of inclusion criteria, statistical analysis, and methods, which makes the data reliable, valid, replicable. Furthermore, the questionnaire of choice includes a symptom scale (pain, nausea, fatigue, and vomiting) relating to QoL during treatment as a variable which adds clinical significance to the results. This also makes the articles useful for a broad range of health care professionals as they treat and provide management for those symptoms. However, the article does not provide a definition for QoL and the article gravitates towards more of a focus on physical symptoms. One limitation of the study is that not all patients underwent a laryngectomy. With more general findings, this lessens the applicability of results that relate to the question of focus for this paper. It was stated that a similar percentage of patients in both groups underwent surgery (71% of the younger patients and 69% of the older patients). This increases the reliability of the findings as direct comparisons between the two age groups can be made. However, an additional limitation can be found in the patient sample as the older group of participants contained significantly more women than the younger group. This presents a concern for comparison between the groups and generalized results should be interpreted with caution as most patients with head and neck cancer are male, as represented in the younger participant group. For validity of the results, it would be preferred if both age groups contained a similar amount of male and female participants.

Overall, this study provides suggestive evidence that both younger and older patients had similar QoL during one year of treatment for head and neck cancer.

Kotake, Kai, Iwanage, Suzukamo, and Takahashi (2019) conducted a longitudinal study that investigated the effects of multiple variables on social functioning and mental health after laryngectomy. The study included 27 patients (23 males and 4 females) with laryngeal and hypopharyngeal cancer between the ages of 48 and 76 years of age (mean=62.9). The subjects were further divided by age (<63 and >64). The patients answered questionnaire surveys before surgery, 3, 6, and 12 months after discharge from the hospital. Social adjustment was examined using social functioning and mental health sections in the SF-36V2 Japanese version. Pertaining to age, it was determined that older subjects showed better social adjustment with more favourable social functioning and better mental health. Results also revealed that those who lived alone had better mental health, which was most common in older adults. Social functioning in older adults with a job was higher before surgery compared to younger adults, however, that declined 3 months after discharge. Older adults without a job had social functioning which continuously increased beyond 3 months after discharge. When considering occupation, 40% of participants had left their job due to loss of voice one year after hospital discharge. The younger participants without a job had lower scores in both social functioning and mental health as it relates to QoL. The younger participants with a job had a significant decrease in social functioning at 3 months post-discharge, however that often improved around 6 months post-discharge. There was also a decrease in mental health for younger patients who lived with their families at 3 months post-discharge. It was suggested that younger subjects struggled with social adjustment a year after discharge with an occupation and family responsibility impacting that.

This study effectively assessed many independent and dependent variables (e.g., occupation status, age, family

structure, social functioning, mental health, etc.). The authors noted that sex was a variable of interest, but it was excluded due to only having 4 female participants. Age was divided based on the median age which increases the validity of the data. A well-explained division of subjects increases the replicability and clinical significance. When considering occupational status as a variable, the researchers further investigated reasons for leaving work, which also adds clinical value to the results. To increase the representation of the sample, a larger sample size and additional variables, such as geographical location and access to resources (it is unclear if all participants are from the same hospital), education, socioeconomic status, etc. which may also impact general QoL following a laryngectomy would increase validity. A repeated measure analysis of variances was used to determine the main effect and second and third order interactions. The depth of statistical analysis and comparison of multiple variables across multiple times in recovery are a strength of this research further validating the results. Although this study did not directly assess QoL through a QoL measurement, their analysis of variables that impact general QoL are standardized and directly related to the proposed research question in the article. An additional strength of the article was that the authors adequately defined mental health and social functioning as the primary variables of interest. The authors included details surrounding conflicts of interest, informed consent, and declaration of ethical standards which suggest that the study is reliable and replicable. The study also mentions confounding variables such as decreased appetite, reduced food intake, constipation, respiratory problems, etc. that damage basic life functions further influencing QoL. Awareness of these variables is important for clinical implications and reliability of the results.

Specific to age, this study demonstrates compelling evidence that social functioning and mental health (which relate to QoL) are more negatively influenced and lower in younger adults post-laryngectomy.

Retrospective Cohort Follow Up Study

Woodward, Oplatek, and Petruzelli (2007) conducted a retrospective cohort follow-up study which analyzed postoperative clinical, functional, and QoL outcomes in patients who have undergone a total laryngectomy. The study focused on 143 patients with advanced-stage laryngeal or hypopharyngeal cancer who underwent a total laryngectomy at Loyola University Medical Centre in Illinois between 1994-2005. Of these 143 patients, 58 were still alive (mean age= 62 years) and 33 completed the Head and Neck Cancer Inventory, which examines the following domains: Speech, Eating, Social Disruption, and Aesthetics. The Inventory also included an Overall QoL score. Woodward et al., (2007) found that patients older than 65 years (n=18) had statistically higher scores in all 4 domains and their mean Overall QoL score was significantly higher (overall QoL score=74) than that of patients aged 65 years or younger (overall QoL score=54). More specifically, this is because younger patients may have a better functional status prior to treatment, therefore, they are more likely to be active prior to a total laryngectomy. After an extensive procedure, an individual's baseline functional status significantly declines, causing the perception of QoL in younger individuals to drastically decrease. On the other hand, older patients generally have a more sedentary lifestyle prior to their total laryngectomy. As a result, there may be less change in their baseline function after a major surgery resulting in a QoL that is not as drastically affected.

