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Quality of life patients after surgical treatment of laryngeal cancer

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ABSTRACT

Introduction. The assessment of the quality of life in cancer patients requires a multidisciplinary approach and an evaluation of emotional, social and physical conditions. Objectives. The aim of the study was to analyze the quality of life patients after surgical treatment of laryngeal cancer but before the next stage of therapy, i.e. radiotherapy.

Material and Methods. The study group comprised 60 patients aged 44–82 years, with laryngeal cancer treated at the Radiotherapy Wards of Wielkopolskie Centrum Onkologii, Poznań, Poland. The Polish versions of the QLQ C-30 and the cancer-specific EORTC QLQ H&N35 questionnaires were used.

Results. Mean score for the general health status (QLQ C-30) was 56.81. Mean values for the physical, role, cognitive, social and emotional functioning were 81.11, 80.83, 75.28, 70.00 and 54.72, respectively. The following constituted the main problems for laryngectomees: difficulty gaining weight (75.00), necessity to take nutritional supplements (58.33), sense of smell and taste problems (57.78), weight loss (56.67), articulation problems (56.67). A statistically significant difference ($p = 0.002$) was observed with regard to emotional functioning, with mean values of 28.83 and 60.51 for women and men, respectively. Also, a statistically significant difference ($p = 0.01$) was observed with regard to social functioning, with mean values of 45.53 and 75.51 for women and men, respectively. Conclusions. There exists a definite need to investigate the quality of life by means of patient self-evaluation of the symptoms in order to monitor patient status and establish an individual therapeutic, care and psychological approach.

Keywords: quality of life, laryngeal cancer, QLQ C-30, EORTC QLQ H&N35.

Introduction

Epidemiologic data demonstrates a steady increase in the incidence of laryngeal cancers, with higher morbidity among men as compared to women. Laryngeal cancer is most often detected in regular smokers and consumers of alcohol, especially distilled beverages. It is the fourth most common malignancy in men, after lung, stomach and prostate cancers, but twenty-seventh in women. Laryngeal cancer remains the most frequent neoplasm among the head and neck carcinomas, which constitute 5% of all registered malignancies in Poland, with 7.2% among the male and 1.8% among

the female population [1, 2]. According to epidemiologic data, the incidence rates among men have stabilized in recent years but increased among women [3, 4, 6].

The symptoms largely depend on the location of the primary site [3]. Laryngeal cancer is associated with mutilating surgical procedures as partial or complete removal of the larynx is performed. It is the consequence of either delayed presentation to a family doctor or referral to a specialist and ignorance of symptoms by family doctors and the patients themselves. The treatment is often initiated in advanced stages of the disease, what has significant negative effect on the outcome and quality of life. The treatment

process of laryngeal cancer is associated with problems and inconveniences resulting from the diagnostic and therapeutic management [4]. The evaluation of the quality of life in cancer patients requires a multidisciplinary approach and evaluation of emotional, social and physical conditions. Specificity of laryngeal cancer treatment ought to take into account disfiguration (tracheostomy tube), eating disorders, problems with communication, and social conditions. Numerous years of research on quality of life help generate the form of questionnaires that nowadays are commonly used in the evaluation of quality of life in cancer patients [5].

Aim

The aim of the study was to analyze the quality of life patients after surgical treatment of laryngeal cancer but before the next stage of therapy, i.e. radiotherapy.

Patient population

The study was conducted in 60 patients with laryngeal cancer between August 2011 and October 2013 at the Radiotherapy Wards of Wielkopolskie Centrum Onkologii, Poznań, Poland. The inclusion criterion was laryngeal cancer and laryngectomy.

The examination was performed in all patients after surgical treatment but before the next stage of therapy, i.e. radiotherapy.

Histopathology confirmed squamous carcinoma in all laryngectomees. All participants were informed about the objective of the study and assured of their anonymity. Informed consent was obtained from all subjects, followed by instruction on how to complete the questionnaire.

The study was approved by the Ethical Review Committee at the Poznan University of Medical Sciences.

