



## Case Report

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# Poor Quality of Life after Neck Dissection is Associated to Depressive Symptoms Instead of Cancer or Operation-Related Factors

Krisztina Molnar, MD<sup>1,2</sup>, Sanni Kakilehto, MD<sup>1,2#</sup>, Sanna Lahtinen, MD, PhD<sup>1,2\*#</sup>, Nurkkala Juho, MD, PhD<sup>2</sup>, Petri Koivunen, MD, PhD<sup>3,4</sup> and Janne Liisanantti, MD, PhD<sup>1,2</sup>

<sup>1</sup>Department of Anesthesiology, Oulu University Hospital, Oulu, Finland

<sup>2</sup>MRC Oulu, Research Group of Surgery, Anesthesiology and Intensive Care, Oulu, Finland

<sup>3</sup>Division of Anesthesiology and Oulu University Hospital, Department of Head and Neck Surgery, Oulu, Finland

<sup>4</sup>MRC Oulu, PEDEGO, Oulu, Finland

\*Equal contribution



## Abstract

**Background:** Neck dissection (ND) is a common surgical procedure in the treatment of the head and neck cancer (HNC). The present study focused on patients' psychosocial well-being and quality of life (QoL) after ND.

**Methods:** A cohort of 63 (54.3%) of the 116 eligible patients answered the QoL-questionnaires at average 4.5 years from the operation. RAND 36-item Health Survey (RAND-36), EORTC QLQ-C30, EORTC-QLQ-H&N35, Beck Depression Inventory (BDI) and Short version of Pain Anxiety Symptoms Scale (PASS20) were used in assessment. QoL was considered poor if at least one RAND-36 dimension was scored below 2SDs from age-adjusted reference values.

**Results:** A total of 23 respondents had poor QoL according to RAND-36 scores. Age, chronic comorbidities, postoperative complications or other adverse events during the postoperative phase had no effect on QoL. Respondents with poor QoL had significantly higher scores on BDI (17.0 (8.8) vs. 5.5 (12.5),  $P < 0.001$ ) and PASS20 assessments (29.5 (19.3) vs. 15.2 (16.2),  $P = 0.004$ ).

**Conclusion:** Poor QoL after ND was related primarily to psychosocial factors and mental well-being. Chronic comorbidities or operation-related factors did not have impact on the QoL.

## Introduction

Neck dissection (ND) is a common surgical procedure managing lymph nodes in the treatment of the head and neck cancer (HNC) and other cancer site such as thyroid gland with metastasis in the lymph nodes of the neck [1].

Despite the advances in the surgical techniques over the years [2], ND still is an invasive procedure with a marked risk of complications [3,4]. The impact of postoperative complications on outcomes in this patient group has been studied previously, but the number of studies focusing on the patients' quality of life (QoL) after ND and factors associated with it, is limited. Studies focusing on psychosocial well-being after ND are rare.

The aim of the present study was to evaluate relation between general QoL and psychosocial well-being in this patient group. Our hypothesis is that QoL after ND is related to psychosocial well-being instead of disease or operation-related factors.

## Methods

This prospective follow-up study is a continuation of our previous retrospective study and was conducted in Oulu University Hospital, Oulu, Finland. The study protocol was accepted by the hospital administration (ref 33/2019) and the local ethics committee (The Regional Ethics Committee of the Northern Ostrobothnia Hospital ref. 42/2021). All the

\*Corresponding author: Sanna Lahtinen, MD, PhD, Department of Anesthesiology, Oulu University Hospital, P.O.BOX 21, 90029 OYS, Oulu, Finland

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patients agreed to join the study by written consent.

## Patients and procedure

We included a total of 181 adult patients who underwent 196 neck dissection procedures between 1<sup>st</sup> of January 2014 and 31<sup>st</sup> of December 2019.

At the end of minimum two-year follow-up period, 116 (64.1%) of the operated 181 patients were alive and were asked to participate the QoL-survey. A total of 63 (54.3%) patients were willing to participate and answered to the QoL questionnaires at average of 4.5 years after surgery. QoL was measured using validated QoL tools (RAND 36-item Health Survey (RAND-36) [5], EORTC QLQ-C30 [6], EORTC-QLQ-H&N35 [7], Beck Depression Inventory (BDI) [8,9], Short version of Pain Anxiety Symptoms Scale (PASS20) [10]).

