

Observation of changes in quality of life for 5 years after thyroid surgery: an observational cross-sectional study in Korean population

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Purpose: As thyroid cancer patients are experiencing longer disease-free survival periods, evaluating their quality of life after surgery has become crucial. However, studies on this topic have primarily focused on Western populations, leaving a gap in understanding the Korean patient population's experiences and needs. This study aims to address this gap and provide insights into the quality of life of thyroid cancer patients in Korea.

Methods: This cross-sectional study evaluated the quality of life of Korean thyroid cancer patients who underwent thyroid lobectomy or total thyroidectomy. Patients were surveyed using the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC-QLQ-C30, ver. 3.0) during outpatient clinic visits from January to September 2015. The results were analyzed by comparing them to scores of the general population and based on the time elapsed since surgery. This approach allowed for a comprehensive evaluation of the quality-of-life outcomes in this patient population.

Results: The study found that thyroidectomy had a notable impact on patients' role and cognitive functions. Patients also experienced worsened symptoms such as fatigue, dyspnea, and constipation, which improved over time and returned to normal levels. However, there were no significant changes in other functions and symptoms after surgery.

Conclusion: The study's findings showed that thyroidectomy had a relatively minor impact on the functional and symptomatic well-being of patients. Therefore, the results suggest that thyroid surgery may be a safe and effective treatment option for thyroid cancer patients seeking to maintain a good quality of life.

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Key Words: Observational study, Postoperative period, Quality of life, Symptom assessment, Thyroid neoplasms

INTRODUCTION

Quality of life is a crucial indicator of treatment outcomes,

as emphasized by the World Health Organization's 1995 definition of quality of life as "individuals' perception of their position in life in the context of the culture and value systems

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in which they live and in relation to their goals, expectations, standards, and concerns" [1]. Various cancer patients often experience functional impairments during treatment, which can significantly impact their quality of life [2-6]. Research has shown that thyroid cancer patients have reported worse scores for anxiety, depression, fatigue, and sleep disturbance compared to patients with other cancers [7-9]. Despite decent oncologic outcomes for thyroid cancer patients, they often face emotional challenges, highlighting the importance of managing their quality of life during their extended survival period.

Studies targeting thyroid cancer patients have consistently shown declines in overall function with prevalent symptoms such as fatigue and depression [10,11]. Furthermore, Mongelli et al. [9] has also highlighted the financial burden experienced by thyroid cancer patients who have undergone surgery. Despite the increasing focus on the quality of life of thyroid cancer patients, there remains a scarcity of research on this topic in the Korean population compared to other cancer types. Therefore, the purpose of this observational cross-sectional study was to investigate and compare the quality of life of Korean patients who underwent thyroidectomies for papillary thyroid carcinoma.

METHODS

This study was approved by the Institutional Review Board of Seoul National University Hospital (No. H-1401-060-550), and all participants provided informed consent.

Study design

Patients visiting the Seoul National University Hospital outpatient clinic after thyroidectomy from January 1 to September 9, 2015, were potential candidates for this study. The patients were asked to participate in the survey and fill out the paper version of the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC-QLQ-C30), version 3.0. Out of 242 patients, 120 patients met the eligibility criteria for the study after excluding those who underwent postoperative radioiodine therapy, had been diagnosed with other types of cancer, or had incomplete surveys. The questionnaire scores were divided into five groups based on the time elapsed after surgery. The study utilized EORTC-QLQ-C30 scores of the normal population, which were obtained from a previous study by Nolte et al. [12] and used as reference scores for comparison.

EORTC QLQ-C30 and Korean validation questionnaire

To measure the quality of life of the thyroid cancer patients in this study, we used the Korean validated version of the EORTC QLQ-C30 (ver. 3.0). This questionnaire is designed to

assess various aspects of the quality of life in cancer patients, including functional and symptomatic domains, as well as the perceived financial impact of the disease. It consists of 30 questions, which are scored on a 4-point Likert scale, with higher scores indicating better quality of life. The questionnaire includes five functional scales, three symptom scales, single items for assessing additional symptoms commonly reported by cancer patients, and the global health and quality-of-life scale. Two questions on the global health and quality-of-life scale used a modified 7-point linear analog scale. The original version of the questionnaire was obtained from the official website, and the Korean validated version was used in this study [13,14].

