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Patient-Reported Outcomes for Dental Health, Shoulder-Neck Dysfunction, and Overall Quality of Life After Treatment With Radiation for Head and Neck Cancer

Neha Verma, BSPH; Xianming Tan, PhD; Mary Knowles, ANP-C; Stephen Bernard, MD; Bhishamjit Chera, MD

Objectives: The current exploratory cross-sectional study was designed to examine and characterize survivorship issues among patients treated with radiation for head and neck cancer with regard to dental health, shoulder-neck dysfunction, and overall quality of life (QOL).

Methods: Patients (N = 58) being seen for follow-up at a radiation oncology clinic at least 1 year beyond the end of treatment completed three survey questionnaires regarding general QOL as well as dental health issues and shoulder-neck dysfunction. The questionnaires were scored and univariate analyses were performed using the variables of age, radiation dosage, definitive radiation + neck dissection versus definitive surgery + postoperative radiation, and chemotherapy.

Results: Median follow-up was 2.5 years. Of 58 patients, 35% reported having more problems with their general dental health as compared to before treatment and 38% reported having pain at night in the neck/shoulder after treatment. With regard to pretreatment counseling, 79% of patients reported being counseled about their dental health prior to treatment, while 31% reported being counseled about possible shoulder-neck dysfunction. Patients younger than 65, patients receiving higher doses of radiation, and patients undergoing definitive surgery + postoperative radiation reported more functional and symptomatic issues.

Conclusion: Patients treated with radiation for head and neck cancer face a number of survivorship issues, including problems with dental health and shoulder-neck dysfunction, and are not necessarily thoroughly counseled about these issues prior to treatment. Patients younger than 65, patients receiving higher doses of radiation, and patients undergoing definitive surgery + postoperative radiation may experience more survivorship issues.

Key Words: Head and neck cancer, survivorship, quality of life, dental health, shoulder-neck dysfunction.

Level of Evidence: IV

INTRODUCTION

Although head and neck cancers have traditionally been considered difficult to cure beyond very early-stage disease, recent advances in therapy over the past two decades have lengthened the duration of survival after diagnosis. The overall 5-year survival rate for head and neck cancer increased from 54.7% in 1992–1996 to 65.9% in 2002–2006.[1] As the population of head and neck cancer survivors grows, it is becoming increasingly important for health care providers to understand, anticipate, and manage the long-term effects of treatment.

Measurement of quality of life (QOL) in head and neck cancer survivors has shown that currently, more than 60% of this population have unmet needs, which include functional issues such as speech and swallowing and psychological issues such as depression.[2,3] Of particular concern from a survivorship, standpoint is the decline in dental health and the shoulder-neck dysfunction that these patients may experience, often with a significant and lasting impact on QOL.[4] The salivary glands are particularly sensitive to radiation, and radiation-induced tissue damage can result in a rapid decline in salivary gland function.[5] Xerostomia, or dry mouth, is among the most common symptoms experienced by head and neck cancer survivors, and radiation-induced changes in both the quantity and quality of saliva produced predispose these patients to the development of dental caries.[5] Additionally, many of these patients undergo removal of lymph nodes from the neck (neck dissection) as part of their treatment.[6] As a result, they may experience a number of long-term side effects including neck and shoulder pain and decreased range of motion, with a correlation described in the literature between the extent of neck dissection and the severity of symptoms.[6] Given the prevalence of these issues and their potentially significant impact on long-term QOL, it has been recommended that head and neck cancer patients be counseled about both potential problems with dental health and potential shoulder-neck dysfunction prior to treatment.[5,6]

From the University of North Carolina School of Medicine (N.V.), Chapel Hill, North Carolina, U.S.A.; the University of North Carolina Department of Hematology/Oncology (S.B.), Chapel Hill, North Carolina, U.S.A.; the University of North Carolina Department of Radiation Oncology (M.K., B.C.), Chapel Hill, North Carolina, U.S.A.; Lineberger Comprehensive Cancer Center (X.T.), Chapel Hill, North Carolina, U.S.A.

