



Contents lists available at ScienceDirect

European Journal of Oncology Nursing

journal homepage: www.elsevier.com/locate/ejon

Changes in health related quality of life in women and men undergoing radiation treatment for head and neck cancer and the impact of smoking status in the radiation treatment period



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A B S T R A C T

Keywords:

Head and neck cancer
Health-related quality of life
Radiation therapy
Prospective cohort study
EORTC QLQ-C30
EORTC QLQ-H&N35

Purpose: The aim of this study was to evaluate health-related quality of life (HRQOL) in women and men undergoing radiation treatment for head and neck cancer through the intervention period and examine if age, body mass index (BMI) and smoking status at baseline may modify changes in HRQOL.

Methods: HRQOL was examined by the European Organization for Research and Treatment of Cancer (EORTC) QLQ-C30 and the EORTC QLQ-H&N35, in the beginning and end of the treatment period in 65 patients at the University Hospital in Northern Norway. Changes in HRQOL were calculated and compared by paired sample *T*-tests. Linear multiple regression analyses were used to examine if baseline characteristics had any influence towards HRQOL changes.

Results: Most aspects of HRQOL declined substantially and significantly ($p < 0.001$) with a magnitude of more than one standard deviation during the radiation treatment period irrespective of sex and age. Smoking status at baseline had some, albeit minor, influence on changes in HRQOL. Patients who continued smoking during therapy had significantly higher decline in several aspects of HRQOL, compared to patients who stopped smoking.

Conclusions: HRQOL declined with substantial magnitude in patients undergoing radiation treatment for head and neck cancer, but smoking cessation may modify the declining quality of life.

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Introduction

Treatments of head and neck (H&N) cancer include surgery, radiotherapy (RT), chemotherapy, target therapy or a combination of these modalities. The diagnosis and the following treatment may exert a severe impact on patient's quality of life (QOL) (So, 2012). The malignancy affects the most visible area of the body, and may influence the most fundamental activities of daily life in a negative way, such as speech, breathing, eating and drinking (Larsson and Hedelin, 2003; Wells, 1998). H&N cancer patients' illness often involves physical symptoms, psychological distress, as well as side effects from RT (Archer et al., 2008). The treatment can result in dry mouth (xerostomia), oral discomfort, mucositis, recurrent microbial infections, difficulty in chewing and swallowing, increased incidence of dental caries, impaired taste, and an inability to wear dentures (Parsons, 1994). In addition, depression is reported to

increase in H&N cancer patients undergoing RT (Neilson et al., 2010; Kelly et al., 2007).

The interest in health-related quality of life (HRQOL) (i.e. the physical, mental, and social functioning and well-being) in H&N cancer patients has increased over the two decades (So, 2012). Even if the most important outcome for cancer patients is overall survival, the disease and its treatment often have a major impact on HRQOL and functional status (List et al., 2002). Reliable and valid HRQOL questionnaires are available (Aaronson et al., 1993; Bjordal et al., 2000; Ringash and Bezjak, 2001). The EORTC QLQ-H&N35 is widely used to measure quality of life in H&N cancer patients (Singer et al., 2013). Both prospective and cross-sectional studies (Bjordal et al., 2001; Hammerlid et al., 2001a, 2001b; Hammerlid and Taft, 2001; Nguyen et al., 2002; Talmi et al., 2002; Shepherd and Fisher, 2004) have documented reductions in HRQOL in populations of H&N cancer patients who have received RT. Several studies have also examined changes in HRQOL during the treatment period (Bjordal et al., 2001; Henson et al., 2001; Airoidi et al., 2004; Parliament et al., 2004; Jabbari et al., 2005; Braam et al., 2007; Curran et al., 2007; Ackerstaff et al., 2009, 2012; Maguire et al., 2011; Maurer et al., 2011; Nutting et al., 2011). These

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studies show that QOL worsens during treatment and improves after cessation of treatment, returning to baseline QOL by 12 months after treatment (So, 2012; Curran et al., 2007; Bjordal et al., 2001). During the radiation treatment period a number of functions and symptoms change significantly, but a direct comparison between studies is difficult because of the varying design and HRQOL measurements. There are also contradictory findings about the gender influence on QOL before and after treatment (So, 2012). According to Bjordal et al. (2001) women scored lower than men at baseline. Bozec et al. (2008), on the other hand found that women had fewer or less severe general and H&N symptoms 12 months after surgery, particularly concerning dyspnea and sticky saliva. de Graeff et al. (2000) found that women scored lower on fatigue, pain, physical and emotional functioning and role activities, social contacts and social eating 6 and 12 months after treatment. Scrimger et al. (2007) who investigated the correlation between saliva flow rates and various toxicity endpoints commonly used in H&N cancer treatment, demonstrated higher improvement in women than in men from pre-treatment to 12 months post-treatment, and patients who never had smoked had higher QOL scores before and after treatment than ex-smokers and current smokers (Scrimger et al., 2007). The influence of smoking on side effects in H&N cancer patients has rarely been studied (Jensen et al., 2007). Ronis et al. (2008) found that smoking was highly predictive of poorer QOL scores at 12 months for most items. On the other hand, Aarstad et al. (2007) found no significant association between rate of cigarette smoking and levels of general coping in patients who had been disease-free for at least 1 year.