## Data extraction

The following data were obtained manually from the medical records: Patient demographics, the type of cancer, preoperative laboratory results, duration of operation, intraoperative blood loss and intraoperative fluid intake. Chronic co-morbidities including coronary heart disease, diabetes and chronic lung disease as well as data concerning smoking and alcohol abuse were also recorded. Neck dissections were classified by the number of regions removed (1-2 regions, 2-3 regions, > 4 regions) and radical or modified radical neck dissection according to national classification of surgical procedures [11].

Patients' QoL was evaluated using those validated tools mentioned above. All the patients were contacted by phone by the end of the year 2021 and those willing to participate replied the questionnaire by letter or were interviewed by phone by the main researcher (KM).

## QoL assessment

RAND-36 [5] is a general QoL questionnaire of health and well-being consisting of eight domains (general health, physical functioning, physical and emotional role functioning, emotional well-being, social functioning, pain, energy/fatigue) scored in a scale from 0 (the worst) to 100 (the best). QoL was considered poor if at least one of the eight dimensions was scored less than two standard deviations (SD) of the age adjusted population values. A validated Finnish version with age-adjusted population values of RAND-36-tool is available [12].

EORTC QLQ-C30 [6] is a core questionnaire used for evaluating the general QoL among cancer patients. The questionnaire consists of five functioning scales, three symptom scales, a global QoL scale and six single items assessing other symptoms and problems often reported by cancer patients. High scores from the functioning scale and the global QoL scale represent a better level of functioning, whereas a high score from the symptom scale or a single-item scale indicates a high level of symptoms or problems [13].

EORTC QLQ-H&N35 [7] is a tumour-specific QoL questionnaire specially designed for the head and neck cancer patients. This questionnaire includes seven symptom

scales, six single items and five optional items that evaluate the impact of tumour location and treatment on the QoL. The results of the EORTC QLQ-H&N35 are interpreted as the results of the EORTC QLQ-C30.

EORTC QLQ-C30 and EORTC QLQ-H&N35 are available as validated Finnish translations. Scales of both EORTC instruments are linearly transformed into a score of 0-100.

BDI [8,9] is the globally used questionnaire to screen possible depressive symptoms. It consists of 21 statements to answer on a 1-4 Likert scale. The BDI can be used to reliably distinguish mild, moderate and severe depression. Total score of less than 10 is considered normal, scoring between 10-16 is considered mild, scoring between 17-29 considered moderate, and scoring between 30-63 is considered severe depression. BDI tool is validated in Finnish [14].

PASS20 [10] is a general QoL assessment tool that is used to measure pain-related anxiety and fear. It has been shortened to 20 questions from the original 40-questions PASS survey [15]. It consists of four anxiety subscales (cognitive anxiety, escape/avoidance behavior, fear of pain, and physiological anxiety symptoms). Answers are scored from 0 (never) to 5 (always) and a total score 0-34 reveals mild, 35-67 reveals moderate and 68-100 reveals severe risk for developing problematic pain-related anxiety. The PASS20 is not validated in Finnish so for the study the questionnaire was translated into Finnish by a native English speaker and then retranslated back into English.

## Statistical analysis

Statistical analysis was performed using IBM SPSS 27 for windows software. Categorical variables are presented as number (n) and percentages and compared using Pearson Chi-square test unless otherwise stated. Continuous variables are presented as a mean with standard deviation (SD) and were analyzed using the non-parametric Mann-Whitney test. P-value less than 0.05 is considered statistically significant.

## Results

There were a total of 63 respondents of which 32 (50.8%) were males. The mean age at operation was 56.8 (SD 16.9) years. The proportions both of HNC and thyroid gland cancer were 25 (39.7%), equally. A total of 12 (19.0%) respondents had a recorded postoperative complication (Table 1). The recorded complications included 4 (6.3%) cases with postoperative hematoma, 2 (3.2%) cases with pneumonias. Both stroke and surgical site infection were recorded in two patients. 4 patients had nerve injury and four patients had chyle leakage.

A total of 23 respondents reported poor QoL according to RAND-36 scores. Poor QoL was not related to age, chronic comorbidities, to the immensity of the surgery or adverse events during the postoperative phase (Table 1), but generally the QoL of the study population was scored lower compared to Finnish reference values in most of the domains of RAND-36 tool (Table 2).