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Send correspondence to Neha Verma, 1208 Heathrow Dr., Greensboro, NC 27410. Email: neha_verma@med.unc.edu

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While the amount of attention to cancer survivorship has certainly grown in recent years, the survivorship needs of head and neck cancer patients are not yet being adequately addressed, and we suspect that this is at least in part because the complexities of these needs have not yet been fully described. This is especially true with regard to dental health and shoulder-neck dysfunction, which are of particular concern in this population. The current exploratory cross-sectional study was designed to examine and better characterize survivorship issues among patients treated with radiation for head and neck cancer at the University of North Carolina (UNC) at least 1 year after treatment with regard to dental health, shoulder-neck dysfunction, and overall QOL. In describing the experience of this contemporary group of patients, we hope to clarify how we might better support head and neck cancer patients before and especially after treatment.

MATERIALS AND METHODS

This study was reviewed and approved by the Biomedical Institutional Review Board (UNC IRB #15-3271) at the UNC.

Study Participants

Eligible patients were defined as: 1) History of head and neck squamous cell carcinoma, 2) underwent definitive surgery + postoperative radiation (+/– chemotherapy) or definitive radiation (+/– chemotherapy and +/– planned neck dissection), and 3) at least 1 year beyond the end of treatment. Patients were identified by reviewing the daily lists of patients being seen for follow-up in UNC's Radiation Oncology clinic. Patients were accrued over a 6-month period. Envelopes containing a cover letter describing the study and the survey questionnaires were prepared for each eligible patient. When an eligible patient arrived for his/her follow-up visit, he/she was given an envelope. All of the patients who agreed to participate filled out the questionnaires during the time of their visits.

Study Instruments

The survey questionnaires consisted of: 1) European Organization for Research and Treatment of Cancer Quality of Life Questionnaire-Core 30 (EORTC QLQ-C30), 2) EORTC Head and Neck 35 Cancer module (EORTC QLQ-H&N35), and 3) 18 questions developed for this study assessing dental health issues and shoulder dysfunction. Pertinent clinical and demographic information for each individual was also obtained from his or her electronic medical record (e.g., primary site, treatment, age, etc).

The EORTC questionnaires are frequently used in QOL studies in patients with cancer; the EORTC QLQ-C30 and QLQ-H&N35 have been validated in patients with head and neck cancer.[7–11] The EORTC QLQ-C30 is a standard questionnaire with 30 items regarding physical functioning, role functioning, emotional functioning, cognitive functioning, and social functioning. Scores range from 0 to 100 and are calculated according to the EORTC QLQ-C30 scoring manual.[12,13] A higher score for a functional scale represents a higher/healthier level of functioning, but a higher score for a symptom scale represents a higher level of symptomatology/problems. The EORTC QLQ-H&N35 is a standard module specific to patients with head and neck cancer with 35 items including questions relating to dry mouth and sticky saliva. The module is scored according to the same scoring system as the EORTC QLQ-C30.

For this study, we developed a Dental Health and Shoulder Function Questionnaire (Supporting Appendix 1) containing 6 items that reflect pretreatment status and 12 items that reflect post-treatment status. These items were used to obtain specific information about the patient's dental health and shoulder function prior to treatment and after treatment. Because there is no validated dental health QOL questionnaire for head and neck cancer patients, this questionnaire was specifically created for this study. The items were designed to be standard questions that are frequently asked in routine clinical practice (i.e., routine survivorship questions that are asked by clinicians at UNC). Each item was individually scored as either present (yes) or absent (no) and the overall percentage of Yes/No responses for each individual item was determined.

Statistical Analyses

The EORTC QLQ-C30 and QLQ-H&N35 questionnaires were scored according to the EORTC scoring manual, and the frequency of positive responses (yes) to each item of the Dental Health and Shoulder Function Questionnaire was determined. The EORTC QLQ-C30 global health status and functional scores of this study population were compared to reference values using Wilcoxon rank-sum tests. To examine the associations between various sample characteristics (including age, radiation dose, definitive radiation + neck dissection vs. definitive surgery + postoperative radiation, and chemotherapy) and survey responses, we classified subjects into different sample characteristic groups—age (<65 years of age and ≥65 years of age), radiation dosage (≤65.25 Gy and >65.25 Gy), definitive radiation + neck dissection/definitive surgery + postoperative radiation, chemotherapy (yes/no)—and compared EORTC QLQ-C30 and QLQ-H&N35 scores as well as frequency of positive responses to the Dental Health and Shoulder Function Questionnaire between the groups using either Wilcoxon rank-sum tests (for comparing numerical variables) or Chi-square tests (for comparing categorical variables). The significance level for all comparisons was .050, and all tests were two-sided without adjustment for multiplicity, due to the exploratory nature of this study. All analyses were conducted using SAS (version 9.4, SAS, Inc., Cary, North Carolina) software.