General population reference

The reference data for the EORTC QLQ-C30 scores of the normal population was obtained from a study conducted by Nolte et al. [12] in 2019. The study included 11,343 individuals from 11 European countries (Austria, Denmark, France, Germany, Hungary, Italy, the Netherlands, Poland, Spain, Sweden, and the United Kingdom). The data was collected in March and April 2017 through an online survey conducted by a research company specializing in multinational/multilingual surveys. The study participants included an equal distribution of sex (female, 49.6%; male, 50.4%) and a wide age range from 18 to 99 years. Approximately 36% of participants were working full-time, while 34% were retired. Most respondents reported being married or in a steady relationship. The most reported diseases among participants were chronic pain, arthritis, and diabetes. The first author of the present study obtained permission to use the data as a reference.

Statistical analysis

The statistical analysis for this study was conducted using IBM SPSS Statistics ver. 23.0 for Windows (IBM Corp.). The threshold for statistical significance was set at P-values less than 0.05. The mean difference between the EORTC scores of each time point and the reference scores were calculated and analyzed using the Student t-test.

RESULTS

Comparison of scores to the general population

Figs. 1 and 2 depict a comparison between the EORTC QLQ-C30 normative scores of the general population of 11 European countries and our patient group. The results showed that irrespective of the type of surgery, patients perceived their overall health and quality of life status to be higher than those of the general population. However, patients who underwent lobectomy exhibited significantly lower mean scores for cognitive function (84.8 vs. 76.3, $P = 0.025$) and fatigue (29.5 vs. 38.0, $P = 0.039$) compared to the general population.

Similarly, patients who underwent total thyroidectomy also had significantly lower mean scores for cognitive function (84.8 vs. 80.0, $P = 0.013$) and fatigue (29.5 vs. 38.1, $P = 0.001$). Additionally, they reported significantly lower mean scores for nausea and vomiting (5.9 vs. 9.8, $P = 0.047$), dyspnea (15.9 vs. 21.5, $P = 0.045$), and constipation (12.5 vs. 20.0, $P = 0.005$) compared to the general population.

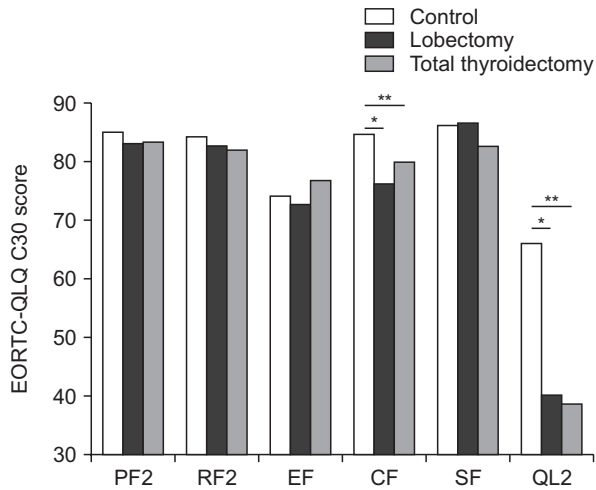


Fig. 1. Function scales and the global health and quality-of-life scale. PF2, physical function; RF2, role function; EF, emotional function; CF, cognitive function; SF, social function; QL2, global health and quality-of-life scale. Lobectomy, $n = 31$; total thyroidectomy, $n = 90$. * $P < 0.05$, ** $P < 0.001$.