Patients operated due to metastasis instead of tumor (TO

**Table 1:** Comparison between respondents with and without poor quality of life assessed using RAND-36-tool.

	All	Good QoL N = 40	Poor QoL N = 23	P-value
Age	56.8 (16.9)	58.3 (15.3)	54.1 (19.5)	0.403
Female gender	32 (50.8)	19 (47.5)	13 (56.5)	0.490
ASA > 2	23 (36.5)	13 (32.5)	10 (43.5)	0.384
BMI	26.9 (4.3)	26.7 (4.0)	27.3 (4.8)	0.680
Chronic comorbidities				
MCC	6 (9.5)	4 (10.0)	2 (8.7)	> 0.9*
DM	10 (15.9)	6 (15.0)	4 (17.4)	> 0.9*
COPD	3 (4.8)	1 (2.5)	2 (8.7)	0.548*
Cancer site				
H&NC	25 (39.7)	18 (45.0)	7 (30.4)	0.303
Thyroid gland	25 (39.7)	13 (32.5)	12 (52.2)	
Other	13 (20.6)	9 (22.5)	4 (17.4)	
TMN classification				
T0 N1-3 M0-1	26 (44.8)	14 (36.8)	12 (60.0)	0.017
T1-4 N0 M0	20 (34.5)	12 (31.6)	8 (40.0)	
T1-4 N1-3 M0-1	12 (20.7)	12 (31.6)	0	
Dissection > 4 regions or radical or modified radical neck dissection	25 (39.7)	15 (37.5)	10 (43.5)	0.689
Pre- or postoperative	24 (38.1)	18 (45.0)	6 (26.1)	0.137
Complication	12 (19.0)	7 (17.5)	5 (21.7)	0.680
Surgical complication	9 (14.3)	5 (12.5)	4 (17.4)	0.713*
Medical complication	4 (6.3)	3 (7.5)	1 (4.3)	> 0.9*
BDI	9.7 (8.6)	5.5 (4.9)	17.0 (8.8)	< 0.001
PASS20	20.3 (18.6)	15.2 (16.2)	29.5 (19.3)	0.004
Time between operation and assessment	4.7 (14.1)	4.5 (1.3)	5.0 (1.6)	0.201

**Table 2:** The RAND-36 scoring of the study population and the Finnish reference values.

Domain		All	General population
Physical functioning	All patients	65.7 (23.2)	84.9 (20.1)
	< 65 y	76.9 (12.6)	90.3 (16.3)
	> 65 y	54.9 (26.1)	60.6 (26.7)
Role functioning physical	All patients	66.0 (37.4)	74.8 (35.5)
	< 65 y	75.8 (33.9)	80.9 (32.6)
	> 65 y	56.3 (53.6)	47.0 (41.8)
Role functioning emotional	All patients	71.4 (39.8)	75.0 (36.4)
	< 65 y	68.8 (43.1)	78.4 (34.6)
	> 65 y	74.0 (38.8)	58.8 (40.3)
Energy/fatigue	All patients	62.4 (18.1)	64.0 (22.4)
	< 65 y	59.4 (23.3)	64.7 (21.7)
	> 65 y	65.3 (21.8)	60.7 (23.8)
Emotional well-being	All patients	73.4 (18.2)	73.7 (19.7)
	< 65 y	70.1 (20.3)	73.8 (19.1)
	> 65 y	76.5 (15.5)	74.8 (20.9)

<b>Social functioning</b>	All patients	77.1 (24.6)	82.1 (23.2)
	< 65 y	73.8 (20.3)	82.9 (22.3)
	> 65 y	80.5 (20.8)	77.3 (25.5)
<b>Pain</b>	All patients	71.0 (26.2)	76.2 (24.0)
	< 65 y	71.8 (27.4)	78.4 (23.1)
	> 65 y	70.3 (23.4)	64.2 (26.5)
<b>General health</b>	All patients	54.2 (25.0)	65.0 (19.8)
	< 65 y	58.4 (29.5)	68.0 (19.7)
	> 65 y	50.3 (19.5)	49.0 (20.2)

