

Health-related quality of life of parotid carcinoma patients—a comparative study with parotid adenoma patients and assessment of the influence of demographic, treatment, and pathological factors

D. Stodulski¹,
R. Świa?tkowska-Stodulska²,
B. Mikaszewski¹, J. Kuczkowski¹

¹Department of Otolaryngology, Medical University of Gdańsk, Gdańsk, Poland;

²Department of Endocrinology and Internal Medicine, Medical University of Gdańsk, Gdańsk, Poland

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Abstract. The aim of this study was to compare the health-related quality of life (HRQoL) of patients treated for parotid carcinoma (PC) and parotid adenoma (PA). The impact of demographic, treatment, and pathological factors was analyzed within the PC group. The EORTC QLQ-C30 and QLQ-H&N35 questionnaires were completed by 45 PC patients and 46 PA patients. A number of HRQoL domains were significantly worse in the PC group than in the PA group: global health status, pain, insomnia, loss of appetite, mouth opening, swallowing problems, dry mouth, sticky saliva, problems with senses and speech, social eating, and cognitive functioning ($P < 0.05$). In the PC group, significantly worse scores were found for age >55 years, radical parotidectomy, neck dissection, radiotherapy, recurrence of the disease, pT3/T4 stage, pN+ status, and high-grade tumour ($P < 0.05$). Worse results were related to global health status, social contact, mouth opening, weight and appetite loss, physical, role, emotional, and social functioning, fatigue, speech problems, social eating, and financial difficulties. The study results demonstrate worse HRQoL in PC patients in comparison to PA patients. Older age, radical parotidectomy, neck dissection, radiotherapy, T3/T4 stage, pN+, high-grade tumours, and recurrence had a significant influence on HRQoL in PC patients.

Key words: parotid gland; quality of life; carcinoma; EORTC QLQ-C30; EORTC QLQ-H&N35; predictive factors.

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The World Health Organization (WHO) has defined quality of life (QoL) as “an individual’s perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns”¹. Schipper introduced the concept of health-related quality of life (HRQoL), which is defined as “the functional effect of an illness and its consequent therapy upon a patient, as perceived by the patient”².

For cases of malignant tumours of the parotid gland and other major salivary glands, the treatment consists of surgery alone or surgery accompanied by adjuvant radiotherapy (RT). The extent of surgical excision depends on the stage of the tumour and may differ regarding the approach to the facial nerve and the structures surrounding the gland (skin, mandible) and neck lymph nodes (neck dissection, ND)^{3,4}. Removal of the parotid gland along with the facial nerve (radical parotidectomy) is a highly mutilating procedure that leads to an unfortunate combination of disturbance of the facial contour, its mobility and skin coverage. Adjuvant RT, which severely increases the negative impact of surgical treatment, is also to be considered⁵.

Parotid carcinoma accounts for only 0.3% of all malignant tumours. It is characterized by a heterogeneous histology and a lack of specific risk factors typical for other head and neck cancers⁶. Publications evaluating QoL in patients with parotid gland carcinoma are scarce as a result of the relative rarity of this disease. Hence the present study was performed to evaluate QoL in patients with parotid gland carcinoma.

Materials and methods

The study was performed with the approval of the local research ethics committee. This HRQoL study was conducted using questionnaires completed by surviving patients selected from those operated on in the department of otolaryngology for primary parotid carcinoma (159 patients) during the years 1992–2015. The control group was selected from 288 patients treated surgically during the years 2011–2015 for parotid adenoma. The impact of demographic factors (sex, age, education, place of residence), factors related to treatment and its results (type of parotidectomy, ND, adjuvant RT, tumour recurrence), and pathological factors (pT, pN, grade, surgical margins) was also analyzed within the carcinoma group. TNM staging was recorded in accordance

with the latest issue of the *TNM Classification of Malignant Tumours* (2017)⁷. Patients with severe psychiatric disorders, severe chronic diseases, and secondary malignancies were excluded from the study. Finally, 280 questionnaires were sent: 80 to the study group, and due to the low response rate, 200 to the control group. All questionnaires, along with a cover letter, were sent to patients by post after previous telephone contact. The study was conducted from March 1 to June 30, 2017.

Treatment protocol

In these cases of parotid carcinoma, the overriding priority of surgical treatment was the radicality of the procedure; however whenever there was the possibility of maintaining the continuity of cranial nerve VII, a conservative parotidectomy was performed. The extent of parenchyma resection depended on the location and size of the tumour. In cases of enlarged lymph nodes, a ND was always performed. Elective ND was performed in patients without clinically enlarged lymph nodes but with T3/T4 stage and/or high-grade tumours. Indications for adjuvant RT were always T3/T4 stage, high grade, neural/perineural invasion, lymphatic/vascular invasion, and pN+. For the first 2 years of follow-up, clinical examinations were performed every 3 months. In the subsequent 3 years (years 3, 4, and 5), the patients were examined every 6 months; they were examined once a year thereafter. During the first 2 years, magnetic resonance imaging (MRI) was performed every 6 months. In the subsequent years, it was performed once a year or immediately in cases of suspected clinical recurrence.

In cases of benign parotid tumours, a conservative parotidectomy was performed in all patients. The extent of parenchymal resection depended on the location of the tumour: superficial lobe (lateral parotidectomy) or deep lobe (total). In the case of a tumour located in the lower part of the superficial lobe, a partial parotidectomy was also performed. ND was not performed in any patient and none of them received RT. Clinical follow-up examinations took place once a year, and if a patient or their physician suspected a recurrence, an MRI examination was performed.

Description of the questionnaires

Questionnaires developed by the European Organisation for Research and Treatment of Cancer (EORTC), based in

Brussels (Belgium), were used to assess QoL. The EORTC quality of life questionnaire (QLQ) is an integrated system for assessing the HRQoL of cancer patients. Standardized questionnaires were used in the appropriate language version. The core questionnaire used was the EORTC QLQ-C30 (version 3.0), common to all patients treated for cancer; the head and neck cancer-specific module EORTC QLQ-H&N35 was also used^{8,9}.

The QLQ-C30 questionnaire is used for a comprehensive examination of the patient’s sense of health and to assess functioning in the physical, emotional, and social dimensions. It contains 30 questions grouped into (a) five functional scales: physical functioning (five questions), role functioning (two questions), emotional functioning (four questions), cognitive functioning (two questions), and social functioning (two questions); (b) three symptoms scales: fatigue (three questions), nausea and vomiting (two questions), and pain (two questions); (c) six individual questions assessing the intensity of the following symptoms/problems: dyspnoea, insomnia, loss of appetite, constipation, diarrhoea, and financial difficulties; and (d) two questions concerning global health status. All questions refer to the patient’s last week. Answers to the questionnaire are available on a 4-point scale (‘not at all’ 1 point, ‘a little’ 2 points, ‘quite a bit’ 3 points, and ‘very much’ 4 points) assessing the severity of each parameter analyzed. The patient is asked to choose one answer for each question.