Methods

The Polish version of the QLQ C-30 (version 3.0) was used to investigate quality of life. The questionnaire is applicable in all oncologic patients, regardless of cancer type, and assess the impact of the complaints on the quality of life and effect of the disease on various types of functioning [7]. Also, QLQ C-30 evaluates the general health status of patients, their physical, role, emotional, cognitive, and social functioning. The scores range from 0 to 100 points, with high scores

signifying either better life quality (with regard to general health status, physical, role, emotional, cognitive, and social functioning) or more severe symptom-related complaints (with regard to the impact of the symptoms on the quality of life).

Additionally, Polish version of the EORTC QLQ H&N35 questionnaire, investigating the incidence of cancer-specific symptoms in patients treated for head and neck cancer, was used. The tool evaluates various aspects of life on seven different functioning scales. One answer is to be selected on a 4-point scale ('not at all', 'a little', 'significantly', 'greatly').

The answer choices (points) were converted into numbers using a typical database. The scores ranged from 0 to 100 points, with high scores signifying more severe symptom-related complaints (with regard to the impact of the symptoms on the quality of life).

An approval for using the two questionnaires was obtained from the European Organization for Research and Treatment of Cancer (EORTC), Quality of Life Unit, Brussels.

Statistical analysis

Values calculated for the selected measuring instruments were used to assess the quality of life of the laryngectomees and the following measures of descriptive statistics were used: mean, median, standard deviation, incidence, and percent values of fractions. Laven and Kolmogorov-Smirnov tests evaluated the normality of dependent variables. Mann-Whitney test was applied to compare two independent groups. Spearman's correlation was used to investigate correlations between mean values for the QLQ C-30 quality of life scale and H&N35 symptom intensity scale. The p-value of <0.05 was considered statistically significant.

Results

The study group (11 women and 49 men, aged 44–82) included laryngectomees with different levels of education (8 – primary, 27 – VET, 17 – secondary, and 8 – tertiary) and types of professions (in the subgroup of men: driver – 9, farmer – 5, bricklayer – 4, teacher – 3, accountant – 3, carpenter – 3, ironworker – 3, house painter – 2, security officer – 2, baker – 2, as well as gardener, building technician, electrical engineer, woodworker, fine artist, electroplater, steelworker, tire technician, car mechanic, welder, mechanic technician, and women: teacher – 2, shop assistant

- 2, hairdresser - 1, accountant - 1, seamstress - 1, IT specialist - 1, no profession - 3). The respondents declared contact with various hazardous substances in the course of their professional career (paints and varnish - 3, construction chemicals and fertilizers - 2, fumes - 2, galvanized steel - 2, wood dust - 2, flour dust - 3, noise - 1) or prolonged work in hazardous locations (contaminated area near alumina plant - 2, printing house - 1, iron foundry - 1, tire production - 1, magnetic field - 1). Over half of the respondents failed to answer that question.

Twenty-seven people admitted to smoking (50-75 cigarettes/day for 25-35 years - 5 patients, 30-40/day for 25-30 years - 9, 20-35/day for 25-35 years - 17, 6-15/day for 20-30 - 6). Also, the patients reported time elapsed from first symptom to seeking medical help (> 6 months - 17, > 1 year - 11, > 3 months - 8, > 7 months - 6, > 4 months - 2, >5 months - 2, >8 months - 2, > 2 years - 2, whereas 5 subjects sought medical advice after: 1 month, 9 and 10 months, 1.5 and 3 years). Thirteen patients were diagnosed with stage T3 and 47 with T4.

Evaluation of the quality of life

Mean value (QLQ-C30 scale) for the general health status in laryngectomees was 56.81. Mean values for physical functioning, role, cognitive, social, and emotional functioning were 81.11, 80.83, 75.28, 70.00 and 54.72, respectively.

The analysis of mean values for complaints, from the most to the least intensified, revealed the following: constipation (47.22), financial difficulties (43.89), insomnia (39.44), fatigue (32.22), loss of appetite (28.33), dyspnoea (21.11), pain (20.56), nausea and vomiting (8.06), and diarrhea (1.67). The results are presented in **Table 1**.