**Table 3:** Rand-36-values in patients with or without positive BDI screen.

Domain		All	No depressive symptoms N=49 Mean (SD)	Depressive symptoms N=14 Mean (SD)	p-value	General population
Physical functioning	All patients	65.7 (23.2)	71.3 (18.8)	51.1 (27.5)	0.004	84.9 (20.1)
	< 65 y	76.9 (12.6)	79.2 (12.6)	71.8 (11.6)	0.023	90.3 (16.3)
	> 65 y	54.9 (26.1)	64.5 (20.8)	25.2 (17.0)	0.001	60.6 (26.7)
Role functioning physical	All patients	66.0 (37.4)	75.0 (36.5)	43.1 (38.2)	0.004	74.8 (35.5)
	< 65 y	75.8 (33.9)	83.0 (30.3)	60.0 (37.6)	0.090	80.9 (32.6)
	> 65 y	56.3 (53.6)	67.7 (20.8)	21.9 (28.2)	0.007	47.0 (41.8)
Role functioning emotional	All patients	71.4 (39.8)	82.6 (32.8)	42.6 (42.5)	< 0.001	75.0 (36.4)
	< 65 y	68.8 (43.1)	87.9 (28.3)	26.7 (41.0)	< 0.001	78.4 (34.6)
	> 65 y	74.0 (38.8)	77.8 (36.3)	62.5 (37.5)	0.210	58.8 (40.3)
Energy/fatigue	All patients	62.4 (18.1)	72.2 (16.8)	36.7 (19.0)	< 0.001	64.0 (22.4)
	< 65 y	59.4 (23.3)	72.1 (16.2)	31.5 (18.4)	< 0.001	64.7 (21.7)
	> 65 y	65.3 (21.8)	72.4 (17.6)	43.1 (18.9)	0.002	60.7 (23.8)
Emotional well-being	All patients	73.4 (18.2)	80.3 (11.9)	55.3 (19.7)	< 0.001	73.7 (19.7)
	< 65 y	70.1 (20.3)	81.1 (11.1)	46.0 (14.1)	< 0.001	73.8 (19.1)
	> 65 y	76.5 (15.5)	79.5 (67.0)	67.0 (20.2)	0.139	74.8 (20.9)
Social functioning	All patients	77.1 (24.6)	87.2 (16.3)	51.4 (23.4)	< 0.001	82.1 (23.2)
	< 65 y	73.8 (20.3)	86.4 (20.0)	46.3 (22.1)	< 0.001	82.9 (22.3)
	> 65 y	80.5 (20.8)	88.0 (12.5)	57.8 (24.9)	0.001	77.3 (25.5)
Pain	All patients	71.0 (26.2)	79.7 (21.2)	48.3 (24.8)	< 0.001	76.2 (24.0)
	< 65 y	71.8 (27.4)	80.8 (21.2)	52.0 (30.0)	0.008	78.4 (23.1)
	> 65 y	70.3 (23.4)	78.8 (21.5)	43.8 (17.1)	0.001	64.2 (26.5)
General health	All patients	54.2 (25.0)	64.2 (20.0)	28.6 (25.0)	< 0.001	65.0 (19.8)
	< 65 y	58.4 (29.5)	73.8 (20.4)	26.0 (16.1)	< 0.001	68.0 (19.7)
	> 65 y	50.3 (19.5)	58.2 (16.0)	31.9 (18.7)	0.005	49.0 (20.2)

N1-3 M0-1) reported more often poor QoL and respondents with poor QoL had significantly higher scores also in BDI 17.0 (8.8) vs. 5.5 (12.5)  $P < 0.001$  and PASS20 assessments 29.5 (19.3) vs. 15.2 (16.2),  $P = 0.004$ ) (Table 1).

Respondents with BDI scoring over 9 had lower scorings in all of the RAND-36-dimensions (Table 3). Accordingly, respondents with PASS20 total score above 34 had lower scorings in 7 of 8 RAND-36 dimensions (Table 4).

In the EORTC-C30 and EORTC-H&N35 tools the scorings were comparable expect. The EORTC-H&N35 domains “less sexuality”, “teeth”, and “felt ill” in which of the scorings of the study population were higher than the reference values (Table 5).

The recorded postoperative complications did not have impact on the assessed QoL except (data not shown).