RESULTS

A total of 67 questionnaires were distributed to eligible patients. Of these questionnaires, 58 were completed and 9 declined, yielding a response rate of 86.6%. No further information was captured for these nine patients. Median follow-up of the 58 patients was 2 years 6 months (range: 1 year to 6 years 7 months).

Major socio-demographic, disease-related, and treatment-related variables are summarized in Table I**.** Among the 58 study participants, the median age was 62. The majority of patients were male (78%), Caucasian (78%), and married (67%). In terms of health insurance status, the majority of patients had Medicare (53%), whereas 26% had private insurance and 10% were uninsured. Most patients were T stage T1 (35%) or T2 (28%) and N stage N0 (31%) or N2a/b (35%). Radiation doses ranged from 60 to 74.4 Gy, with 46% of patients receiving a dose less than or equal to 65.25 Gy and 54% receiving a dose greater than 65.25 Gy. The majority of patients (72%) received some form of chemotherapy, with

TABLE I.
Socio-Demographic, Disease-Related, and Treatment Characteristics (n = 58).

Sample Characteristic		% (n)
Median follow-up (range)	2 years 6 months (1 year to 6 years 7 months)	
Age (mean ± SD)	62 ± 12	
Gender	Male	78% (45)
	Female	22% (13)
Race	White or Caucasian	78% (45)
	Black or African American	14% (8)
	Asian	3% (2)
	Other	5% (3)
Ethnicity	Hispanic or Latino	5% (3)
	Not Hispanic or Latino	95% (55)
Marriage status	Married	67% (39)
	Divorced or legally separated	5% (3)
	Single	19% (11)
	Widowed	9% (5)
Insurance status	Medicare	53% (31)
	Private insurance	26% (15)
	Medicaid	5% (3)
	State Health Plan	5% (3)
	Uninsured	10% (6)
Tumor stage—T	T0	2% (1)
	T1	35% (20)
	T2	28% (16)
	T3	19% (11)
	T4	16% (9)
	NA	2% (1)
Tumor stage—N	N0	31% (18)
	N1	17% (10)
	N2	5% (3)
	N2a/b	35% (20)
	N2c	7% (4)
	N3	3% (2)
	NA	2% (1)
Radiation dose	60 Gy	36% (21)
	62 Gy	2% (1)
	63 Gy	5% (3)
	64 Gy	2% (1)
	65.25 Gy	2% (1)
	66 Gy	12% (7)
	70 Gy	35% (20)
	73.2 Gy	2% (1)
	74.4 Gy	5% (3)
Chemotherapy	Yes	72% (42)
	No	28% (16)
Surgery	Definitive surgery + radiation	26% (15)
	Definitive radiation + surgery	24% (14)
	No surgery	50% (29)

Study population characteristics. Percentages rounded to nearest whole number.

weekly Cisplatin being the most common regimen, in accordance with the National Comprehensive Cancer Network (NCCN) Clinical Practice Guidelines.[14]

TABLE II.
EORTC QLQ-C30 Global Health Status, Functional Scale, and Symptom Scale Scores.

EORTC QLQ-C30 Score	Study Population (Mean ± SD)	Reference Value (Mean ± SD)	*P* Value
Global health status/quality of life	65 ± 21	64 ± 23	.709
Physical functioning	85 ± 19	81 ± 20	.174
Role functioning	84 ± 28	79 ± 28	.155
Emotional functioning	83 ± 24	73 ± 24	.001
Cognitive functioning	82 ± 22	86 ± 20	.193
Social functioning	84 ± 25	83 ± 25	.626
Fatigue	24 ± 24	27 ± 25	.386
Nausea and vomiting	6 ± 14	5 ± 14	.686
Pain	18 ± 27	23 ± 26	.165
Dyspnea	13 ± 25	18 ± 27	.162
Insomnia	24 ± 32	27 ± 32	.454
Appetite loss	17 ± 29	18 ± 28	.787
Constipation	13 ± 25	11 ± 23	.438
Diarrhea	4 ± 11	6 ± 17	.372
Financial difficulties	25 ± 34	18 ± 30	.109

Mean scores for EORTC QLQ-C30 for the study population. Scores range from 0 to 100. A higher score for a functional scale represents a higher/healthier level of functioning. A higher score for a symptom scale represents a higher level of symptomatology/problems. Reference values shown for comparison. Means rounded to nearest whole number.