The QLQ-H&N35 evaluates specific symptoms associated with head and neck cancer and its treatment and contains a total of 35 questions. There are 24 questions for seven issues: pain (four questions), swallowing (four questions), senses (two questions), speech (three questions), social eating (four questions), social contact (five questions), and sexuality (two questions); and 11 individual questions regarding teeth problems, mouth opening, dry mouth, sticky saliva, coughing, feeling ill, pain killers, nutritional supplements, feeding tube use, weight loss, and weight gain. Similar to the core questionnaire, each patient is required to provide one answer on a 4-point scale, except for the last six questions, which require a ‘yes’ or ‘no’ response. Consent was obtained from EORTC for the use of the questionnaires.

Statistical analysis

All calculations were performed using Microsoft Excel version 2010 (Microsoft

Inc., Redmond, WA, USA) and Statistica version 12 (StatSoft, Inc., Tulsa, OK, USA). For the statistical description of quantitative data, the arithmetic mean and median were obtained, as well as the standard deviation and range as general measures of variation. The normality of the distribution of continuous variables and the equality of the variance of the features investigated in the groups were examined using the Shapiro–Wilk test and the equality test of variance, respectively. When comparing quantitative data between two groups, the Student *t*-test was used for parametric data with a normal distribution and homogeneous variance, and the Mann–Whitney *U*-test was used in the case of non-compliance with the above assumptions. In the comparative analysis of a larger number of non-parametric data groups, the Kruskal–Wallis test was used, together with the post hoc multiple com-

parison test (Dunn’s test) as a non-parametric equivalent of analysis of variance (ANOVA). To assess the statistical significance of non-parametric qualitative data differences, tables of contingency for the variables compared were constructed, after which, depending on the sizes of the samples and expected numbers, the Pearson χ^2 test or the highest credibility method, the Yates test or Fisher’s exact test, was used. In all statistical tests, $P < 0.05$ was assumed as the level of statistical significance of differences.

Results

For the parotid carcinoma group of patients, 45 completed questionnaires were returned out of the 80 questionnaires sent out (56%). In the control group (patients with parotid adenoma), only 46 of the 200 questionnaires sent out were

returned (23%). The time period since the end of treatment ranged from 2 to 14 years (mean 6.8 ± 5.3 , median 4 years) for the carcinoma patients, and from 1 to 3 years (mean 2.3 ± 0.7 , median 2 years) for the adenoma patients.

The average age of patients in the carcinoma group was 58.3 ± 19.2 years and in the adenoma group was 52.2 ± 17.0 years. The proportion of female patients was higher than male patients in both groups (carcinoma 60%, adenoma 52.2% female). All patients were treated surgically. The main difference between the two groups was the scope of treatment for some of the patients with cancer: cranial nerve VII resection (31.1%), ND (51.1%), and the application of adjuvant RT (62.2%). There were no statistically significant differences ($P > 0.05$) in demographic data or clinicopathological data for patients who completed the questionnaire and those who did not between the carcinoma and adenoma groups. The clinical and pathological data of the patients examined are presented in Table 1.

Table 1. Clinicopathological features of patients with parotid carcinoma and adenoma.

Clinicopathological features	Parotid carcinoma <i>n</i> = 45 (%)	Parotid adenoma <i>n</i> = 46 (%)
Mean age (years)	58.3 ± 19.2	52.2 ± 17.0
Sex		
Male	18 (40)	22 (47.8)
Female	27 (60)	24 (52.2)
Education		
Vocational	11 (28.2)	12 (28.6)
Secondary	11 (28.2)	15 (35.7)
University	17 (43.6)	15 (35.7)
No data	6	4
Place of residence		
Countryside	11 (24.4)	12 (26.1)
Small/average town	12 (26.7)	9 (19.6)
Large town	22 (48.9)	25 (54.3)
Parotidectomy		
Total radical	14 (31.1)	0
Total conservative	3 (6.7)	10 (21.7)
Lateral conservative	28 (62.2)	34 (73.9)
Partial conservative	0	2 (4.4)
Neck dissection	23 (51.1)	0
Complementary radiotherapy	28 (62.2)	0
Resection		
R0	12 (26.7)	23 (50)
R0 (close margin)	22 (48.9)	23 (50)
R1	11 (24.4)	0
Facial nerve palsy		
Preoperative	6 (13.3)	0
Postoperative		
Transient	16 (35.6)	17 (37.0)
Permanent	14 (31.1)	0
pT stage		
pT1 (<2 cm for adenomas)	11 (24.4)	21 (45.7)
pT2 (2–4 cm for adenomas)	16 (35.6)	24 (52.2)
pT3 (>4 cm for adenomas)	8 (17.8)	1 (2.2)
pT4a	10 (22.2)	–
pN stage		
pN (–)	31 (68.9)	–
pN (+)	14 (31.1)	–
Grade		
Low	26 (57.8)	–
High	19 (42.2)	–
Recurrence	7 (15.5)	0

HRQoL in patients with parotid carcinoma vs. adenoma (Table 2)

Statistically significant differences between the groups were found for 13 of 33 parameters, including global health status and 10 symptoms. In terms of QLQ-C30 global health, the carcinoma group scored 58.3 ± 20.9 and the adenoma group scored 67.2 ± 22.5 . With regard to the functional scales, a statistically significant difference between the groups was shown only for cognitive functioning (72.2 ± 27.5 vs. 85.5 ± 21.8). Among the symptom scales of the QLQ-C30 questionnaire, patients with carcinoma showed worse scores for insomnia (37.0 ± 28.6 vs. 24.6 ± 32.5) and loss of appetite (25.1 ± 24.7 vs. $13.7 \pm 23, 9$), while for the QLQ-H&N35 questionnaire, these patients showed worse scores for pain (22.7 ± 23.7 vs. 9.9 ± 15.8), swallowing problems (19.2 ± 25.2 vs. 5.6 ± 12.3), mouth opening problems (42.9 ± 38.0 vs. 8.6 ± 19.1), dry mouth (48.8 ± 37.3 vs. 24.6 ± 30.1), and sticky saliva (34.8 ± 36.2 vs. 14.4 ± 24.9). Significant differences with worse scores in carcinoma patients were found for problems with the senses (19.6 ± 24.1 vs. 6.8 ± 17.42), speech problems (20.4 ± 21.3 vs. 11.1 ± 15.8), social eating (20.9 ± 25.1 vs. 9.6 ± 22.4), and nutritional supplements (42.2 ± 49.9 vs. 76.0 ± 43.1).

HRQoL in relation to demographic data in patients with parotid carcinoma (Table 3)

A statistically significant difference in physical functioning was found between age groups ≤ 55 and > 55 years (53.4 ± 23.9 vs. 77.9 ± 24.9). There were no significant differences between the sexes, education levels (secondary/university vs. primary/vocational), or place of residence (town vs. countryside).

HRQoL in relation to treatment data and outcome in patients with parotid carcinoma (Table 4)

A better general HRQoL status was reported by those who had a conservative parotidectomy compared to those who underwent radical parotidectomy (64.5 ± 19.8 vs. 44.6 ± 16.9), those who

did not have a ND compared to those who underwent ND (65.1 ± 18.1 vs. 51.8 ± 21.8), and those who did not receive adjuvant RT compared to those who received adjuvant RT (67.6 ± 16.4 vs. 52.6 ± 21.6). These findings were statistically significant. In addition, radical parotidectomy affected only the score for social contact (30.4 ± 24.6 vs. 14.1 ± 21.1), and patients after ND had worse scores for social functioning (69.5 ± 25.9 vs. 85.6 ± 24.3) and weight loss (56.5 ± 50.7 vs. 90.9 ± 29.4).

