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It's a question of endurance – Patients with head and neck cancer experiences of ^{18}F-FDG PET/CT in a fixation mask

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ABSTRACT

Purpose: This study aimed to explore how patients with head and neck cancer experienced undergoing an ^{18}F-fluoro-deoxy-glucose positrons emissions tomography/computed tomography (^{18}F-FDG PET/CT) examination in a fixation mask.
Method: Interviews were conducted with nine patients with known or suspected head and neck cancer who were scheduled for the examination for the first time. The phenomenological method according to van Manen and his four lifeworld existentials; lived space, lived body, lived time, and lived relation was used to analyse the interviews.
Results: The thoughts and feelings of the patients during the PET/CT examination varied, some found it very difficult, while others did not. However, for all the patients, it was an experience that required some form of coping to maintain composure for example distraction.
Conclusions: PET/CT examnation in a fixation mask may be strenuous for some patients. Patients need more detailed information, including suggestions for coping behaviours, prior to the examination, as well as higher level of support during and after the examination. The results of this study may be used to improve patient care and optimize the procedure of PET/CT examination in a fixation mask.
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1. Introduction

The development of different imaging techniques such as computed tomography (CT), magnetic resonance imaging (MRI), and positrons emissions tomography (PET)/CT has improved diagnostics for head and neck diseases (Dammann et al., 2014). However, patients undergoing such examinations may experience anxiety and fear, of the results, the unknown, or the unnatural space and movement restrictions (Murphy and Brunberg, 1997; Ollivier et al., 2009). In this study we focus on patients with head and neck cancer (HNC) undergoing an ^{18}F-fluoro-deoxy-glucose (FDG) PET/CT examination in a fixation mask.

HNC is the 10th most common cancer worldwide, and the seventh most common cause of cancer-induced mortality (Mehanna et al., 2011). Approximately 1500 people are diagnosed with HNC annually in Sweden (SweHNCR, 2017). Treatment includes radiotherapy, chemotherapy, or surgery in different arrangements. During radiotherapy the patient is immobilized by a tightly fitted molded fixation mask, which is made for each individual patient to ensure that the patient is in the same position during each treatment (Mehanna et al., 2010).

The uncertainty of the disease, and desire to be cured may cause altering feelings of hope and despair. Patients may experience functional, social, and existential losses during and after treatment which may alter their life expectations (Lang et al., 2013). The location of the tumor and the treatment causes various side-effects, such as decreased ability to breathe, eat, speak, and altered physical appearance, leading to a need for different kinds of support before, during, and after treatment (Eades et al., 2009; Moore et al., 2014). It has also been recognized that the molding of the fixation mask, the lack of communication during this process, and placement of the fixation mask on the face during radiotherapy may cause feelings of anxiety among patients (Moore et al., 2014). Besides support from family and friends, the patients also need support from the clinical staff throughout the entire treatment process, including the

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radiotherapy planning phase. Patients' needs for information regarding what is to be expected must be recognized. It is also important for the clinical staff to be honest, positive and empathetic (Richardson et al., 2015).

PET/CT with the radioactively labeled glucose analog ^{18}F-FDG is a well established technique in the care of patients with HNC. ^{18}F-FDG PET/CT is used for diagnosis, staging, evaluation of therapy response, and it also provides essential information for radiotherapy planning (Abramyuk et al., 2013; Awan et al., 2015; Boellaard et al., 2015; Mehanna et al., 2011). If the examination is to be used for the planning of radiotherapy it is performed with the patient lying in the fixation mask.

The ^{18}F-FDG PET/CT examination requires the patient to understand and follow pre-examination instructions, and also follow instructions from the nursing staff during the procedure in order to secure a satisfying examination result with high image quality (Boellaard et al., 2015). Our earlier investigations of patients' experiences and satisfaction of PET/CT examinations indicate that patients' knowledge regarding the examination procedure needs to be improved and increased. Time spent in the PET/CT scanner may also be strenuous because the patient must remain stationary in a fixed position during acquisition, thus increasing patient discomfort (Andersson et al., 2015, 2016). According to a recent study, 28% of the participants felt claustrophobic in varying degrees during the time spent in the PET/CT scanner (Andersson et al., 2015). These studies have used questionnaires as the data collection method and did not investigate what the patient thought and felt during the examination. A qualitative method may provide deeper insight into patients' individual experiences during the process of undergoing a PET/CT examination. This knowledge is important, as it increases the possibilities to improve the quality of care of these patients. To our knowledge the present study is the first to explore the experience of an ^{18}F-FDG PET/CT examination using a qualitative method.