Table 2 presents scores on QLQ-H&N35 symptom intensity. Analysis of mean values revealed that the greatest problem for laryngectomees were: difficulty gaining weight (75.0), necessity to use nutritional supplements (58.33), sense of smell and taste problems (57.78), weight loss (56.67), articulation problems (56.67), problems with social contacts (54.78), loss of libido (46.11), increased stickiness of the saliva (46.11), general feeling of being ill (46.11), necessity to use painkillers (38.33), tooth loss (35.56), mouth dryness (32.78), swallowing difficulty (29.31), limited mouth opening (28.33), problems with social eating (28.06), pain (26.53) (**Table 2**).

Table 3 presents differences in scores on QLQ-C30 with regard to gender and age. The respondents were subdivided into women and men, and into two age-groups: < 60 and ≥ 60. Statistically significant differences were observed in emotional functioning (p = 0.002), with mean values of 28.83 and 60.51 for women and men, respectively. Also, a statistically significant difference was noted in social functioning (p = 0.01), with mean values of 45.53 and 75.51 for women and men, respectively.

Table 1. Quality of life (QLQ-C30) scores (N = 60)

| Aspects | Mean (± SD) | Median | Min. | Max. |
|------------------------|---------------|--------|-------|--------|
| Global health status* | 56.81 ± 19.92 | 58.33 | 16.67 | 100.00 |
| Functioning scales* | | | | |
| Physical functioning | 81.11 ± 13.23 | 86.67 | 46.67 | 100.00 |
| Role functioning | 80.83 ± 23.54 | 83.33 | 33.33 | 100.00 |
| Emotional functioning | 54.72 ± 28.84 | 62.50 | 0.00 | 100.00 |
| Cognitive functioning | 75.28 ± 20.70 | 83.33 | 33.33 | 100.00 |
| Social functioning | 70.00 ± 29.72 | 66.67 | 0.00 | 100.00 |
| Symptom scales** | | | | |
| Fatigue | 32.22 ± 20.63 | 33.33 | 0.00 | 88.89 |
| Nausea/vomiting | 8.06 ± 14.87 | 10.00 | 0.00 | 66.67 |
| Pain | 20.56 ± 21.56 | 16.67 | 0.00 | 83.33 |
| Dyspnoea | 21.11 ± 21.23 | 33.33 | 0.00 | 100.00 |
| Insomnia | 39.44 ± 33.33 | 33.33 | 0.00 | 100.00 |
| Appetite loss | 28.33 ± 31.79 | 16.67 | 0.00 | 100.00 |
| Constipation | 47.22 ± 41.30 | 33.33 | 0.00 | 100.00 |
| Diarrhea | 1.67 ± 7.33 | 5.00 | 0.00 | 33.33 |
| Financial difficulties | 43.89 ± 32.76 | 33.33 | 0.00 | 100.00 |

* Higher scores on the global health status and functioning scale represent a better quality of life.

** Higher scores on the symptom scale represent more severe symptom-related complaints.

Table 2. Scores on QLQ-H&N35 (N = 60)

| Symptoms** | Mean (\pm SD) | Median | Min. | Max. |
|-------------------------------|-------------------|--------|------|--------|
| Pain | 26.53 \pm 25.56 | 20.83 | 0.00 | 75.00 |
| Swallowing difficulty | 29.31 \pm 22.94 | 25.00 | 0.00 | 66.67 |
| Sense of smell&taste problems | 57.78 \pm 30.45 | 50.00 | 0.00 | 100.00 |
| Articulation problems | 56.67 \pm 23.21 | 66.67 | 0.00 | 100.00 |
| Problems with social eating | 28.06 \pm 0.07 | 25.00 | 0.00 | 100.00 |
| Problems with social contacts | 54.78 \pm 33.12 | 60.00 | 0.00 | 100.00 |
| Loss of libido | 46.11 \pm 38.25 | 33.33 | 0.00 | 100.00 |
| Tooth loss | 35.56 \pm 39.71 | 33.33 | 0.00 | 100.00 |
| Limited mouth opening | 28.33 \pm 38.73 | 28.00 | 0.00 | 100.00 |
| Dry mouth | 32.78 \pm 34.44 | 33.33 | 0.00 | 100.00 |
| Sticky saliva | 46.11 \pm 35.30 | 33.33 | 0.00 | 100.00 |
| Coughing | 32.22 \pm 28.10 | 33.33 | 0.00 | 66.67 |
| Felt ill | 46.11 \pm 32.53 | 50.00 | 0.00 | 100.00 |
| Painkillers | 38.33 \pm 49.03 | 43.00 | 0.00 | 100.00 |
| Nutritional supplements | 58.33 \pm 49.72 | 100.00 | 0.00 | 100.00 |
| Weight loss | 56.67 \pm 49.97 | 100.00 | 0.00 | 100.00 |
| Weight gain | 75.00 \pm 43.67 | 100.00 | 0.00 | 100.00 |