Comparison of scores of 2 types of surgeries

Then EORTC QLQ-C30 scores of patients who underwent total thyroidectomy were compared with those who underwent thyroid lobectomy (Table 1). The results revealed that there were no significant differences in outcomes between these 2 groups. The mean scores for symptoms such as nausea and vomiting and dyspnea were slightly lower in patients who underwent total thyroidectomy, but the differences did not reach statistical significance. Similarly, no significant differences were found in functional scores between the 2 groups. Overall, our findings suggest that the choice of surgical procedure does not have a significant impact on the quality of life and functional outcomes of thyroidectomy patients.

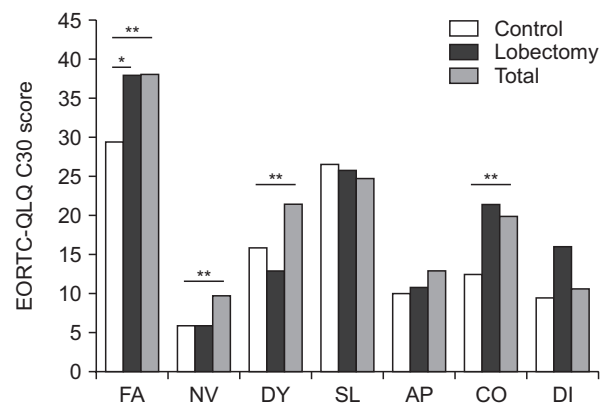


Fig. 2. Symptom scales. FA, fatigue; NV, nausea and vomiting; PA, pain; DY, dyspnea; SL, insomnia; AP, appetite loss; CO, constipation; DI, diarrhea. * $P < 0.05$, ** $P < 0.001$.

Table 1. Comparison of EORTC-QLQ-C30 scores of thyroid lobectomy and total thyroidectomy patients with scores of normal population

Scale	Control (n = 11,343)	Lobectomy (n = 31)	P-value	Total thyroidectomy (n = 90)	P-value
Function scale					
PF2	85.1	83.2	0.519	83.4	0.208
RF2	84.3	82.8	0.719	82.0	0.288
EF	74.2	72.8	0.678	76.9	0.217
CF	84.8	76.3	0.025	80.0	0.013
SF	86.2	86.6	0.908	82.6	0.112
Symptom scale					
FA	29.5	38.0	0.040	38.1	0.001
NV	5.9	5.9	>0.999	9.8	0.046
DY	15.9	12.9	0.321	21.5	0.045
SL	26.6	25.8	0.869	24.8	0.547
AP	10.0	10.8	0.807	13.0	0.181
CO	12.5	21.5	0.084	20.0	0.005
DI	9.5	16.1	0.138	10.7	0.570
Global health status					
QL2	66.1	40.1	<0.010	38.6	<0.010

EORTC-QLQ-C30, the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire, ver. 3.0; PF2, physical function; RF2, role function; EF, emotional function; CF, cognitive function; SF, social function; FA, fatigue; NV, nausea and vomiting; DY, dyspnea; SL, insomnia; AP, appetite loss; CO, constipation; DI, diarrhea; QL2, global health and quality-of-life scale.

Difference in yearly scores

The trends in changes in function and symptoms over time were examined by analyzing the average EORTC QLQ-C30 scores each year (Figs. 3, 4). Our findings showed that the mean scores for physical, role, and cognitive functions declined in the first year but steadily recovered as time progressed. Notably, compared to the general population, role function had a significant mean score difference in the first year (84.3 vs. 77.0, $P = 0.042$), whereas cognitive function had a significant mean score difference in the second year (84.8 vs. 72.2, $P = 0.009$). In contrast, emotional function and social function did not show significant changes over time, and none of these scores were significantly different from those of the normal population. The patients' mean scores for fatigue were at their peak in the first year (29.5 vs. 42.5, $P < 0.001$), then slowly recovered as time passed. Similar trends were seen for dyspnea (15.9 vs. 25.2, $P = 0.029$) and constipation (12.5 vs. 23.0, $P = 0.008$).

Other symptom scores did not show statistically significant differences compared to the general population, but an upward trend in mean scores for nausea and vomiting, diarrhea, and appetite loss over time was observed.