Recurrence of the disease was associated with significantly worse scores for role functioning (14.2 ± 37.8 vs. 64.8 ± 42.3), fatigue (49.2 ± 15.5 vs. 31.2 ± 23.4), loss of appetite (42.8 ± 16.3 vs. 21.9 ± 24.8), social contact (31.4 ± 15.3 vs. 17.0 ± 23.9), and mouth opening (76.1 ± 37.1 vs. 36.8 ± 35.3).

Table 2. Health-related quality of life: patients with parotid carcinoma compared to those with parotid adenoma.

	Parotid carcinoma	Parotid adenoma	P-value
QLQ-C30			
Global health status/QoL	58.3 ± 20.9	67.2 ± 22.5	<0.05
Functional scales (higher score indicates better QoL)			
Physical functioning	64.2 ± 27.0	69.3 ± 29.1	NS
Role functioning	56.8 ± 45.2	75.5 ± 36.7	NS
Emotional functioning	62.5 ± 25.0	70.6 ± 28.0	NS
Cognitive functioning	72.2 ± 27.5	85.5 ± 21.8	<0.05
Social functioning	77.4 ± 26.1	82.9 ± 27.7	NS
Symptom scales/items (lower score indicates better QoL)			
Fatigue	34.0 ± 23.1	29.7 ± 26.0	NS
Nausea and vomiting	7.0 ± 13.9	6.5 ± 15.5	NS
Pain	25.5 ± 24.7	19.9 ± 27.3	NS
Dyspnoea	13.3 ± 22.9	20.2 ± 34.0	NS
Insomnia	37.0 ± 28.6	24.6 ± 32.5	<0.05
Loss of appetite	25.1 ± 24.7	13.7 ± 23.9	<0.05
Constipation	25.9 ± 30.0	22.4 ± 27.2	NS
Diarrhoea	7.4 ± 15.8	11.5 ± 22.4	NS
Financial difficulties	21.4 ± 31.9	13.7 ± 25.8	NS
QLQ-H&N35			
(Lower score indicates better QoL)			
Pain	22.7 ± 23.7	9.9 ± 15.8	<0.05
Swallowing	19.2 ± 25.2	5.6 ± 12.3	<0.05
Problems with senses	19.6 ± 24.1	6.8 ± 17.4	<0.05
Speech problems	20.4 ± 21.3	11.1 ± 15.8	<0.05
Trouble with social eating	20.9 ± 25.1	9.6 ± 22.4	<0.05
Trouble with social contact	19.2 ± 23.2	10.2 ± 14.9	NS
Reduced sexuality	34.8 ± 38.3	35.8 ± 35.9	NS
Teeth	26.6 ± 34.5	19.5 ± 27.7	NS
Mouth opening	42.9 ± 38.0	8.6 ± 19.1	<0.05
Dry mouth	48.8 ± 37.3	24.6 ± 30.1	<0.05
Sticky saliva	34.8 ± 36.2	14.4 ± 24.9	<0.05
Coughing	21.4 ± 21.5	25.3 ± 27.3	NS
(Higher score indicates better QoL)			
Felt ill	30.3 ± 28.2	21.7 ± 26.4	NS
Pain killers	53.3 ± 50.4	54.3 ± 50.3	NS
Nutritional supplements	42.2 ± 49.9	76.0 ± 43.1	<0.05
Feeding tube	95.5 ± 20.8	100.0 ± 0.0	NS
Weight loss	73.3 ± 44.7	86.9 ± 34.0	NS
Weight gain	68.8 ± 46.8	71.7 ± 45.5	NS

EORTC, European Organisation for Research and Treatment of Cancer; NS, not significant; QoL, quality of life; QLQ-C30, the EORTC core quality of life questionnaire; QLQ-H&N35, the EORTC quality of life questionnaire head and neck cancer module.

Receiving adjuvant RT had the greatest impact on QoL. In addition to the deterioration in global HRQoL status, those receiving postoperative RT showed poorer scores in social functioning (67.2 ± 25.9 vs. 94.1 ± 16.6), speech problems (26.1 ± 22.7 vs. 11.1 ± 13.0), financial difficulties (30.9 ± 29.7 vs. 5.8 ± 17.6), social contact (27.3 ± 23.9 vs. 5.8 ± 10.5), mouth opening (57.1 ± 36.1 vs. 19.6 ± 29.0), and weight loss (57.1 ± 50.4 vs. 100.0 ± 0.0) than those who did not receive RT ($P < 0.05$).

HRQoL in relation to pathological data in patients with parotid carcinoma (Table 5)

A higher T-stage (T3 + T4 vs. T1 + T2; 47.2 ± 20.8 vs. 65.7 ± 17.8), the presence of metastases to the neck lymph nodes (pN(+) vs. pN(-); 41.6 ± 11.3 vs. 65.8 ± 20.0), and a high tumour grade (high grade vs. low grade; 51.3 ± 22.4 vs. 63.4 ± 18.6) had a significant negative impact on global health status. Patients with a higher T-stage had worse scores in emotional functioning (53.7 ± 24.8 vs. 68.5 ± 23.8), social functioning (66.6 ± 26.8 vs. 84.5 ± 23.5), social contact (28.5 ± 25.3 vs. 13.0 ± 19.9), and mouth opening (57.4 ± 31.9 vs. 33.3 ± 39.2) and a higher percentage of weight loss (50.0 ± 51.4 vs. 88.8 ± 32.0). The presence of lymph node metastases (pN(+) vs. pN(-)) was associated with worse scores for social eating (32.7 ± 28.2 vs. 15.5 ± 22.0) and weight loss (42.8 ± 51.4 vs. 87.0 ± 34.1). High-grade tumours had a statistically significant influence on scores for speech problems (28.0 ± 24.4 vs. 14.9 ± 17.2) and weight loss (52.6 ± 51.3 vs. 88.4 ± 32.6). A positive microscopic surgical margin (R1) did not significantly affect QoL, except for more frequent use of nutritional supplements (9.0 ± 30.2 vs. 52.9 ± 50.7).

Discussion

It was decided to use the EORTC QLQ-C30 and QLQ-H&N35 questionnaires in this study. These have been tested in numerous studies and were used in the appropriate language version. Questions in these surveys are not specific to parotid tumours and their treatment, but they can illustrate the disorders associated with them, e.g. the association between facial palsy and problems in social contact/eating or sexuality, and the association between RT and sticky saliva¹⁰⁻¹⁴. Unfortunately, only a few studies on parotid tumours have used the EORTC questionnaire. The remaining studies have

Table 3. Health-related quality of life in relation to demographic data in patients with parotid carcinoma.