EORTC QLQ-C30 = European organization for research and treatment of cancer quality of life questionnaire-core 30.

EORTC QLQ Scores

The study population's mean EORTC QLQ-C30 scores are shown in Table II. These values are similar to reference values for the global health status and functional scores compiled by the EORTC for head and neck cancer patients after treatment[14] (Table II), although participants in our study had a mean emotional functioning score that was higher than the reference value ($P < .050$). The study population's mean EORTC QLQ-H&N35 scores are shown in Table III. Although these values are also similar to reference values compiled by the EORTC,[15] participants in our study had lower symptom scores in pain, swallowing, speech, sexuality, feeling ill, use of painkillers, use of feeding tube, and weight loss, and a higher symptom score in dry mouth ($P < .050$). Although the composition of our study population was relatively similar to that of the EORTC reference population, a higher percentage of patients in the reference population had disease classified as stage T3 or T4 than in our study population (59% vs. 35%).

Dental Health and Shoulder Function Questionnaire Results

Table IV shows the patient responses to the Dental Health and Shoulder Function Questionnaire. With regard to experiences before treatment, 79% of study participants reported being counseled about taking care of their teeth before beginning treatment, 74% reported having a dental evaluation before beginning treatment, and 31% reported being counseled about possible shoulder problems before

TABLE III.
EORTC QLQ-H&N35 Scores.

EORTC QLQ-H&N35 Score	Study Population (Mean ± SD)	Reference Value (Mean ± SD)	*P* Value
Pain	14 ± 20	27 ± 24	<.000
Swallowing	17 ± 21	24 ± 25	.031
Senses	26 ± 28	19 ± 29	.062
Speech	18 ± 22	28 ± 28	.006
Social eating	19 ± 26	21 ± 25	.631
Social contact	9 ± 16	13 ± 19	.088
Sexuality	20 ± 31	31 ± 35	.020
Teeth	24 ± 33	26 ± 33	.706
Opening mouth	21 ± 32	20 ± 30	.761
Dry mouth	45 ± 36	31 ± 33	.001
Sticky saliva	26 ± 32	31 ± 34	.356
Coughing	29 ± 29	34 ± 32	.282
Feeling ill	13 ± 25	22 ± 29	.028
Use of pain killers	31 ± 47	50 ± 50	.005
Use of nutritional supplements	37 ± 49	27 ± 44	.087
Use of feeding tube	2 ± 13	20 ± 40	.001
Weight loss	16 ± 37	39 ± 49	<.000
Weight gain	34 ± 48	27 ± 45	.226

Mean scores for EORTC H&N35 for the study population. Scores range from 0 to 100. A higher score for a symptom scale represents a higher level of symptomatology/problems. Reference values shown for comparison. Means rounded to nearest whole number.

EORTC QLQ-H&N35 = European organization for research and treatment of cancer quality of life questionnaire-head and neck 35.

TABLE IV.
Patient-Reported Dental Health and Shoulder Function Before and After Treatment (n = 58).