Despite the declines in function in the first year, patients' mean scores for overall quality of life and their perspective of health status were higher than those of the general population starting from the first year. However, patients' mean scores for fatigue, dyspnea, and constipation were at their highest in the first year (29.5 vs. 42.5, $P < 0.001$; 15.9 vs. 25.2, $P = 0.029$; and 12.5 vs. 23.0, $P = 0.008$), before slowly recovering as time passed. While other symptom scores did not show statistically significant differences compared to the general population, we observed an upward trend in mean scores for nausea and vomiting, diarrhea, and appetite loss over time. Each scores are represented in Tables 2 and 3.

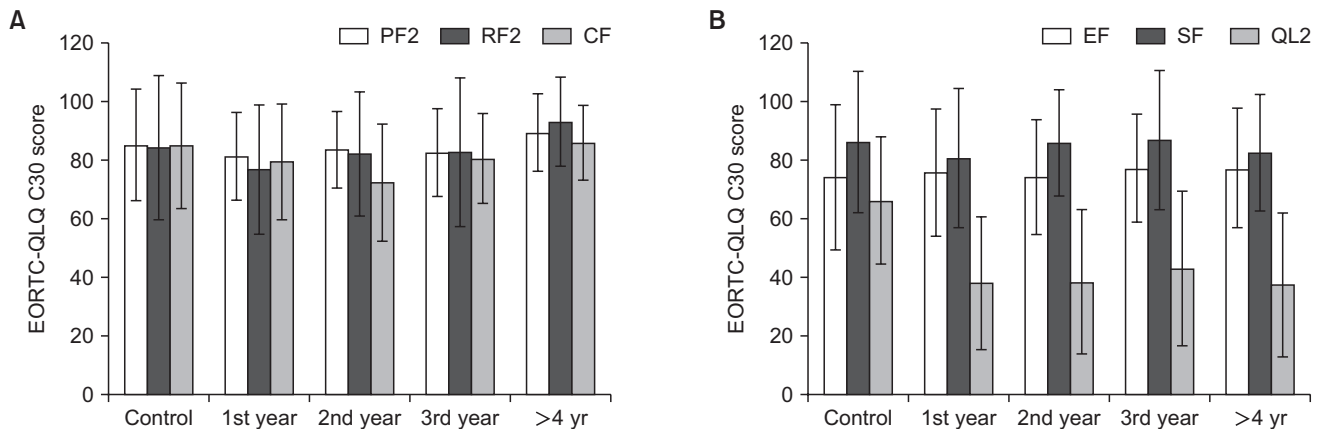


Fig. 3. Differences in function scales and the global health and quality-of-life scale over time. Yearly changes in the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC-QLQ-C30, ver. 3.0) score for (A) physical (PF2), role (RF2), and cognitive functions (CF) and (B) emotional (EF) and social functions (SF) with global health and quality-of-life scale (QL2).

