YBJOM-5379; No. of Pages 5 ARTICLE IN PRESS

Available online at www.sciencedirect.com

ScienceDirect

British Journal of Oral and Maxillofacial Surgery xxx (2017) xxx–xxx

BRITISH Journal of Oral and Maxillofacial Surgery

www.bjoms.com

Preoperative assessment of the risk of postoperative death in patients with oral squamous cell carcinoma: a consideration beyond age, sex, and stage of cancer

A.K. Bartella [a,∗], A.-K. Sander [a], M. Kamal [a], J. Steegmann [a], A. Kloss-Brandstätter [a,b], J. Teichmann [a], F. Hölzle [a], B. Lethaus [a]

[a] Department of Oral, Maxillofacial and Plastic Facial Surgery, University Hospital of Aachen University, Pauwelsstraße 30, 52074 Aachen, Germany

[b] Carinthia University of Applied Sciences, Europastrasse 4, 9524 Villach, Austria

Accepted 16 March 2018

Abstract

Despite improvements in the management of patients in critical care, about 3% patients who have an operation with curative intent for oral squamous cell carcinoma (SCC) do not survive their stay in hospital. Our aim was to assess the risk factors for postoperative death that were independent of the stage of the cancer, or the age and sex of the patients. We screened 4760 consecutive inpatients at a maxillofacial tertiary care centre from 2011 to 2016, and 34 of them had died within the first three months after operation. We matched them with a further 34 patients with the same TNM stage, age, and sex. General personal and clinical data and preoperative laboratory values were screened, and we applied a Charlson Comorbidity Score (for anaesthetic risk) for each group. Patients' mean (SD) age was 66 (12) years old. There was no significant difference in sex ($p = 1$), age ($p = 0.718$), or TNM classification. Those who died after operation had significantly more renal ($p = 0.027$) and gastrointestinal ($p = 0.006$) diseases, but cardiac diseases ($p = 0.468$) and diabetes mellitus ($p = 1$) were not significant risk factors in themselves. Patients who died postoperatively had significantly worse risk scores ($p = 0.001$) overall. The most common causes of death were septic shock ($n = 10$) and acute cardiac ($n = 9$) or respiratory failure ($n = 7$). Our findings suggested that general diseases were not intrinsically a contraindication for operation with curative intent. The Charlson Comorbidity Score helped to detect potentially fatal courses and could be useful in the preoperative assessment of patients whose general health is not good.

Keywords: OSCC; Mortality; Risk factors; Charlson Comorbidity Score; Oral squamous cell carcinoma

Introduction

In recent decades, cancer treatment has focused progressively not only on the patient's prognosis but also on their quality of life after treatment to decide if a curative or a palliative path should be chosen.

The worst outcome of "intent-to-cure" treatment is the death of the patient during postoperative rehabilitation. In patients with oral squamous cell carcinoma (SCC), operations usually involve large resections, neck dissections, tracheostomies, and reconstruction using free-flap transplants or local flaps, and are, therefore, incapacitating for patients. Such operations are also known to have an in-hospital mortality of 117/3932 (3%).[1,2] Patients with oral SCC often present with a history of tobacco or alcohol misuse, or both, which are associated with many coexisting condi-

∗ Corresponding author.

E-mail addresses: abartella@ukaachen.de (A.K. Bartella), katharina.sander@rwth-aachen.de (A.-K. Sander), mkamal@ukaachen.de (M. Kamal), jsteegmann@ukaachen.de (J. Steegmann), akloss@ukaachen.de (A. Kloss-Brandstätter), jteichmann@ukaachen.de (J. Teichmann), fhoelzle@ukaachen.de (F. Hölzle), blethaus@ukaachen.de (B. Lethaus).

https://doi.org/10.1016/j.bjoms.2018.03.006

0266-4356/

Please cite this article in press as: Bartella AK, et al. Preoperative assessment of the risk of postoperative death in patients with oral squamous cell carcinoma: a consideration beyond age, sex, and stage of cancer. *Br J Oral Maxillofac Surg* (2017), https://doi.org/10.1016/j.bjoms.2018.03.006

tions, all of which make it harder for them to cope with extensive procedures.[2–4]

Several treatment guidelines and clinical recommendations have been proposed to assess the feasibility of operations based on the size and stage of the tumour.[3,5,6] However, just because this may be technically possible, it may not be the best treatment to improve the overall outcome, which should prolong survival with a functionally acceptable quality of life.