	Sex			Age, >years			Education ^a			Residence		
	Male	Female	P-value	≤55	>55	P-value	Higher	Lower	P-value	Town	Country	P-value
QLQ-C30												
Global health status	56.9 ± 22.4	59.2 ± 22.5	NS	53.5 ± 20.0	64.9 ± 20.9	NS	55.9 ± 18.5	60.6 ± 25.8	NS	57.8 ± 20.9	59.8 ± 22.0	NS
Functional scales (higher score indicates better QoL)												
Physical functioning	57.8 ± 27.1	68.7 ± 28.4	NS	53.4 ± 23.9	77.9 ± 24.9	<0.05	64.7 ± 23.9	60.6 ± 30.3	NS	64.8 ± 26.5	62.4 ± 29.6	NS
Role functioning	63.8 ± 44.1	51.9 ± 29.2	NS	54.0 ± 45.5	60.5 ± 45.9	NS	59.2 ± 48.1	45.4 ± 41.6	NS	57.5 ± 45.3	54.5 ± 47.2	NS
Emotional functioning	64.8 ± 24.0	61.1 ± 30.6	NS	59.6 ± 26.2	66.6 ± 23.4	NS	60.4 ± 27.6	61.3 ± 21.5	NS	63.2 ± 25.7	60.6 ± 23.9	NS
Cognitive functioning	73.1 ± 16.6	71.6 ± 25.8	NS	66.0 ± 28.5	80.7 ± 24.4	NS	72.6 ± 28.4	63.6 ± 28.7	NS	74.0 ± 27.3	66.6 ± 28.9	NS
Social functioning	81.4 ± 26.2	74.6 ± 29.7	NS	75.0 ± 26.4	80.7 ± 26.2	NS	74.4 ± 27.8	75.7 ± 25.1	NS	78.9 ± 27.0	72.7 ± 23.9	NS
Symptom scales/items (lower score indicates better QoL)												
Fatigue	30.8 ± 27.0	36.2 ± 25.1	NS	32.9 ± 20.5	35.6 ± 26.9	NS	33.7 ± 23.9	38.3 ± 27.4	NS	33.0 ± 21.4	37.3 ± 28.7	NS
Nausea/vomiting	6.4 ± 9.2	7.4 ± 19.7	NS	8.3 ± 16.5	5.2 ± 9.7	NS	5.9 ± 13.8	12.1 ± 16.8	NS	5.8 ± 12.9	10.6 ± 17.1	NS
Pain	28.7 ± 23.3	23.4 ± 30.7	NS	28.2 ± 28.2	21.9 ± 19.3	NS	25.5 ± 27.0	28.7 ± 24.8	NS	24.5 ± 25.4	28.7 ± 23.7	NS
Dyspnoea	9.2 ± 35.1	16.0 ± 33.8	NS	14.1 ± 25.3	12.2 ± 19.9	NS	13.0 ± 22.8	18.1 ± 27.3	NS	11.7 ± 21.5	18.1 ± 27.3	NS
Insomnia	37.0 ± 26.7	37.0 ± 36.1	NS	41.0 ± 30.3	31.5 ± 26.0	NS	35.7 ± 27.1	45.4 ± 34.2	NS	38.2 ± 26.1	33.3 ± 36.5	NS
Loss of appetite	27.7 ± 21.9	23.4 ± 26.0	NS	29.4 ± 27.2	19.2 ± 20.2	NS	22.6 ± 24.1	36.3 ± 27.7	NS	21.5 ± 23.0	36.3 ± 27.7	NS
Constipation	27.7 ± 22.4	24.6 ± 30.0	NS	32.0 ± 33.3	17.5 ± 23.2	NS	23.8 ± 28.5	39.3 ± 36.0	NS	23.5 ± 30.2	33.3 ± 29.8	NS
Diarrhoea	7.4 ± 22.2	7.4 ± 23.0	NS	8.9 ± 17.8	5.2 ± 12.5	NS	5.9 ± 15.9	12.1 ± 16.8	NS	6.8 ± 16.0	9.0 ± 15.6	NS
Financial difficulties	16.6 ± 17.6	24.6 ± 31.0	NS	21.7 ± 31.2	21.0 ± 33.7	NS	21.4 ± 34.2	24.2 ± 30.2	NS	21.5 ± 32.7	21.2 ± 30.8	NS
QLQ-H&N35												
(Lower score indicates better QoL)												
Pain	25.0 ± 12.8	21.2 ± 18.2	NS	24.6 ± 26.8	20.1 ± 19.1	NS	25.0 ± 24.7	25.7 ± 24.6	NS	22.5 ± 23.4	23.4 ± 25.8	NS
Swallowing	18.0 ± 13.5	20.0 ± 11.3	NS	20.1 ± 21.9	17.9 ± 29.8	NS	22.9 ± 26.7	19.6 ± 25.4	NS	20.8 ± 26.2	14.3 ± 22.4	NS
Problems with senses	22.2 ± 19.8	17.9 ± 15.3	NS	21.1 ± 26.5	17.5 ± 21.1	NS	23.2 ± 26.2	15.1 ± 15.7	NS	20.5 ± 26.6	16.6 ± 14.9	NS
Speech problems	22.8 ± 14.7	18.9 ± 17.1	NS	22.2 ± 24.5	18.1 ± 16.2	NS	21.0 ± 19.9	27.2 ± 26.5	NS	18.6 ± 19.1	26.2 ± 27.3	NS
Social eating problems	22.6 ± 23.9	19.7 ± 21.4	NS	22.7 ± 25.9	18.4 ± 24.5	NS	24.1 ± 26.7	23.4 ± 24.1	NS	18.8 ± 25.2	27.2 ± 24.7	NS
Social contact problems	15.1 ± 11.9	21.9 ± 17.4	NS	18.9 ± 21.7	19.6 ± 25.8	NS	21.9 ± 26.3	21.2 ± 17.8	NS	18.0 ± 24.6	23.0 ± 18.7	NS
Reduced sexuality	27.7 ± 35.7	39.7 ± 37.0	NS	43.3 ± 40.8	23.6 ± 32.5	NS	38.0 ± 39.0	28.7 ± 38.1	NS	34.8 ± 38.9	34.8 ± 38.3	NS
Teeth	22.2 ± 26.5	29.6 ± 29.4	NS	29.4 ± 34.4	22.8 ± 35.2	NS	33.3 ± 38.5	15.1 ± 22.9	NS	28.4 ± 37.7	21.2 ± 22.5	NS
Mouth opening	37.0 ± 7.1	46.9 ± 24.0	NS	35.8 ± 33.9	52.6 ± 42.0	NS	46.4 ± 38.9	51.5 ± 37.6	NS	38.2 ± 36.8	57.5 ± 39.7	NS
Dry mouth	53.7 ± 28.6	45.6 ± 31.0	NS	57.6 ± 37.2	36.8 ± 35.0	NS	53.5 ± 37.8	45.4 ± 40.2	NS	49.0 ± 36.0	48.4 ± 43.1	NS
Sticky saliva	35.1 ± 24.5	34.5 ± 26.0	NS	34.6 ± 38.3	35.0 ± 34.2	NS	38.0 ± 38.2	36.3 ± 34.8	NS	34.3 ± 37.1	36.3 ± 34.8	NS
Coughing	20.3 ± 21.3	22.2 ± 32.1	NS	23.0 ± 24.5	19.2 ± 16.9	NS	20.2 ± 21.0	30.3 ± 23.4	NS	20.5 ± 20.1	24.2 ± 26.2	NS
(Higher score indicates better QoL)												
Felt ill	25.9 ± 24.6	33.3 ± 28.2	NS	33.3 ± 29.8	26.3 ± 26.2	NS	32.1 ± 27.9	36.3 ± 31.5	NS	28.4 ± 27.4	36.3 ± 31.5	NS
Pain killers	66.6 ± 51.0	44.4 ± 50.9	NS	61.5 ± 49.6	42.1 ± 50.7	NS	50.0 ± 50.9	45.4 ± 52.2	NS	55.8 ± 50.4	45.4 ± 52.2	NS
Nutritional supplements	50.0 ± 45.6	37.0 ± 41.5	NS	34.6 ± 48.5	52.6 ± 51.3	NS	46.7 ± 50.8	45.4 ± 52.2	NS	41.1 ± 50.0	45.4 ± 52.2	NS
Feeding tube	94.4 ± 0.0	96.2 ± 0.0	NS	92.3 ± 27.2	100.0 ± 0.0	NS	96.4 ± 18.9	90.9 ± 30.2	NS	97.0 ± 17.1	90.9 ± 30.2	NS
Weight loss	72.2 ± 29.4	74.0 ± 38.1	NS	69.2 ± 47.1	78.9 ± 41.9	NS	71.4 ± 46.0	63.6 ± 50.5	NS	76.9 ± 43.1	63.6 ± 50.5	NS
Weight gain	66.6 ± 35.1	70.3 ± 50.4	NS	65.3 ± 48.5	73.6 ± 45.2	NS	75.0 ± 44.1	54.5 ± 52.2	NS	70.5 ± 46.2	63.6 ± 50.5	NS