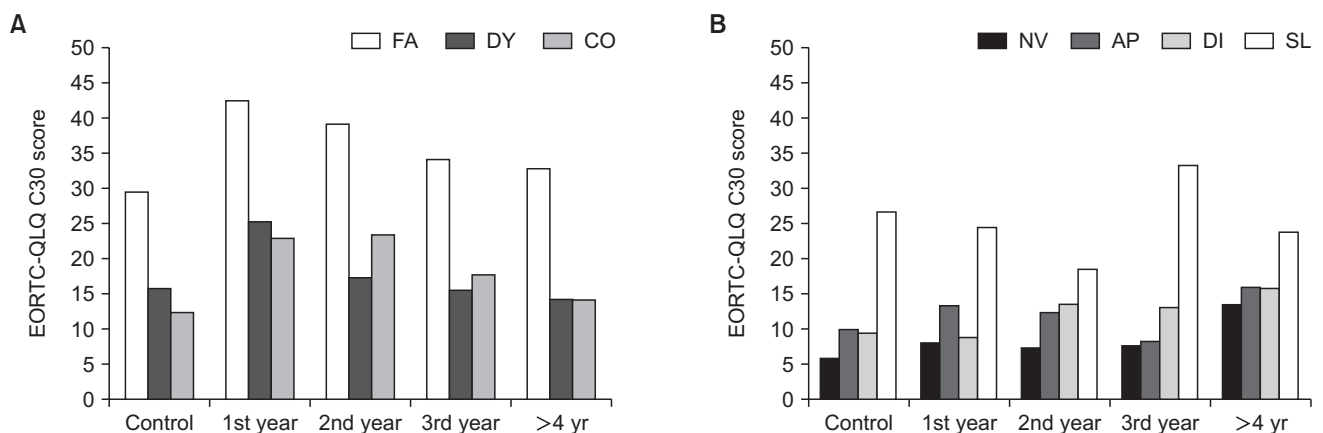


Fig. 4. Differences in symptom scales over time. Yearly changes in the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC-QLQ-C30, ver. 3.0) score for (A) fatigue (FA), dyspnea (DY), and constipation (CO) and (B) nausea and vomiting (NV), appetite loss (AP), diarrhea (DI), and insomnia symptoms (SL).

Table 2. Yearly EORTC-QLQ-C30 function scale scores

Function scale and Global health status	Control (n = 11,343)	1st year (n = 45)	P-value	2nd year (n = 27)	P-value	3rd year (n = 28)	P-value	>4 years (n = 21)	P-value
PF2	85.1	81.2	0.052	83.5	0.496	82.4	0.381	89.2	0.122
RF2	84.3	77.0	0.043	82.1	0.482	82.7	0.720	92.9	0.009
EF	74.2	75.7	0.637	74.1	0.980	77.1	0.397	77.0	0.550
CF	84.8	79.3	0.053	72.2	0.008	80.4	0.136	85.7	0.758
SF	86.2	80.7	0.134	85.8	0.901	86.9	0.858	82.5	0.356
QL2	66.1	37.8	<0.010	38.3	<0.010	42.9	<0.010	37.3	<0.010

EORTC-QLQ-C30, the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire, ver. 3.0; PF2, physical function; RF2, role function; EF, emotional function; CF, cognitive function; SF, social function; QL2, global health and QOL scale.

Table 3. Yearly EORTC-QLQ-C30 symptom scale scores

Symptom scale	Control (n = 11,343)	1st year (n = 45)	P-value	2nd year (n = 27)	P-value	3rd year (n = 28)	P-value	>4 years (n = 21)	P-value
FA	29.5	42.5	<0.01	39.1	0.042	34.1	0.328	23.8	0.478
NV	5.9	8.1	0.315	7.4	0.680	7.7	0.503	13.5	0.161
DY	15.9	25.2	0.030	17.3	0.737	15.5	0.913	14.3	0.772
SL	26.6	24.4	0.559	18.5	0.128	33.3	0.250	23.8	0.674
AP	10.0	13.3	0.316	12.3	0.473	8.3	0.547	15.9	0.331
CO	12.5	23.0	0.008	23.5	0.060	17.9	0.289	14.3	0.683
DI	9.5	8.9	0.789	13.6	0.365	13.1	0.411	15.9	0.292

EORTC-QLQ-C30, the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire, ver. 3.0; FA, fatigue; NV, nausea and vomiting; DY, dyspnea; SL, insomnia; AP, appetite loss; CO, constipation; DI, diarrhea.

DISCUSSION

Quality of life is a complex and multifaceted concept that cannot be easily quantified using numerical scales. It is influenced by a range of abstract values such as goals, expectations, standards, and concerns [1]. Therefore, the current practice for quantifying quality of life relies on surveys. Several studies have been conducted on thyroid cancer patients, but the results have varied. For example, some studies have shown that quality of life returns to normal six months after surgery [15], while others suggest it may take at least a year or longer [16]. These varying results may be due to different survey types used for patients with varying backgrounds, as well as different treatment decisions across different regions.