Dental Health and Shoulder Function Questionnaire Item		% (n)
Were you told about taking care of your teeth before you started treatment?	Yes	79% (46)
	No	14% (8)
	Declined to answer	7% (4)
Did you have a dental evaluation before you started treatment?	Yes	74% (43)
	No	22% (13)
	Declined to answer	3% (2)
Did you have any teeth removed (extractions) before treatment?	Yes	35% (20)
	No	62% (36)
	Declined to answer	3% (2)
How often each day did you brush your teeth before treatment?	1 time	16% (9)
	2 times	43% (25)
	More than 2 times	28% (16)
	Declined to answer	14% (8)
How often did you see a dentist before treatment?	Every 3 months	14% (8)
	Every 6 months	52% (30)
	Once a year	16% (9)
	Declined to answer	14% (8)
Were you told about possible problems with your shoulder before you started treatment?	Yes	31% (18)
	No	55% (32)
	Declined to answer	14% (8)
Did you have teeth removed after treatment?	Yes	19% (11)
	No	74% (43)
	Declined to answer	7% (4)
Compared to before your cancer treatment, do you have more problems with your general dental health?	Yes	35% (20)
	No	59% (34)
	Declined to answer	7% (4)
Do you use fluoride-containing toothpaste?	Yes	84% (49)
	No	9% (5)
	Declined to answer	7% (4)
Do you use fluoride trays?	Yes	17% (10)
	No	76% (44)
	Declined to answer	7% (4)
Do you use dry mouth medications?	Yes	43% (25)
	No	52% (30)
	Declined to answer	5% (3)
Did you see your dentist after treatment?	Yes	79% (46)
	No	16% (9)
	Declined to answer	5% (3)
Are you able to raise your arm above your head?	Yes	88% (51)
	No	7% (4)
	Declined to answer	5% (3)
Do you do exercises to keep your neck/shoulder limber?	Yes	62% (36)
	No	33% (19)
	Declined to answer	5% (3)
Do you have pain at night in your neck/shoulder?	Yes	38% (22)
	No	57% (33)
	Declined to answer	5% (3)
Have you changed the way you sleep because of neck/shoulder pain?	Yes	22% (13)
	No	74% (43)
	Declined to answer	3% (2)
Has your dental health affected your ability to work?	Yes	10% (6)
	No	86% (50)
	Declined to answer	3% (2)
Have neck/shoulder symptoms affected your ability to work?	Yes	19% (11)
	No	78% (45)
	Declined to answer	3% (2)

Responses from the Dental Health and Shoulder Function Questionnaire. Percentages rounded to nearest whole number.

beginning treatment. With regard to experiences after treatment, 79% of study participants reported seeing a dentist after treatment, 19% reported having teeth extracted after treatment, 35% reported having more problems with their general dental health as compared to before treatment, and 38% reported having pain at night in the neck/shoulder after treatment.

Univariate Analyses

In comparing patients <65 yoa and patients ≥65 yoa, it was found that patients 65 and older had higher

functional scores in role functioning (95 ± 12 vs. 76 ± 34, $P = .023$) and emotional functioning (89 ± 25 vs. 79 ± 22, $P = .025$), as well as lower symptom scores in pain (4 ± 7 vs. 29 ± 32, $P = .001$), insomnia (8 ± 22 vs. 36 ± 33, $P = .000$), and financial problems (8 ± 17 vs. 38 ± 38, $P = .001$). Patients 65 and older also reported less pain at night in the neck and shoulder (16% vs. 55%, $P = .001$).

In comparing patients who received a radiation dose less than or equal to 65.25 Gy and those who received a radiation dose greater than 65.25 Gy, it was found that patients who received lower doses of radiation had higher functional scores in physical functioning (90 ± 17 vs. 80 ± 19, $P = .015$), emotional functioning (91 ± 17 vs. 76 ± 26, $P = .004$), and cognitive functioning (93 ± 12 vs. 73 ± 25, $P = .000$), as well as lower symptom scores in fatigue (15 ± 18 vs. 32 ± 27, $P = .012$), nausea and vomiting (1 ± 6 vs. 10 ± 18, $P = .007$), insomnia (14 ± 25 vs. 33 ± 34, $P = .012$), constipation (7 ± 21 vs. 19 ± 27, $P = .038$), dry mouth (25 ± 24 vs. 63 ± 36, $P = .000$), and feeling ill (6 ± 21 vs. 19 ± 27, $P = .019$). Those who received lower doses of radiation were also less likely to have teeth extracted after treatment (7% vs. 29%, $P = .049$).

Comparisons between patients who received definitive radiation + neck dissection and those who received definitive surgery + postoperative radiation are summarized in Table V. In general, patients who received definitive radiation + neck dissection were found to have higher EORTC functional scores overall; however, due to the small size of the two comparison groups, many of these differences were not statistically significant. Patients who received definitive radiation + neck dissection had lower symptom scores in constipation ($P = .041$), senses ($P = .020$), and social contact ($P = .019$), and they were also more likely to do exercises to keep the neck/shoulder limber ($P = .018$). In comparing patients who received chemotherapy with those who did not, it was found that patients who received chemotherapy were more likely to be counseled about taking care of their teeth prior to beginning treatment (56% vs. 88%, $P = .011$), as well as to have a dental evaluation prior to beginning treatment (50% vs. 83%, $P = .012$).