EORTC, European Organisation for Research and Treatment of Cancer; NS, not significant; QoL, quality of life; QLQ-C30, the EORTC core quality of life questionnaire; QLQ-H&N35, the EORTC quality of life questionnaire head and neck cancer module.

^a Higher = secondary/university; Lower = primary/vocational.

Table 4. Health-related quality of life in relation to treatment data and outcome in patients with parotid carcinoma.

	Parotidectomy			Neck dissection			Radiotherapy			Recurrence		
	Radical	Conservative	<i>P</i> -value	Yes	No	<i>P</i> -value	Yes	No	<i>P</i> -value	Yes	No	<i>P</i> -value
QLQ-C30												
Global health status	44.6 ± 16.9	64.5 ± 19.8	<0.05	51.8 ± 21.8	65.1 ± 18.1	<0.05	52.6 ± 21.6	67.6 ± 16.4	<0.05	59.5 ± 23.3	58.1 ± 20.8	NS
Functional scales (higher score indicates better QoL)												
Physical functioning	52.4 ± 23.4	68.5 ± 27.3	NS	60.5 ± 24.9	67.7 ± 29.0	NS	59.4 ± 25.6	71.6 ± 28.3	NS	47.7 ± 28.7	67.0 ± 26.1	NS
Role functioning	53.8 ± 47.7	58.0 ± 44.9	NS	61.3 ± 43.5	52.2 ± 47.5	NS	50.0 ± 46.0	67.6 ± 43.1	NS	14.2 ± 37.8	64.8 ± 42.3	< 0.05
Emotional functioning	57.1 ± 21.6	65.0 ± 26.4	NS	56.1 ± 25.9	69.3 ± 22.8	NS	57.1 ± 26.1	71.5 ± 20.8	NS	57.1 ± 15.5	63.5 ± 26.5	NS
Cognitive functioning	66.6 ± 30.0	74.7 ± 26.5	NS	66.6 ± 29.7	78.0 ± 24.3	NS	68.4 ± 28.8	78.4 ± 24.8	NS	73.8 ± 16.3	71.9 ± 29.3	NS
Social functioning	67.8 ± 24.0	81.7 ± 26.3	NS	69.5 ± 25.9	85.6 ± 24.3	<0.05	67.2 ± 25.9	94.1 ± 16.6	<0.05	66.6 ± 27.2	79.3 ± 25.8	NS
Symptom scales/items (lower score indicates better QoL)												
Fatigue	38.0 ± 22.5	32.2 ± 23.5	NS	35.7 ± 25.3	32.3 ± 21.1	NS	39.6 ± 24.5	24.8 ± 17.8	NS	49.2 ± 15.5	31.2 ± 23.4	<0.05
Nausea/vomiting	3.5 ± 9.6	8.6 ± 15.4	NS	5.0 ± 11.7	9.0 ± 16.0	NS	6.5 ± 12.3	7.8 ± 16.8	NS	9.5 ± 13.1	6.5 ± 14.3	NS
Pain	35.7 ± 31.9	20.9 ± 19.7	NS	31.8 ± 28.4	18.9 ± 18.8	NS	30.3 ± 26.9	17.6 ± 19.1	NS	30.8 ± 15.0	24.5 ± 26.2	NS
Dyspnoea	9.5 ± 15.6	15.0 ± 25.6	NS	11.5 ± 21.6	15.1 ± 24.6	NS	14.2 ± 23.0	11.7 ± 23.4	NS	14.2 ± 26.2	13.1 ± 22.6	NS
Insomnia	35.7 ± 27.6	37.6 ± 29.5	NS	42.0 ± 32.1	31.8 ± 24.1	NS	39.2 ± 30.2	33.3 ± 26.4	NS	52.3 ± 26.2	34.3 ± 28.5	NS
Loss of appetite	30.9 ± 30.6	22.5 ± 21.8	NS	30.4 ± 28.3	19.6 ± 19.7	NS	32.1 ± 24.8	13.7 ± 16.9	< 0.05	42.8 ± 16.3	21.9 ± 24.8	< 0.05
Constipation	28.5 ± 31.6	24.7 ± 29.8	NS	28.9 ± 32.3	22.7 ± 28.0	NS	29.7 ± 31.4	19.6 ± 31.3	NS	28.5 ± 23.0	25.4 ± 31.4	NS
Diarrhoea	4.7 ± 12.1	8.6 ± 17.1	NS	4.3 ± 11.5	10.6 ± 18.9	NS	7.1 ± 15.8	7.8 ± 18.7	NS	9.5 ± 16.3	7.0 ± 15.8	NS
Financial difficulties	33.3 ± 37.0	16.1 ± 28.4	NS	24.6 ± 32.1	18.1 ± 32.1	NS	30.9 ± 29.7	5.8 ± 17.6	<0.05	38.0 ± 40.5	18.4 ± 29.7	NS
QLQ-H&N35												
(Lower score indicates better QoL)												
Pain	22.6 ± 25.0	22.8 ± 23.6	NS	23.5 ± 25.5	21.9 ± 22.4	NS	24.4 ± 24.9	20.0 ± 19.3	NS	22.6 ± 17.2	22.8 ± 24.9	NS
Swallowing	20.2 ± 21.9	18.8 ± 27.0	NS	19.2 ± 22.5	19.3 ± 28.3	NS	21.4 ± 26.3	15.6 ± 27.8	NS	21.4 ± 20.3	18.8 ± 26.3	NS
Problems with senses	20.2 ± 22.8	19.3 ± 25.1	NS	24.6 ± 26.5	14.3 ± 20.8	NS	21.4 ± 25.4	16.6 ± 28.9	NS	19.0 ± 17.8	19.7 ± 25.4	NS
Speech problems	27.7 ± 19.9	17.2 ± 21.4	NS	23.1 ± 25.1	17.6 ± 16.7	NS	26.1 ± 22.7	11.1 ± 13.0	<0.05	23.8 ± 11.9	19.8 ± 22.7	NS
Social eating problems	31.5 ± 27.0	16.1 ± 23.1	NS	23.4 ± 26.5	17.8 ± 23.8	NS	26.7 ± 25.0	11.2 ± 20.2	NS	34.5 ± 22.3	18.4 ± 25.0	NS
Social contact problems	30.4 ± 24.6	14.1 ± 21.1	<0.05	20.5 ± 22.9	17.8 ± 24.0	NS	27.3 ± 23.9	5.8 ± 10.5	<0.05	31.4 ± 15.3	17.0 ± 23.9	<0.05
Reduced sexuality	41.6 ± 48.4	31.6 ± 33.1	NS	40.5 ± 43.8	28.5 ± 31.2	NS	40.4 ± 37.6	25.0 ± 25.1	NS	45.2 ± 43.8	32.8 ± 37.6	NS
Teeth	38.0 ± 43.1	21.5 ± 29.2	NS	33.3 ± 36.2	19.6 ± 32.0	NS	34.5 ± 33.7	13.7 ± 20.6	NS	23.8 ± 41.8	27.1 ± 33.7	NS
Mouth opening	57.1 ± 35.6	36.5 ± 37.9	NS	43.4 ± 32.5	42.2 ± 43.9	NS	57.1 ± 36.1	19.6 ± 29.0	<0.05	76.1 ± 37.1	36.8 ± 35.3	<0.05
Dry mouth	52.3 ± 33.9	47.3 ± 39.2	NS	52.1 ± 37.4	45.4 ± 37.9	NS	55.9 ± 38.5	37.2 ± 33.1	NS	42.8 ± 37.1	50.0 ± 37.8	NS
Sticky saliva	35.7 ± 40.2	34.4 ± 34.9	NS	36.2 ± 38.8	33.3 ± 34.1	NS	40.4 ± 39.9	25.4 ± 27.7	NS	52.3 ± 32.5	31.5 ± 36.3	NS
Coughing	11.9 ± 16.6	25.8 ± 22.3	NS	18.8 ± 24.3	24.2 ± 18.3	NS	20.2 ± 22.8	23.5 ± 19.6	NS	19.0 ± 17.8	21.9 ± 22.3	NS
(Higher score indicates better QoL)												
Felt ill	40.4 ± 32.5	25.8 ± 25.4	NS	34.7 ± 30.9	25.7 ± 25.1	NS	36.9 ± 30.5	19.6 ± 20.6	NS	47.6 ± 32.5	27.8 ± 26.7	NS
Pain killers	42.8 ± 51.4	58.0 ± 50.2	NS	52.1 ± 51.1	54.5 ± 51.0	NS	42.8 ± 50.4	70.5 ± 47.0	NS	14.2 ± 37.8	60.5 ± 49.5	NS
Nutritional supplements	42.8 ± 51.4	41.9 ± 50.2	NS	47.8 ± 51.1	36.3 ± 49.2	NS	39.2 ± 49.7	47.0 ± 51.4	NS	28.5 ± 48.8	44.7 ± 50.4	NS
Feeding tube	85.7 ± 36.3	100.0 ± 0.0	NS	91.3 ± 28.8	100.0 ± 0.0	NS	92.8 ± 26.2	100.0 ± 0.0	NS	85.7 ± 37.8	97.3 ± 16.2	NS
Weight loss	57.1 ± 51.4	80.6 ± 40.2	NS	56.5 ± 50.7	90.9 ± 29.4	<0.05	57.1 ± 50.4	100.0 ± 0.0	<0.05	42.8 ± 53.5	78.9 ± 41.3	NS
Weight gain	64.2 ± 49.7	70.9 ± 46.1	NS	65.2 ± 48.7	72.7 ± 45.6	NS	67.8 ± 47.6	70.5 ± 47.0	NS	71.4 ± 48.8	68.4 ± 47.1	NS