** Higher scores on the symptom scale represent more severe symptom-related complaints

Table 3. Effect of age and gender on quality of life (N = 60)

| Aspects of quality of life QLQ-C30 | Mean (\pm SD) | P value |
|---------------------------------------|-------------------|---------|
| General health status | | |
| Age < 60 (n = 34) | 58.32 \pm 20.12 | 0.260 |
| Age \geq 60 (n = 26) | 54.80 \pm 19.91 | |
| Women (n = 11) | 65.22 \pm 13.32 | 0.076 |
| Men (n = 49) | 54.91 \pm 20.80 | |
| Physical functioning | | |
| Age < 60 | 82.0 \pm 12.34 | 0.665 |
| Age \geq 60 | 80.0 \pm 14.55 | |
| Women | 83.64 \pm 11.73 | 0.468 |
| Men | 80.52 \pm 13.67 | |
| Role functioning | | |
| Age < 60 | 83.32 \pm 22.12 | 0.429 |
| Age \geq 60 | 77.64 \pm 25.43 | |
| Women | 77.34 \pm 15.45 | 0.163 |
| Men | 81.66 \pm 25.17 | |
| Emotional functioning | | |
| Age < 60 | 57.15 \pm 29.36 | 0.596 |
| Age \geq 60 | 51.64 \pm 28.53 | |
| Women | 28.83 \pm 19.83 | 0.002 |
| Men | 60.51 \pm 27.42 | |
| Cognitive functioning | | |
| Age < 60 | 75.55 \pm 21.0 | 0.994 |
| Age \geq 60 | 75.01 \pm 20.74 | |
| Women | 71.24 \pm 25.90 | 0.717 |
| Men | 76.24 \pm 19.51 | |
| Social functioning | | |
| Age < 60 | 67.21 \pm 32.22 | 0.561 |
| Age \geq 60 | 73.74 \pm 26.34 | |
| Women | 45.53 \pm 32.63 | 0.01 |
| Men | 75.51 \pm 26.43 | |

The analysis of mean values for quality of life (QLQ C-30) and symptom intensity (H&N35) revealed a correlation between social functioning and the following symptoms: discomfort (-0.427), fatigue (-0.225), nausea and vomiting (-0.588), pain (-0.604), loss of appetite (-0.455), and constipation (-0.399). A correlation was found between general health status and swallowing difficulty (-0.333), and between emotional functioning and the following symptoms: sense of smell and taste problems (-0.495), nausea and vomiting (-0.290), insomnia (-0.295), and constipation (-0.289). Also, a relation was detected between articulation problem and the following kinds of functioning: role (-0.394), emotional (-0.498), cognitive (-0.256), pain (-0.350), dyspnoea (-0.393), insomnia (-0.287), and diarrhea (-0.293). Problems with social eating correlated with the following types of functioning: physical (-0.547), role (-0.288), emotional (-0.317), cognitive (-0.358), and with fatigue (-0.559), nausea and vomiting (-0.318), pain (-0.357), dyspnoea (-0.290), loss of appetite (-0.436), and constipation (-0.340) (**Table 3**).