The authors included some information about the inclusion criteria. Demographic information regarding participants could have been enhanced as the authors did not include information about education level and ethnic group, which could affect one's QoL. Similar to other studies, the male to female ratio was significantly higher (7:51 in the alive category), therefore this is a representative sample of the population. There is a possibility that interviewer biases may have occurred as two surveys were completed as a telephone interview. A limitation of the retrospective cohort follow-up study is that the validity may be affected as it is likely that not all relevant risk factors have been recorded (de Oliveira, 2019). Additionally, it is possible that the outcomes are not as accurate as they would have been in a prospective cohort study (de Oliveira, 2019). Some additional limitations include the lack of a control group and the administration of the survey given only to survivors.

The study by Woodward et al., (2007) demonstrates somewhat equivocal evidence that postoperative clinical, functional, and QoL outcomes are worse in younger patients after a total laryngectomy.

Qualitative Study

Bickford, Coveney, Barker, and Hersh (2013) conducted a qualitative study which examined the views and experiences of individuals of diverse backgrounds and demographics post-laryngectomy. The study consisted of 12 (7 men and 5 women) individuals recruited through two tertiary hospital speech-language pathologists in a large Australian city. All participants were at least 1-year post total laryngectomy. The researchers conducted in-depth, semi-structured interviews (mean length = 90 minutes) with participants. Participants were also journal keeping throughout the

duration of the study. Results of the study showed that younger participants reported greater social isolation, changed roles, loss of employment, and forced early retirement. Some older women also expressed changed roles and social isolation.

A strength of the study includes a detailed description of inclusion and exclusion criteria. It is also important to note the equality of men to women in this study, as many studies regarding laryngectomies mainly include a higher male to female ratio. Although gender equality and diverse locations (rural and urban) were well-maintained, the study lacked varying ages (57-75 years), socio-economic status, and cultural and linguistic diversity. Additionally, the sample size was relatively small. The authors failed to provide an age range description when describing the results relative to age. The individual interviews were conducted at home or at the university, compromising the validity as some individuals may have felt more expressive in the comfort of their own home. Moreover, one participant interviewed with their partner present, which also may compromise the accuracy of their data. Each interview was audio recorded and transcribed verbatim adding to the validity of the study. Coding was completed using the QSR Nivo program, however no statistical programs were run. The research used comprehensive memo writing of all methodological and analytical decisions, member checking techniques, inter-rater coding, and joint appraisal of the coding structure. The use of a qualitative study provided rich data; however, the possibility of interviewer biases affects the validity of the study.

Overall, this study provides suggestive evidence that quality of life in younger individuals is more compromised relative to older individuals who have undergone a total laryngectomy.

Discussion

A critical analysis of the existing literature provides suggestive evidence that age relates to QoL outcomes post-laryngectomy, specifically, with younger individuals faring worse than older individuals. Studies that compared QoL among the two age groups considered social functioning and adjustment, mental health, physical pain, patterns of coping, appearance/aesthetics, occupational status, speech, voice, eating, swallowing, and social disruptions as different domains related to QoL. Overall, it was revealed that younger individuals had worse scores in almost all of the related domains.

With the exception of Derks et al. (2004), all studies agreed that younger participants had poorer QoL scores and were more likely to be negatively affected by variables related to QoL. Derks et al. (2004) found that QoL did not differ between older and younger adults post-laryngectomy. Upon further analysis, it is recognized that this difference in results may be caused by Derks et al. (2004) including participants who had undergone standard treatments, such as radiotherapy, surgery (transoral resection, partial glossectomy, and partial glossectomy) with postoperative radiotherapy, and combined chemotherapy and radiotherapy in addition to or in lieu of a laryngectomy.

When interpreting the information gathered from this review, limitations congruent across many of the studies should be considered. The articles by Derks et al., (2004), Eadie et al., (2012), Kotake et al., (2019), Bickford et al., (2013), and Woodward et al., (2007) did not define QoL. Almost all of the studies did not consider or assess similar QoL domains under general QoL, but rather there were differences in the domains assessed. With regards to data collection, not all of the studies used standardized measures indicating reliance on clinical judgement and interpretation as opposed to evidence-based practice. As well, the studies by Bickford et al., (2013), and Woordward et al., (2007), did not account for interviewer bias. Lastly, it should be noted that not all of the participants across the different studies were at the same point in their postoperative recovery and not all had received the same, or any, surgery. This suggests that more research is recommended to ensure consistent and valid findings and to explore additional related variables. More specifically, additional research should focus on the effect of patient expectancy on postoperative outcomes and QoL. Future research should also focus on specific strategies that can be implemented to improve younger individuals' QoL post-laryngectomy. Novel studies should explore long term outcomes and additional variables including but not limited to tumour location, education, occupation, social supports/marital status.