Phenomenology is both a philosophy and a qualitative research method. As a philosophy, it was founded by Edmund Husserl, and centers on individuals' lived experiences of phenomena (Zahavi, 2003). Husserl introduced the concept of the "lifeworld", which can be understood as the everyday world of individuals, their thoughts, and feelings, the world which they live and experience phenomena through consciousness, before they reflect upon them (Zahavi, 2003). Studying how the lifeworld is experienced prereflectively was, for Husserl, a way of studying the essential understanding of human experience (Dowling, 2007). Inspired by Husserl, phenomenology has been adapted in different ways by many philosophers, for example Martin Heidegger, Maurie Merleau-Ponty, Hans-Georg (Dowling, 2007). Phenomenology has also been taken up by human science researchers in many different disciplines as a way to study how human beings experience the world (van Manen, 1990). For example Max van Manen in pedagogy, Amadea Giorgi in psychology, and Patricia Benner in nursing (Dowling, 2007). Generally speaking, the aim for the researcher using phenomenology as a qualitative research method is to describe the variations in ways individuals experience a phenomenon, and then capture the essence of the shared experience of the phenomenon in question, or the element of the experience common to all individuals (Dahlberg et al., 2008). Phenomenological methodology according to max van Manen has been used in a previous study regarding HNC patients' experiences of sickness and treatment (Roing et al., 2007).

The aim of this study was to explore how patients with head and neck cancer experienced undergoing an ^{18}F-FDG PET/CT examination in a fixation mask.

2. Methods

2.1. Study design

Phenomenological methodology according to Max van Manen was used to explore the lived experience of undergoing an ^{18}F-FDG PET/CT examination in a fixation mask. Van Manen's method is based on the existential phenomenological theory that the unity of four fundamental existentials, lived space, lived body, lived time, and lived relation form our lived world (van Manen, 1990). Lived space is the world or our surroundings and how it makes us feel. Lived body is our physical and bodily preference. Lived time is our subjective orientation in the past, present, and future. Lived relation is our subjective relation to others (van Manen, 1990).

2.2. Participants

During February 2012 to August 2015, a convenient sample of patients was recruited at the department of Nuclear Medicine in a university hospital in Sweden where the ^{18}F-FDG PET/CT in a fixation mask examination was carried out. Outpatients who could speak and understand Swedish, who were 18 years or older and scheduled for an ^{18}F-FDG PET/CT examination in a fixation mask for the first time were eligible. Patients who had received anxiolytic medication just before the examination were excluded, as the influence of this drug could potentially affect patient experience. Eleven patients declined. The study sample ($n = 9$) consisted of seven men and two women ranging in age from 48 to 75 years with a known or suspected oropharynx and oral cancer. Reasons for referral were investigation of tumor extent and diagnosis of regional and distant metastases ($n = 3$), investigation of tumor extent and radiation treatment planning ($n = 2$), radiation treatment planning ($n = 3$), and verification of a tonsil cancer diagnosis ($n = 1$).

2.3. ^{18}F-FDG PET/CT examination

The patients were instructed not to consume anything other than 0.5–1 L of plain water six hours prior to their appointment. Upon arrival they were guided to a warm resting place specifically used during the uptake phase, which is the time between the ^{18}F-FDG injection and the PET/CT acquisition. They needed to be silent 15 min before the intravenous injection and during the 1 h uptake phase, and to lie still and not drink any water during this period. The ^{18}F-FDG PET/CT examination was performed on a Discovery VCT (GE. Healthcare, Waukesha), with 64 slice CT. After the uptake phase the patients were taken to the PET/CT scanner. Lying supine on the PET/CT scanner bed, the fixation mask was positioned on their faces in the same way as during radiation treatment. After performing a low dose CT scan for attenuation correction, a whole-body PET acquisition was started by moving the patients stepwise through the tunnel of the scanner. The scan was acquired from the liver to the top of the skull. Acquisition time was 3 min per bed position. Lastly, a diagnostic CT examination during intravenous contrast enchantment was performed to cover the same body regions. During this time the patients needed to remain still to avoid image artifacts. This yielded a total PET/CT scanner time of approximately 25 min. The visit at the department from arrival to end of examination generally lasted two hours or more.

2.4. Data collection

Conversational interviews were conducted either directly after

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