EORTC, European Organisation for Research and Treatment of Cancer; NS, not significant; QoL, quality of life; QLQ-C30, the EORTC core quality of life questionnaire; QLQ-H&N35, the EORTC quality of life questionnaire head and neck cancer module.

Table 5. HRQoL in relation to pathological data in patients with parotid carcinoma.

	pT			pN			Grade			Surgical margin		
	T1+T2	T3+T4	P-value	(+)	(-)	P-value	Low	High	P-value	R0	R1	P-value
QLQ-C30												
Global health status	65.7 ± 17.8	47.2 ± 20.8	<0.05	41.6 ± 11.3	65.8 ± 20.0	<0.05	63.4 ± 18.6	51.3 ± 22.4	<0.05	59.0 ± 19.1	56.0 ± 26.9	NS
Functional scales (higher score indicates better QoL)												
Physical functioning	66.5 ± 27.9	60.2 ± 25.8	NS	55.4 ± 22.8	67.4 ± 28.1	NS	64.6 ± 28.4	63.5 ± 25.6	NS	63.0 ± 28.1	68.0 ± 24.3	NS
Role functioning	57.4 ± 45.4	55.8 ± 46.4	NS	57.6 ± 44.9	56.4 ± 46.1	NS	53.8 ± 46.7	61.1 ± 43.9	NS	59.0 ± 45.9	50.0 ± 44.7	NS
Emotional functioning	68.5 ± 23.8	53.7 ± 24.8	<0.05	54.7 ± 22.3	66.1 ± 25.7	NS	66.3 ± 24.3	57.4 ± 25.7	NS	63.7 ± 24.2	59.0 ± 28.5	NS
Cognitive functioning	78.3 ± 24.4	62.9 ± 30.0	NS	64.2 ± 27.6	75.8 ± 27.2	NS	69.8 ± 28.3	75.4 ± 26.9	NS	71.5 ± 29.5	74.2 ± 21.6	NS
Social functioning	84.5 ± 23.5	66.6 ± 26.8	<0.05	66.6 ± 24.5	82.2 ± 25.8	NS	83.3 ± 25.8	69.2 ± 25.0	NS	77.4 ± 25.9	77.2 ± 28.2	NS
Symptom scales/items (lower score indicates better QoL)												
Fatigue	29.6 ± 21.4	40.7 ± 24.7	NS	36.5 ± 21.5	32.9 ± 24.1	NS	33.7 ± 22.1	34.5 ± 25.1	NS	30.3 ± 21.9	45.4 ± 24.1	NS
Nausea/vomiting	8.0 ± 14.9	5.5 ± 12.8	NS	2.3 ± 6.0	9.1 ± 16.0	NS	8.9 ± 16.5	4.3 ± 9.4	NS	8.3 ± 15.5	3.0 ± 6.7	NS
Pain	19.7 ± 18.5	34.2 ± 30.5	NS	36.9 ± 32.1	20.4 ± 19.1	NS	21.1 ± 19.8	31.5 ± 29.9	NS	24.5 ± 26.0	28.8 ± 21.2	NS
Dyspnoea	9.8 ± 20.3	18.5 ± 26.1	NS	7.1 ± 14.2	16.1 ± 25.6	NS	14.1 ± 25.3	12.2 ± 19.9	NS	12.7 ± 21.7	15.1 ± 27.3	NS
Insomnia	32.0 ± 25.3	44.4 ± 32.3	NS	35.7 ± 27.6	37.6 ± 29.5	NS	39.7 ± 29.8	33.3 ± 27.2	NS	34.3 ± 26.6	45.4 ± 34.2	NS
Loss of appetite	18.5 ± 19.2	35.1 ± 29.1	NS	33.3 ± 32.0	21.5 ± 20.3	NS	23.0 ± 20.6	28.0 ± 29.9	NS	22.5 ± 24.2	33.3 ± 25.8	NS
Constipation	20.9 ± 28.0	33.3 ± 32.3	NS	30.9 ± 33.2	23.6 ± 28.8	NS	25.6 ± 30.3	26.3 ± 30.6	NS	24.5 ± 28.8	30.3 ± 34.8	NS
Diarrhoea	8.6 ± 17.5	5.5 ± 12.8	NS	2.3 ± 8.9	9.6 ± 17.6	NS	10.2 ± 18.3	3.5 ± 10.5	NS	8.8 ± 17.0	3.0 ± 10.1	NS
Financial difficulties	16.0 ± 29.8	29.6 ± 34.1	NS	30.9 ± 35.7	17.2 ± 29.7	NS	14.1 ± 28.6	31.5 ± 34.2	NS	22.5 ± 34.5	18.1 ± 22.9	NS
QLQ-H&N35												
(Lower score indicates better QoL)												
Pain	22.2 ± 23.7	23.6 ± 24.5	NS	26.7 ± 27.6	20.9 ± 22.0	NS	22.1 ± 23.0	23.6 ± 25.3	NS	25.7 ± 25.8	13.6 ± 12.5	NS
Swallowing	16.9 ± 27.5	22.6 ± 21.7	NS	24.4 ± 23.2	16.9 ± 26.1	NS	17.6 ± 27.3	21.4 ± 22.6	NS	19.3 ± 26.3	18.9 ± 22.7	NS
Problems with senses	17.2 ± 25.5	23.1 ± 22.2	NS	22.6 ± 22.3	18.2 ± 25.2	NS	19.2 ± 26.1	20.1 ± 21.9	NS	20.5 ± 26.0	16.6 ± 18.3	NS
Speech problems	16.4 ± 21.4	26.5 ± 20.2	NS	29.3 ± 26.0	16.4 ± 17.9	NS	14.9 ± 17.2	28.0 ± 24.4	<0.05	21.5 ± 22.7	17.1 ± 16.8	NS
Social eating problems	16.9 ± 24.4	26.8 ± 25.7	NS	32.7 ± 28.2	15.5 ± 22.0	<0.05	16.6 ± 22.6	26.7 ± 27.7	NS	21.8 ± 26.6	18.1 ± 20.7	NS
Social contact problems	13.0 ± 19.9	28.5 ± 25.3	<0.05	25.2 ± 21.7	16.5 ± 23.7	NS	14.1 ± 20.3	26.3 ± 25.6	NS	17.2 ± 21.6	25.4 ± 27.9	NS