DISCUSSION

This study examined survivorship issues with a focus on dental health and shoulder-neck dysfunction among 58 patients at least 1 year after treatment with radiation as well as, in some cases, surgery and/or chemotherapy, for head and neck cancer. Post-treatment QOL (as assessed by the EORTC QLQ) was similar to reference head and neck cancer populations. Although a modest number of patients reported issues with dental health and shoulder-neck dysfunction after treatment, not all patients reported being counseled about these issues prior to treatment.

Patients were more likely to receive pretreatment counseling about potential dental problems than potential shoulder problems, with 79% of study participants reporting being counseled about taking care of their teeth prior to treatment compared to only 31% of study participants reporting being counseled about possible shoulder problems prior to treatment. The post-treatment prevalence of dental problems and shoulder problems was found to be similar, with 35% of patients reporting more problems with their general dental health after treatment and 38% reporting having pain at night in the neck or shoulder after treatment.

Older patients (≥65 yoa) reported fewer functional issues, specifically in terms of role functioning and emotional functioning, as well as fewer symptomatic issues—pain, insomnia, and financial issues—than younger patients (<65 yoa). We speculate that younger patients struggled more with functional and symptomatic issues because they were more likely to go back to work following treatment or to have more duties and activity at home. It is also possible that older patients experienced a higher degree of certain symptoms due to normal aging prior to treatment and were therefore less likely to report a change in these symptoms following treatment. Furthermore, although it may be assumed that older patients will fare worse following cancer treatment, it has been shown that these patients do not necessarily experience increased toxicity and/or long-term complications from regular intensity cancer treatments.[16–19] Our observations lend further support to these previous findings.

We observed that patients who received higher radiation doses (>65.25 Gy, as compared with ≤65.25 Gy) reported more functional issues, specifically in terms of physical functioning, emotional functioning, and cognitive functioning. Other studies have reported similar findings, especially with regard to physical functioning and emotional functioning.[20] In our data set, patients receiving higher radiation doses also had more fatigue, nausea and vomiting, insomnia, constipation, dry mouth, and malaise. Prior studies have similarly shown that patients receiving higher doses of radiation are more likely to experience symptoms including dry mouth, fatigue, insomnia, and constipation.[20–24] We also found that patients who received higher radiation doses were more likely to have teeth extracted following treatment. This correlation is in accordance with previous literature and is thought to be due to the fact that higher doses of radiation are associated with increased incidence of dry mouth, resulting in an imbalance in the oral microbiome with a higher percentage of cavity-producing bacteria.[24,25] It is important to note that patients who received higher doses of radiation also likely had larger radiation fields and were more likely to receive chemotherapy, and certain patients may have needed more intense treatment regimens involving higher doses of radiation due to the aggressiveness of their disease. These associations therefore cannot necessarily be attributed to radiation dose alone.

With regard to combining radiation therapy with other treatment modalities, our results showed that patients receiving definitive radiation + neck dissection reported fewer symptomatic issues—constipation, senses, and social contact—than patients receiving definitive surgery + postoperative radiation. Patients receiving definitive radiation + neck dissection were also more likely to do exercises to keep the neck/shoulder limber. We also observed that patients receiving chemotherapy as part of their treatment were more likely to be

TABLE V.
Significant Functional and Symptomatic Comparisons Between Definitive Radiation + Surgery versus Definitive Surgery + Radiation.