Although many studies have focused on survival rates and QOL in patients with H&N cancer, the effort has primarily focused on improving treatment techniques or use of therapies or combined modalities (So, 2012). To be able to improve supportive care, we need more knowledge on factors influencing HRQOL in this vulnerable patient group. This paper focuses on the HRQOL and functional status of a representative sample of H&N cancer patients from the start to the end of the radiation treatment period. The purpose of the current study was twofold. First, the aim was to examine women's and men's HRQOL during radiation treatment. Secondly, the aim was to examine if smoking status had any impact on head and neck cancer patients' HRQOL during radiation treatment.

Methods

Study design and participants

The study was conducted at the University Hospital in Northern Norway, in a period from May 2009 to November 2012. All adults patients (18 years or older) with a primary H&N cancer, referred to the oncology center for radiotherapy, were consecutively invited to participate in the study. When the referral arrived at the department, the chief radiation therapist informed the research assistants, all radiation therapists, working in the department. The research assistants approached eligible patients, explained the consent and considered whether the patients were able to complete the questionnaires and collected the data. Patients who were unable to answer the HRQOL questionnaires as a result of mental disturbance, or unable to fill the questionnaire for other reasons, or if they were unable to speak and understand Norwegian, were excluded. Each eligible patient received a letter broadly explaining the purpose and the methods of the study and the level of commitment required to participate in the project. Eighty patients met the criteria and were invited to participate in the study. Three patients refused participation and one relative of a patient declined. Eleven patients did not return the written consent. Sixty-five were

included, resulting in a recruitment rate of 81%. The study was approved by the Regional Committee for Medical Research Ethics (REK NORD 200900504-3KST017/400), and the Norwegian Social Science Data Services (21831).

Data collection

Socio demographic and tumor-related patient characteristics were recorded at inclusion, i.e. sex, age, residence, tumor location according to ICD-10, TNM (T = tumor size, N = node, M = metastasis) and planned treatment was noted. In addition, a study-specific questionnaire was filled out by the radiation therapist. The patients also responded to whether they smoked, had smoked earlier or stopped smoking after diagnosis.

HRQOL questionnaires

Data were collected at two time points: at baseline which was the first radiation treatment week; (T1), and in the last week, after 60 Gy; (T2). At T1 and T2, the patients filled in the European Organization for Research and Treatment of Cancer (EORTC) QLQ-C30 (Aaronson et al., 1993) and EORTC QLQ-H&N35 (Bjordal et al., 2001). The EORTC QLQ-C30 questionnaire is a generic questionnaire developed for patients with any cancer type. The questionnaire is designed for self-administration and assesses multiple dimensions of HRQOL and responses to this 30-item questionnaire are categorized into five functional domains (physical, role, emotional, cognitive, and social) (scored on a four-point scale), one global HRQOL domain (scored on a seven-point scale), three symptom domains (fatigue, nausea/vomiting, pain) and six single items (scored on a four-point scale). Each score is transformed into 0–100 point scale. EORTC QLQ-H&N35 is a questionnaire specifically developed for H&N cancer patients consisting of 35 items on HRQOL. It includes seven scales (pain, swallowing, senses, speech, social eating, social contact and sexuality) and 11 single items (problems with teeth, problems opening the mouth, dry mouth, sticky saliva, cough, feeling ill, pain killers, nutritional supplements, feeding tube, weight loss and weight gain). Items 1–30 are scored on a four-point scale (1; not at all, 2; a little, 3; quite a bit, 4; very much). Items 31–35 have a yes (2) or no (1) response format. Both EORTC instruments were scored according to recommendations in the EORTC QLQ-C30 scoring manual (Borggrevén et al., 2007). In the five functional scales and the global HRQOL scale, a high score represents a high level of functioning or global HRQOL. In the symptom scales and single items, a higher score implies a high level of symptoms or problems.

Clinical treatment

RT was administered to the primary tumor and the regional neck lymphatics (dependent on N stage) by conventional fractionation, i.e. dose of 2 Gy, 1 fraction per day, 5 days per week. The total radiation doses were 60–70 Gy. RT was delivered using megavoltage equipment (6 MV linear accelerator) in general over a period of six to seven weeks. In all patients, planning computed tomography scans were used, and all patients were treated with three-dimensional conformal or intensity-modulated RT. None of the patients had distant metastases.

Statistical analysis

Baseline characteristics, distribution of tumor location, tumor stage and nodal stage were compared between women and men using chi square testing for categorical variables and Independent sample *T*-Tests for continuous variables. The mean scores with the

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