Discussion

Cancer is the leading cause of death among all psychosomatic disorders and has a significant impact on psychophysical status of patients. The diagnosis is a challenge and leaves cancer patients with numer-

ous problems. Malignancy, especially in its advanced stages, is always connected with physical and emotional suffering, what greatly lowers self-esteem of the affected individuals.

Apart from genetic factors, alcohol and tobacco use are the two main risk factors for laryngeal cancer. It is predominantly diagnosed in patients smoking tobacco (cigarettes, pipe), chewing tobacco, and consuming excessive amounts of alcohol. Both these factors, tobacco and alcohol, statistically significantly increase the risk for laryngeal cancer. In case of tobacco, time of exposure as well as intensity (smoking 20 cigarettes/day equals 13-fold higher risk) are vital. Unfortunately, not only active but also passive smoker are at risk, with the latter at a 5.5-fold higher risk for disease [1, 2]. Almost half of the participants in our study reported smoking and did not stop despite the illness and treatment. Active smokers (i.e. during therapy) declared they had been smoking 20–25 cigarettes per day for approximately 25–35 years, what indicates that long-term tobacco use is a high-risk factor for malignancy. Rzewnicki et al., investigated 92 people and reported that both, regular smokers and consumers of excessive amounts of alcohol (often combined), constituted the vast majority (95%) of the study population. Thus, they confirmed the risk for cancer in tobacco and alcohol users [3], not to mention that active and passive smoking in general is a high risk for disease factor [1, 2]. Zatoński W. et al., confirmed that theory and proved that daily exposure to tobacco smoke, active or passive, is a powerful risk factor for the development of laryngeal cancer. They found daily exposure to tobacco smoke to be almost identical in the group of young adults (< 45 years of age) and older patients [1, 3]. De Bruin-Visser C. et al., compared regular ex-smokers and active smokers [4] and found positive effects on the general health status in the majority of former smokers. Interestingly, positive effects were visible also in cases when the number of smoked cigarettes was only limited. Therefore, there is a clear need for head-and-neck cancer patients to stop smoking. Our analysis of the impact of sociodemographic factors on quality of life revealed deteriorated quality of life in terms of physical functioning in older patients, what confirms negative consequences of cancer, especially in the situation of threat to life. Despite considerable diversity of the obtained results, no statistical significance with regard to sociodemographic factors (age, gender, education, marital status, place of inhabitation) was found. Younger adults (< 60) evaluate their quality of life, physical, role, emotional

and higher, and cognitive functioning higher, whereas older patients (≥ 60) cope with social functioning better, what was demonstrated by Derks W. et al., and Bernardi D. et al. [5, 6]. In the available literature on the quality of life, especially reports by Bjordal K. et al., de Graeff A. et al., and Williamson J.D., sociodemographic situation takes an important place in the evaluation of health status in cancer patients, even despite diversified results [7–11]. The effect of age, gender, or education may impact health behavior of cancer patients [11]. Lifestyle is commonly believed to play a decisive role in cancer risk.

Both questionnaires, EORTC QLQC30 and QLQ-H&N35, are important sources of information about physical and psychosocial aspects of quality of life in cancer patients and are often used by numerous authors, especially Bjordal K, Kassa S. and others [7–9]. These tools assess the general quality of life, as well as the impact of cancer and therapy on the affected individuals. They also allow for a better grasp of possible physical, emotional, social and functional consequences of different treatment methods, and better choice of management. The analysis of the EORTC C-30 questionnaire revealed that younger patients cope better with physical, role, emotional and cognitive functioning and evaluate their quality of life higher as compared to older subjects, who cope better with social functioning but scored lower on physical functioning and symptoms of fatigue. No statistically significant differences between women and men, despite age group, were detected. Derks W. et al., studied 78 older adults (> 70 years of age) and demonstrated significantly deteriorated physical functioning as compared to younger patients, who in turn reported pain as the most persistent adverse symptom. Other dominant symptoms in the older population were fatigue, swallowing difficulty, and dry mouth, what might be connected with the process of ageing [5]. According to de Graeff A. et al., sociodemographic factors and their analysis are prognostic factors in cancer patients [11]. Evaluation of health-related risk factors, lifestyle (smoking and alcohol use), and marital status helps establish the right management of the disease. The available literature offers proof that swallowing difficulty is the most common complaint in older patients operated on due to laryngeal cancer. It is noted significantly more frequently in that age group because impaired swallowing is an inevitable consequence of ageing [12–14]. Specificity of head-and-neck cancer ought to take into consideration eating disorders, disfiguration, disrupted communication with the environ-