**Table 4:** Rand-36-values in patients with less or more than 34 PASS20 scores.

Domain		PASS20 score ≤ 34 N = 50 Mean (SD)	PASS20 score > 34 N = 13 Mean (SD)	p-value	General population
Physical functioning	All patients	70.1 (19.9)	50.6 (29.4)	0.025	84.9 (20.1)
	< 65 y	79.5 (10.3)	73.6 (12.9)	0.241	90.3 (16.3)
	> 65 y	61.4 (22.8)	30.9 (24.6)	0.011	60.6 (26.7)
Role functioning physical	All patients	71.4 (26.1)	48.1 (45.0)	0.055	74.8 (35.5)
	< 65 y	78.1 (32.4)	75.0 (31.6)	0.703	80.9 (32.6)
	> 65 y	65.0 (38.9)	25.0 (43.3)	0.019	47.0 (41.8)
Role functioning emotional	All patients	79.6 (35.2)	48.7 (44.3)	0.007	75.0 (36.4)
	< 65 y	79.2 (37.8)	44.4 (50.2)	0.050	78.4 (34.6)
	> 65 y	80.0 (33.3)	52.4 (42.4)	0.064	58.8 (40.3)
Energy/fatigue	All patients	67.8 (21.2)	45.8 (24.1)	0.005	64.0 (22.4)
	< 65 y	67.1 (22.1)	36.7 (24.0)	0.016	64.7 (21.7)
	> 65 y	68.5 (20.8)	53.6 (22.9)	0.111	60.7 (23.8)
Emotional well-being	All patients	77.2 (15.8)	61.5 (21.5)	0.016	73.7 (19.7)
	< 65 y	75.5 (18.1)	52.0 (22.1)	0.024	73.8 (19.1)
	> 65 y	78.8 (13.6)	68.0 (20.1)	0.232	74.8 (20.9)
Social functioning	All patients	82.9 (19.9)	61.5 (21.5)	0.014	82.1 (23.2)
	< 65 y	80.2 (18.1)	60.4 (31.0)	0.106	82.9 (22.3)
	> 65 y	85.5 (13.8)	62.5 (31.5)	0.059	77.3 (25.5)
Pain	All patients	77.2 (23.4)	54.8 (24.1)	0.003	76.2 (24.0)
	< 65 y	78.2 (25.1)	62.5 (22.3)	0.078	78.4 (23.1)
	> 65 y	76.3 (22.3)	48.2 (25.3)	0.016	64.2 (26.5)
General health	All patients	59.2 (22.3)	38.1 (25.9)	0.017	65.0 (19.8)
	< 65 y	65.4 (28.0)	39.3 (29.4)	0.071	68.0 (19.7)
	> 65 y	53.7 (16.8)	48.2 (25.3)	0.138	49.0 (20.2)

**Table 5:** EORTC-C30 and EORTC H&N35 scorings of the study population and the Finnish reference values.

	EORTC-C30		EORTC H&N35 Symptom scales		
	Total N = 65	Reference value			Reference value
<b>Global health status</b>	65.5 (20.9)	61.3 (24.2)	Pain	14.3 (18.9)	27.1 (24.0)
<b>Functional scales</b>			Swallowing	10.6 (16.1)	23.9 (25.3)
Physical functioning	80.1 (19.8)	76.7 (23.2)			
Role functioning	82.8 (23.7)	70.5 (32.8)	Senses problems	13.8 (16.3)	19.3 (28.8)
Emotional functioning	77.0 (18.7)	71.4 (24.2)	Speech problems	15.4 (17.1)	28.0 (27.6)
Cognitive functioning	78.6 (23.8)	82.6 (21.9)	Trouble with social eating	11.2 (19.9)	20.9 (25.1)
Social functioning	86.5 (22.2)	75.0 (29.1)	Trouble with social contact	10.0 (13.2)	13.0 (18.9)
<b>Symptom scales</b>			Less sexuality	40.5 (34.9)	31.3 (35.2)
Fatigue	32.2 (21.7)	34.6 (27.8)			
Nausea and vomiting	3.3 (9.4)	9.1 (19.0)	Teeth	27.1 (31.1)	25.5 (33.2)
Pain	24.9 (27.5)	27.0 (29.9)	Opening mouth	16.4 (26.7)	19.5 (29.5)
Dyspnea	12.8 (21.0)	21.0 (28.4)	Dry mouth	37.2 (34.3)	30.7 (33.4)