Clinical Implications

Speech-language pathologists working with patients post-laryngectomy can use these findings to consider therapy outcomes. Relevant to therapy, QoL is strongly correlated to mood which can in turn influence motivation and thus, therapy commitment. By knowing information about different age demographics, clinicians can better predict and use their clinical judgement to plan assessment and intervention which may affect overall therapy outcomes. Furthermore, clinicians can use this information in order to provide additional counselling to younger patients who will have a laryngectomy or who are recovering post-laryngectomy. This information is also useful to

clinicians as they establish therapy expectations, consider resource allocation, and prepare for patient education regarding therapy.

References

Bickford, J., Coveney, J., Baker, J., & Hersh, D. (2013). Living with the altered self: A qualitative study of life after total laryngectomy. *International Journal of Speech Language Pathology*, *15*(3), 324-333. https://doi.org/10.3109/17549507.2013.785591

Bussian, C., Wollbrück, D., Danker, H., Herrmann, Thiele, A., Dietz, A., & Schwarz, R. (2009). Mental health after laryngectomy and partial laryngectomy: A comparative study. *European Archives of Oto-Rhino-Laryngology*, *267*, 261. https://doi.org/10.1007/s00405-009-1068-7

Canadian Cancer Society. (2019). *Oral cavity cancer statistics*. Canadian Cancer Society. https://www.cancer.ca/en/cancer-information/cancer-type/oral/statistics/?region=on

Danker, H., Wollbrück, D., Singer, S., Fuchs, M., Brähler, E., & Meyer A. (2010). Social withdrawal after laryngectomy. *European Archives of Oto-Rhino-Laryngectomy*, *267*, 593-600. https://doi/org/10.1007/s00405-009-1087-4

Derks, W., de Leeuw, R.J., Hordijk, G.J., Winnubst, J.A.M. (2004). Quality of life in elderly patients with head and neck cancer one year after diagnosis. *Head & Neck*, *26*(12), 1045-1052. https://doi.org/10.1002/hed.20113

Eadie, T.L., & Bowker, B.C. (2012). Coping and quality of life after total laryngectomy. *Otolaryngology-Head and Neck Surgery*, *146*(6), 959-965. https://doi.org/10.1177/0194599812437315

Gooding, P.A., Hurst, A., Johnson, J., and Tarrier, N. (2011). Psychological resilience in young and older adults. *International Journal of Geriatric Psychiatry*, *27*(3), 262-270. https://doi.org/10.1002/gps.2712

Llewellyn, C.D., McGurk, M., & Weinman, J. (2005). A psycho-social and behavioural factors related to health-related quality of life in patients with head and neck cancer: A systematic review. *Oral Oncology*, *41*(5), 440-454. https://doi.org/10.1016/j.oraloncology.2004.12.006

Kotake, K., Kai, I., Iwanaga, K., Suzukamo, Y., & Takahashi, A. (2019). Effects of occupational status on social adjustment after laryngectomy in patients with laryngeal and hypopharyngeal cancer. *European Archives of Oto-rhino-laryngology*, *276*(5), 1439-1446. https://doi.org/10.1007/s00405-019-05378-9

Sharpe, G., Camoes Costa, V., Doubé, W., Sita, J., McCarthy, C., & Carding, P. (2019). Communication changes with laryngectomy and impact on quality of life: a review. *Quality of Life Research*, *28*(4), 863–877. https://doi.org/10.1007/s11136-018-2033-y

The Terry Fox Research Institute. (2019). *Head and neck cancers: Understanding the key facts and figures about head & neck cancer research.* The Terry Fox Research Institute. https://www.tfri.ca/about-cancer/cancer-types/cancer-type/head-and-neck#:~:text=In%20Canada%2C%20an%20estimated%205%2C400,from%20head%20and%20neck%20cancers

Vilaseca, C., Chen, A.Y., & Backscheider, A.G. (2006). Long-term quality of life after total laryngectomy. *Head & Neck*, *28*(4), 313–320. https://doi.org/10.1002/hed.20268

Woodard, T.D., Oplatek, A., & Petruzzelli, G.J. (2007).' Life after total laryngectomy: A Measure of long-term survival, function, and quality of life. *Archives of Otolaryngology-Head & Neck Surgery*, *133*(6), 526-532. https://doi.org/10.1001/archotol.133.6.526

World Health Organization. (1997) *WHOQOL: Measuring Quality of Life.* World Health Organization. https://www.who.int/mental_health/media/68.pdf