ment, including closest family and friends, as well as acceptance of social conditions. Also, it is important to take into consideration problems with social functioning due to tracheostomy tube, which many patients find extremely hard to accept. A suitable tool, such as EORTC H&N35, which evaluates swallowing, speech, sense of smell and taste, pain intensity, the condition of the oral cavity and teeth, sexual performance, body weight, use of nutritional supplements offers a possibility to analyze these symptoms as predictors of the health status of the patient.

In our study, the most bothersome symptoms for the majority of patients were pain, insomnia, the necessity to use painkillers, dyspnoea, and swallowing difficulty, followed by tooth loss, problems with communication, social eating, mouth dryness, sticky saliva, limited mouth opening, and coughing fits. The analysis of the EORTC H&N35 scores revealed that most of the investigated patients reported partial loss of taste and smell. There was also a necessity to use nutritional supplements to prevent weight loss.

Żmijewska-Tomczak M et al., assessed the changes in QoL before and at the end of the course of Radiotherapy (RT) in 205 patients with head and neck cancer using the Polish version of the questionnaires EORTC QLQ-C30 and QLQ-H&N35. Their study shows the greatest negative impact of RT was observed in terms of damage to the sense of taste and smell, weight loss, dry mouth, thick saliva retention, pain, loss of appetite, nausea and vomiting as well as fatigue. [15]

Cancer is usually associated with weight loss, especially in case of head-and-neck carcinomas [16, 17]. Malnutrition significantly impacts the strength of the skeletal muscles and decreases energy reservoir in cancer patients, adversely influencing their immunity and making them more prone to infections [14]. Also, malnutrition is often accompanied by depression which is a common occurrence in cancer. Hammerlid E. et al., demonstrated that only one-third of cancer patients with diagnosed malnutrition survived 2 years, whereas the score was two-fold higher in the group of well-nourished subjects [16].

Difficulty communicating turned out to be the main complaint in patients after laryngeal surgeries, with physical dexterity playing a less important role. Difficulty adjusting to social environment and social avoidance in the family were also reported [17–19], as well as the necessity to use nutritional supplements to avoid weight loss in most cases.

The majority of study participants admitted to problems with social contacts, articulation, and speech

which made caused communication difficulty or even breakdown. Swallowing difficulty, problems with social eating, and the general feeling of being ill, are a common occurrence among cancer patients [16, 21, 22], distinctly demonstrating the challenges of the life after laryngectomy and with tracheostomy tube.

The overall quality of life among the investigated subjects indicated general physical and psychological discomfort, especially in women, in terms of emotional and social functioning.

Most respondents reported deteriorating contacts with the environment. Patient reservation before the surgery according to Fang F. et al. [20], confirmed that fact. All of the above mentioned complaints are highly bothersome and demand adjustment to the new reality, and post-laryngectomy life is extremely challenging for the affected individuals. Pre-surgery symptoms often intensify post-surgery, particularly weight loss, appetite loss, dry mouth, and tooth loss, making everyday life very difficult. **Weight loss, and the consequent malnutrition, both decrease immunity and lead to infections** [17, 19].

Head and neck cancer patients are at particularly high risk for lasting consequences for health and psyche due to the fact that laryngectomy results in complete loss of normal voice. It is especially arduous for laryngectomees and may even be the basis for declaring disability, especially changes in the body image which require acceptance and signal a new life situation, what was confirmed by the study of Ackerstaff AH. et al. [21], and a study by Dropkin MJ. [22] and others [23, 24].

Conclusions

The need to investigate quality of life by means of patient self-evaluation of the symptoms in order to monitor patient status and establish an individual therapeutic, care and psychological approach, is unquestionable.

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Conflict of interest statement

The authors declare no conflict of interest.

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