Insomnia	28.7 (28.8)	28.9 (31.9)	Sticky saliva	27.1 (25.5)	30.5 (33.9)
Appetite loss	13.5 (25.7)	21.1 (31.3)	Coughing	18.6 (23.3)	33.9 (32.2)
Constipation	14.4 (26.3)	17.5 (28.4)	Felt ill	22.5 (27.9)	21.6 (28.9)
Diarrhea	9.4 (17.3)	9.0 (20.3)	Pain killers	14.4 (16.7)	49.5 (50.0)
Financial difficulties	13.0 (25.6)	16.3 (28.1)	Nutritional supplements	7.6 (14.1)	26.7 (44.2)
			Feeding tube	0.8 (5.0)	19.7 (39.8)
			Weight loss	1.5 (7.0)	38.9 (48.8)
			Weight gain	3.1 (9.8)	27.3 (44.6)

## Discussion

The main finding of the present study is that poor QoL measured 4.5 (mean) years after ND was not related to the patients' preoperative chronic comorbidities or postoperative complications and other adverse events reported during postoperative period. Poor QoL related primarily to psychosocial well-being factors, not to physical health. The only perioperative factor related to poor QoL was operation due to metastasis or lymph nodes instead of operation due to tumor. Interestingly, patients with thyroid cancer reported more often poor QoL than patients who experienced ND due to other cancer type, but this finding was not statistically significant.

Although the QoL of H&NC patients has already been extensively studied, the number of studies focusing on QoL in this patient group from the present point of view, psychosocial well-being, is limited. Previous studies usually focus on surgery and treatment-related factors and comparison of different treatment strategies [16-23].

In our study, the QoL measured by RAND-36 tool was lower compared with general Finnish population values while the scorings in EORTC-tools were comparable and, in some domains, better. This can be explained at least partly by the high rate of depression and pain-related problems, detected with PASS20 and BDI questionnaires. In the EORTC tools the reference values are based on cancer patients and it is possible that these patients are mainly cured from the cancer after 4.5 years after operation. Previous studies have shown that the patients that experienced ND combined with other oncological treatments have more pain disorders in long-term follow-up compared with patients who have experienced definitive (chemo) radiotherapy [23].

However, pain itself does not cause poor QoL, but it is one of the important factors determining QoL [24-26]. Similarly, depression has an important role affecting patients' QoL. The diagnosis of cancer itself can also have an impact on mental health and well-being and can even cause depression [22,27]. Similar results are presented also in other patient groups with cancer, including breast cancer, colorectal cancer and lung cancer patients [27-31].

We have previously reported that QoL after free flap reconstruction due to HNC declined significantly during follow-up between two and five postoperative years and we did not find any relation with poor QoL and operation-

related factors [32]. Accordingly, we have previously shown also relation between two years postoperatively reported poor QoL and long-term mortality in patients undergone free flap reconstruction [33]. One could hypothesize that at time-point two years after surgery patients are still revealed and pleased as they have survived the cancer and the treatment, which is responded as high QoL figures. After five years from treatment, the mental burden from cancer diagnosis may be diminished and possible side effects of treatments are in a bigger role in patients' daily life.

In the present study, poor QoL caused by chronic comorbidities may have been hidden behind the mortality and therefore major psychosocial factors had the dominant role determining the poor QoL. An interesting finding in our study was the high rate of poor QoL (even without statistical significance) among patients operated due to thyroid cancer. Thyroid cancer has generally very good survival outcomes compared with other cancers of the head and neck [34,35]. Our setting does not allow us to explain this finding, but since these patients are generally younger and healthier, the diagnosis of cancer itself may have higher impact on their daily life and also mental health and well-being. Accordingly, thyroidectomy-related hypothyroidism requiring medical substitution and unphysiologically acting thyroid hormone may have an impact on the QoL of these patients. This finding needs further studies.

## Clinical Impact

QoL measurement plays an important role in evaluating the postoperative outcome. Based on our results, we should extend perioperative care to not only physical health but also patients' mental health and well-being. In addition to treating the cancer itself, good pain management and easily available psychosocial support could improve quality of life after ND.

## Limitations

There are some limitations in the present study. First, the sample size was relatively small. Second, we obtained the operation related data retrospectively based on the information available in the medical records. Moreover, we did not have data concerning possible postoperative irradiation, which might have had impact on the QoL. Third, we did not have baseline QoL assessments and no data concerning the socioeconomic status of the patients nor their access to the health care system including mental health care which all might have had an impact on the QoL.

## Conclusion

Poor QoL assessed five years after ND was related primarily to psychosocial factors and mental well-being, commonly to depression. Chronic comorbidities or operation-related factors did not have impact on the QoL.

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## Conflicts of Interest

All authors declare that they have no conflict of interest.

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