Comparison Item	Definitive Radiation + Surgery (n = 14)	Definitive Surgery + Radiation (n = 15)	*P* Value
Global health status/quality of life (EORTC QLQ-C30) Mean ± SD	69 ± 23	59 ± 24	.180
Physical functioning (EORTC QLQ-C30) Mean ± SD	89 ± 18	83 ± 23	.834
Role functioning (EORTC QLQ-C30) Mean ± SD	93 ± 27	84 ± 28	.123
Emotional functioning (EORTC QLQ-C30) Mean ± SD	93 ± 12	85 ± 23	.448
Cognitive functioning (EORTC QLQ-C30) Mean ± SD	89 ± 14	83 ± 23	.600
Social functioning (EORTC QLQ-C30) Mean ± SD	90 ± 20	88 ± 24	.749
Constipation symptom score (EORTC QLQ-C30) Mean ± SD	0 ± 0	13 ± 25	.041
Senses symptom score (EORTC QLQ-C30) Mean ± SD	12 ± 14	40 ± 34	.020
Social contact symptom score (EORTC QLQ-H&N35) Mean ± SD	1 ± 4	13 ± 18	.019
Do you do exercises to keep your neck/shoulder limber? (Dental Health and Shoulder Function Questionnaire) Percentage of positive responses within subgroup	86%	40%	.018

Comparisons from the EORTC QLQ-C30, EORTC QLQ-H&N35, and Dental Health and Shoulder Function Questionnaire. Means and percentages rounded to nearest whole number.

EORTC QLQ-C30 = European organization for research and treatment of cancer quality of life questionnaire-core 30; EORTC QLQ-H&N35 = European organization for research and treatment of cancer quality of life questionnaire-head and neck 35.

counseled about taking care of their teeth and have dental evaluations prior to beginning treatment, perhaps a function of having a more robust multidisciplinary team involved in patient care. Ultimately, few differences were found to be significant within these comparisons due to the small number of patients in each subgroup. Furthermore, it is important to note that there were likely a variety of confounding factors affecting these associations, including differences in sites treated and stages of disease (e.g., more patients with advanced laryngeal cancers in the definitive surgery subgroup than in the definitive radiation subgroup) and adjustments in doses of radiation and chemotherapy based on the overall treatment plan. Because of the small sample size and lack of a multivariate analysis in this study, it is therefore difficult to further interpret these findings.

As an exploratory cross-sectional study, this investigation allowed us to simultaneously consider many different aspects of survivorship needs among a contemporary group of head and neck cancer patients. At the same time, this preliminary study did have certain limitations. A major limitation of this study was the small sample size, reducing the power to detect significant differences. Additionally, information about patient experiences before and after treatment was collected by self-report in the post-treatment timeframe, and was therefore subject to recall bias. Furthermore, a patient's perception of his or her experiences may differ from the care that was actually received. As with other QOL studies, one must also consider response shift, the phenomenon by which patients with a life-threatening disease often adjust to their illness by altering their internal standards, values, and conceptualization of QOL.[26] Additionally, it is important to recognize that our study population had a higher emotional functioning score and lower symptom scores for a number of symptoms as compared with the reference values compiled by the EORTC. We suspect that this discrepancy is due to the higher proportion of disease classified as T3 or T4 in the reference population, and speculate that our study population may suggest more favorable long-term outcomes than are generally seen among survivors of head and neck cancer patients due to its lower proportion of patients with advanced disease. Finally, the Dental Health and Shoulder Function Questionnaire was created specifically for this study and has not been validated.

CONCLUSION

In this exploratory cross-sectional study, we observed that patients who have been treated with radiation for head and neck cancer face a number of survivorship issues, including problems with dental health and shoulder-neck dysfunction. Although dental and shoulder issues both occurred frequently in our study population, not all patients reported being counseled about these issues prior to treatment, and the patients in this study were much less likely to be notified about possible shoulder-neck dysfunction prior to treatment. It may therefore be helpful to increase pretreatment counseling efforts in all head and neck cancer patients, particularly regarding potential shoulder-neck dysfunction. At our institution, discussions about possible side effects of treatment are based on individual providers, and communication is primarily verbal. Incorporating written materials into these discussions and providing this counseling at more than one visit as part of a robust multidisciplinary team, perhaps including a care coordinator who meets with all head and neck cancer patients prior to beginning treatment, may be particularly helpful. Our results also suggest that patients younger than 65 and patients receiving higher doses of radiation are two groups more likely to experience functional and symptomatic problems following cancer treatment. These patients may require an additional emphasis on supportive care to maximize QOL. Further investigation on this topic should involve longitudinal surveys with multivariate analysis for a more thorough exploration of the complex needs of these patients. Therapeutic trials involving pretreatment interventions, such as shoulder-neck exercises, may also be of interest in this population.

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