Reduced sexuality	30.1 ± 32.3	41.6 ± 45.8	NS	46.4 ± 47.2	29.4 ± 33.0	NS	35.3 ± 33.1	34.2 ± 45.3	NS	35.8 ± 38.4	31.8 ± 39.8	NS
Teeth	19.7 ± 29.6	37.0 ± 39.4	NS	40.4 ± 41.7	20.4 ± 29.4	NS	20.5 ± 28.4	35.0 ± 40.8	NS	28.4 ± 35.9	21.2 ± 30.8	NS
Mouth opening	33.3 ± 39.2	57.4 ± 31.9	<0.05	52.3 ± 31.2	38.7 ± 40.5	NS	35.8 ± 39.9	52.6 ± 33.9	NS	37.2 ± 38.3	60.6 ± 32.7	NS
Dry mouth	41.9 ± 36.5	59.2 ± 37.1	NS	59.5 ± 35.0	44.0 ± 37.9	NS	44.8 ± 38.8	54.3 ± 35.5	NS	50.0 ± 36.9	45.4 ± 40.2	NS
Sticky saliva	32.0 ± 35.2	38.8 ± 38.3	NS	38.0 ± 43.1	33.3 ± 33.3	NS	29.4 ± 31.7	42.1 ± 41.3	NS	35.2 ± 37.6	33.3 ± 33.3	NS
Coughing	23.4 ± 20.3	18.5 ± 23.5	NS	14.2 ± 21.5	24.7 ± 21.0	NS	21.7 ± 21.0	21.0 ± 22.8	NS	22.5 ± 21.3	18.1 ± 22.9	NS
(Higher score indicates better QoL)												
Felt ill	24.6 ± 25.5	38.8 ± 30.8	NS	40.4 ± 26.7	25.8 ± 28.2	NS	24.3 ± 22.2	38.5 ± 33.8	NS	28.4 ± 27.4	36.3 ± 31.5	NS
Pain killers	62.9 ± 49.2	38.8 ± 50.2	NS	42.8 ± 51.4	58.0 ± 50.2	NS	53.8 ± 50.8	52.6 ± 51.3	NS	58.8 ± 50.0	36.3 ± 50.5	NS
Nutritional supplements	51.8 ± 50.9	27.7 ± 46.1	NS	42.8 ± 51.5	41.9 ± 50.2	NS	42.3 ± 50.4	42.1 ± 50.7	NS	52.9 ± 50.7	9.0 ± 30.2	<0.05
Feeding tube	100.0 ± 0.0	88.8 ± 32.3	NS	85.7 ± 36.3	100.0 ± 0.0	NS	96.1 ± 19.6	94.7 ± 22.9	NS	97.0 ± 17.1	90.9 ± 30.2	NS
Weight loss	88.8 ± 32.0	50.0 ± 51.4	<0.05	42.8 ± 51.4	87.0 ± 34.1	<0.05	88.4 ± 32.6	52.6 ± 51.3	<0.05	79.4 ± 41.0	54.5 ± 52.2	NS
Weight gain	66.6 ± 48.0	72.2 ± 46.1	NS	78.5 ± 42.6	64.5 ± 48.6	NS	69.2 ± 47.1	68.4 ± 47.8	NS	61.7 ± 49.3	90.9 ± 30.2	NS

EORTC, European Organisation for Research and Treatment of Cancer; NS, not significant; QoL, quality of life; QLQ-C30, the EORTC core quality of life questionnaire; QLQ-H&N35, the EORTC quality of life questionnaire head and neck cancer module.

been based on different questionnaires that have not been validated, which makes it difficult to compare the present study results with those of other authors.

A limitation of this study is the extensive statistical analysis of many parameters from a small number of patients, which may lead to inaccurate conclusions. Undoubtedly, conducting prospective studies on QoL has a definite advantage over retrospective research, as it is possible to compare QoL before and after treatment. In the case of relatively rare tumours such as parotid carcinoma, results and prospective studies are limited by the small size of the study group, which usually consists of only a dozen or so patients¹⁴⁻¹⁶. Both prospective and retrospective studies are based on the desire to fill and send a survey filled by living patients. Unfortunately, the percentage of responses obtained from the control group subjects in this study was relatively poor at only 23%, while for the study group it was only 56%; however this is relatively similar to data reported in the published literature^{4,12}.

The results of studies by other authors have shown the highest negative impact on QoL immediately after treatment, with rapid improvement and stabilization during the first year^{12,14}. In the material analyzed in the present study, the time period between the end of treatment and completion of the questionnaire varied from 2 to 14 years (median 4 years) for the carcinoma patients and from 1 to 3 years (median 2 years) for the adenoma patients, which seems to be sufficient for the assessment of HRQoL.