This study found that only cognitive function and symptoms such as fatigue, nausea and vomiting, diarrhea, and constipation showed statistical significance. These findings were similar to the results of previous reported studies [6,17-20]. However, the underlying pathophysiology for these findings remains unclear, as thyroidectomy can result in diverse side effects such as transient or permanent hypocalcemia and vocal cord palsy. For instance, it is known that symptoms of transient hypocalcemia can be seen in 30%–60% of the patients, and permanent hypocalcemia is found in 3%–10% of

patients [21-24], whereas transient and permanent vocal cord palsy can be found in 10% and 1% of the patients respectively [25-30]; but how these factors play a role in declined cognitive function is still vague. However, cognitive function can be influenced by factors such as depression and drowsiness which are commonly seen in patients with thyroid malignancy. Moreover, thyroidectomy itself causes fluctuation in thyroid hormones especially hypothyroidism, which generally leads to a decline in the overall function of the patient. Nevertheless, cellular mechanisms are yet to be revealed as past articles have been unsuccessful in discovering the connections between thyroidectomy and decline in multiple functions [17-20]. As for the declined gastrointestinal symptoms that the patients have complained about in our study, it could be postulated that it can either be due to fluctuating levels of thyroid hormones or side effects of medications. There are numerous thyroid hormone receptors all over our body, and thyroid hormones have an immense influence on the metabolism of nutrition. Although the exact causes of gastrointestinal symptoms are very difficult to unravel, it could be more likely that thyroid hormones have at least partial impact than symptoms caused by side effects of medications. This hypothesis is supported by the fact that the recovery of side effects from surgery usually takes 12–15 months, where the duration of gastrointestinal symptoms

roughly matches the symptomatic period.

Certain scales were not included in this study, such as the financial scale and the pain scale, as most patients did not experience financial difficulties and had concurrent musculoskeletal problems that could have influenced their pain levels. Dyspnea was reported by patients during the first year after surgery, but vocal cord palsy was not observed in any of the patients. Dyspnea itself can become a very subjective symptom where it could range from actual shortness of breath to mild irritation during breathing. All our surveyed patients were examined with oxygen saturation postoperatively, and none of them showed decreased levels of oxygen. This means that patients who did feel aggravated dyspnea might have been due to minor causes such as tracheal irritation or increased sputum. Since patients who underwent total thyroidectomy were more likely to feel dyspnea, it could be postulated that prolonged operation time could have caused more tracheal irritation that caused more symptoms of dyspnea.

There are certainly many limitations in this study. Firstly, the study was conducted as a cross-sectional study involving only a single survey per patient. Therefore, selected patients cannot completely elucidate the postoperative healing process of thyroidectomy. However, this study was designed more towards having a general idea of how thyroidectomy may have an impact on patients' symptoms at different time points. Secondly, the number of complications related to thyroidectomy of the selected patients in this study was relatively lower than previously reported outcomes. We presume that our dataset with relatively fewer complications certainly impacted the survey outcomes to be generally better than the patients we would generally see. We foresee that a future study with a greater number of patients will better represent the symptoms after thyroidectomy. Lastly, the normative data used for comparison was from a European population, which may not fully reflect the cultural, socioeconomic, and racial factors of the study population in Korea. Almost all Korean studies using the EORTC QLQ-C30 survey were done on patients with other types of malignancies. Therefore, our intention to compare the thyroidectomy patients with the general population could only have been achieved by using the European dataset in this study. We hope that our future research will consider conducting long-term follow-up studies involving multiple surveys per patient to better understand changes in quality of life over time.

Nonetheless, this study will provide a general reference point for future research on the quality of life after thyroidectomy in the Korean population.

After thyroidectomy, there was a significant decline in cognitive function and an increase in nausea and vomiting scores 1–2 years after surgery. However, patients' mean scores in these domains returned to normal levels 4 years after thyroidectomy, comparable to those of the general population. These findings suggest that patients may experience temporary declines in cognitive function and increased gastrointestinal symptoms after thyroidectomy, but they tend to recover over time. Further studies are needed to explore the potential underlying causes and mechanisms of these changes.

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Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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