Stenner et al. compared results obtained from patients with parotid carcinoma to those of the EORTC reference group of patients with head and neck cancers¹². In the present study, it was decided to compare the results obtained between patients with parotid carcinoma and those with parotid adenoma. With such a specific and highly similar control group, it was possible to assess the overall impact of the disease and its treatment on QoL and not just the impact of the parotidectomy itself. Statistically significant differences were found between these groups for 13 of 33 parameters in the EORTC QLQ-C30 and QLQ-H&N35 questionnaires. The worse global health status aside, these differences were related to 10 symptoms including pain, insomnia, loss of appetite, mouth opening problems, swallowing problems, dry mouth, and sticky saliva. In connection with these symptoms, patients more frequently reported problems with the senses, speech, and social and cognitive functioning.

Kaya et al. compared QoL between patients who had undergone parotidectomy for adenoma and patients who had undergone parotidectomy for carcinoma (68 and 31 cases, respectively) based on a questionnaire containing six specific questions. After 30 months, statistically significant differences were found for loss of sensation and/or collapse in the area of operation, facial nerve palsy, and fear of a repeated operation. There were no differences between the groups regarding pain, mouth dryness, and scarring¹⁷. In a similar study by Nitzan et al. involving 53 patients (including nine with cancer), the global health score was good or very good in all patients, and the most common problems were altered sensation, change of appearance, gustatory sweating, and pain. There were no statistically significant differences between the patients with benign and malignant tumours⁴.

It is clear that better global and specific QoL is found in the group of younger patients^{4,10,12,18}. In the present study, a statistically significant difference between the two age groups (≤ 55 and > 55 years) was found only for physical functioning. Other demographic factors such as sex, education, and place of residence had no significant impact on QoL in patients with parotid gland cancer. The results of other studies have shown a negative relationship between female sex and general health status, sleep disorders, and the following symptoms: pain, dry mouth, coughing, and the use of pain killers^{12,18,19}.

The type of treatment appeared to have the greatest impact on QoL. In the case of parotidectomy with preservation of the facial nerve, the extent of tissue resection has a significant impact on the frequency of Frey syndrome, sensory impairment, transient or permanent facial nerve palsy, and the aesthetic outcome (collapse); however this does not cause a serious reduction in long-term QoL^{4,11,17}. Frey syndrome is the most common complication affecting QoL in patients after conservative parotidectomy. This complication has been shown to have a significant impact on social functions, economic difficulties, speech defects, reduced sexuality, and nutritional parameters¹⁸. Another (prospective) study showed that there was no significant effect on QoL following lateral parotidectomy for the treatment of adenoma after 1 year of observation²⁰.

The situation of patients after radical parotidectomy is different; this procedure is associated with significant cosmetic and functional deficits⁵. Microsurgical reconstruction of the facial nerve after radical

parotidectomy brings some benefits, although it never leads to a complete return of function²¹. Nevertheless, despite numerous questionnaires, the impact of nerve VII palsy on QoL is not entirely clear²². In a prospective study conducted by Breeze et al.¹⁶, it was found that cranial nerve VII resection resulted in reduced physical function scores (chewing, swallowing, speech, taste, saliva, appearance) and reduced scores in the social-emotional function domain (pain, activity, recreational, shoulder function, mood, anxiety).

However, the study by Breeze et al. was based on a small group (11 patients) and a short-term follow-up (average 10 months). A weak mutual correlation between the questionnaires used was also noticeable: the University of Washington Quality of Life Questionnaire v4 and EORTC (C30 and H&N35)¹⁶.

In the material analyzed, radical parotidectomy was found to have a negative impact on global health status and social contact. In the work of Stenner et al., based on the EORTC questionnaire, post-operative facial nerve palsy was found to result in worse scores in social contact; however the type of parotidectomy (lateral, total, radical) had no effect on global health status or the various types of functioning (QLQ-C30), but was related only to tooth disorders, mouth opening, and the use of pain killers (QLQ-H&N35)¹². In a comparison between patients who had undergone petrosotomy vs. parotidectomy with RT, QoL was generally worse in the group of patients who had undergone temporal bone resection. However facial nerve VII palsy, flap, and missing pinna did not correlate with the question about appearance in the EORTC questionnaire ('bothered by appearance', which belongs to questions on 'social contact')¹⁵.

Equally controversial is the influence of ND on QoL. ND impairs role, emotional, cognitive, and social functioning, speech, and social eating, causes chronic pain, and negatively affects the level of fatigue and feeling ill¹². In the present study, ND was performed in about half of the patients with cancer and it had a statistically significant negative impact on global health status and social functioning. It was also associated with a higher average weight loss. In the work of Shah et al.²³, ND was associated with limitations of daily activity in one-third of patients, due to neck tightness, numbness, or burning of the ear and shoulder discomfort. However, these complaints were reported by less than one-fifth of patients after 2 years. A correlation between poorer QoL and previous treatment with chemotherapy and RT was also

demonstrated²³. The extent of ND is also significant. Although radical ND is associated with the worst shoulder dysfunction and pain (permanent), and functional and selective ND ailments are transient with a much lower severity, the extent of ND has only a small impact on QoL (subjective appearance, activity, recreation, chewing, swallowing, speech)^{14,23,24}.

Adjuvant RT had the largest adverse effect on QoL in the group of patients analyzed. In addition to the deterioration in their global health status, they also more often reported social functioning, social contact, and speech problems, financial difficulties, appetite or weight loss, and mouth opening problems. Stenner et al. obtained slightly different results, reporting that RT was associated with more frequent pain as well as problems with the teeth, mouth opening, senses, speech, and disturbed social eating¹². Generally, patients treated only surgically have better QoL; however the assessment of the effect of RT in combination therapy is also debatable^{10,24}.

Recurrence of the disease had an impact on role functioning and social contact, and caused more frequent fatigue and loss of appetite. In the group of patients investigated by Stenner et al., recurrence was associated only with more frequent swallowing and coughing disorders¹².

Pathological factors such as advanced stage (T3/T4 and pN+) and high grade were clearly associated with more radical treatment and had a significant negative impact on global health status. Locally advanced disease also more often caused disturbances in emotional functioning, social functioning, and social contact. Similar results have been presented by López-Jornet et al.¹⁰, but Stenner et al.¹² did not show a statistically significant relationship between T and N status and global and specific QoL, except for teeth problems, mouth opening, and social eating.

In conclusion, the results of this study demonstrate worse HRQoL in parotid carcinoma patients in comparison to parotid adenoma patients. Older age, radical parotidectomy, neck dissection, radiotherapy, T3/T4 stage, pN+ status, high-grade tumour, and recurrence of the disease had a significant influence on HRQoL in the carcinoma patients.

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Competing interests

None declared.

Ethical approval

This study was approved by the Local Research Ethics Committee of the Medical University of Gdańsk (No. NKBBN/200/2018).

Patient consent

Not required.

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Address:
Dominik Stodulski
Department of Otolaryngology

Medical University of Gdańsk
ul. Smoluchowskiego 17
80-214 Gdańsk
Poland
Tel.: +48 58 3493110; Fax: +48 58 3493120
E-mail: dstodulski@gumed.edu.pl