Further discussions prompt more questions. Is the current medical definition of oral SCC clear? Which patients have no objective advantage (in terms of prolongation of survival) or which patients may not even survive their stay in hospital? Are there factors other than the size, grade, and stage of the tumour that can suggest a protracted clinical course? Are there any scoring systems of clinical risk that have been validated by other specialties (such as anaesthetics) that may be applied to patients with cancers of the head and neck to predict their course and outcome?

We aimed to identify the preoperative risk factors of in-hospital mortality in patients with oral SCC, independent of the stage of the cancer, or the patient's age and sex. We tried to better define the indications for surgical intervention, alternative treatment, or palliative measures, and to attempt to avoid deaths during the postoperative stay in hospital.

Patients and methods

This study was completed in accordance with the ethics committee at a tertiary care university hospital (EK 206-16). A total of 4760 patients were admitted for operation over a five-year period, and 45 (0.9%) of them died during their stay. We included only the 34 (7.9%) patients with oral SCC who had had operations with curative intent (n = 433) and who had died in hospital or within three months of their stay.

To define the preoperative risk factors independently of age, sex, and stage of the cancer, we matched the subjects included with 34 patients who had survived, and our priority was to match the TNM stage. Records were also screened for patients matched by age and sex. To establish this control group, we focused on the influence of concurrent medical conditions as confounding factors on the courses of treatment.

We screened the patients' preoperative laboratory test results, general illnesses, American Society of Anesthesiologists (ASA) grade, and their use of alcohol and tobacco. General medical conditions were further stratified according to the organ systems that were involved (hepatic, renal, cardiovascular, gastrointestinal, or neurological). A validated scoring system for known risks (Charlson Comorbidity Score) was also applied to both groups. Additionally, the causes of death were listed and reviewed for association with the corresponding diseases.

Statistical analysis was done using SPSS software (version 24.0, IBM Corp, Armonk, NY) and by applying the Students' *t* test, and chi squared and Fisher's exact tests. Probabilities of less than <0.05 were accepted as significant.

Table 1
The basic characteristics of patients (n = 34 in each group). No significant differences between the groups shows a successful match. Data are mean (SD) unless otherwise indicated.

Characteristics	Died	Survived	p value
Age (years)	65.9 (12)	65 (12)	0.747
Body mass index	24.1 (6)	25.7 (5)	0.258
Sex:			
Men	19	19	1
Women	15	15	1
Stage of cancer:			
T	–	–	0.880
N	–	–	0.831
M	–	–	1

Results

Mean (SD) age was 66 (12) years old, and the male:female ratio was 1.3:1. There were no significant differences in age (p = 0.718), sex (p = 1), body mass index (BMI) (p = 0.258), stage of tumour (p = 0.880), metastases to the lymph nodes (p = 0.831), or distant metastases (p = 1) between the patients who died and those who survived after operation (Table 1).

Table 2 shows that pulmonary, gastrointestinal, hepatological, and renal diseases particularly increased the chances of death, but a higher ASA score did not significantly increase the probability (p = 0.109). Cardiovascular (p = 0.468) and neurological diseases (p = 0.167), other cancers (p = 1) and diabetes mellitus type II (p = 1) were not significantly associated with deaths. Patients who died postoperatively had higher rates of pulmonary diseases (p = 0.069) and hepatological diseases (p = 0.054), although these were not significant. Surprisingly, neither a history of alcohol (0.658) nor tobacco misuse (0.684) influenced these figures. The Charlson Comorbidity Score was significantly worse (p = 0.001) in patients who died postoperatively than in those who survived.

The preoperative blood counts are shown in Table 3. showed a significantly lower haemoglobin concentration (117 compared with 141 g/L; p < 0.001) and significantly higher concentrations of inflammatory markers (CRP (32.7 compared with 6 mg/L; p < 0.001) and white cell count (10.1 compared with 7.9 10^9/L; p = 0.013)) as well as an appreciable worsening of gamma-GT (129.4 compared with 52.2 U/L; p = 0.025). Alkaline phosphatase (AP; 102 compared with 75.7 U/L; p = 0.057) and aspartate aminotransferase (AST; 30.1 compared with 23.9 U/L; p = 0.096) were higher in patients who died postoperatively, although these were not significant. AST (32.4 compared with 24.2; p = 0.037) and γ-glutamyl transpeptidase (gamma-GT) (111.2 compared with 50.4; p = 0.024) were higher in patients who died. No other laboratory values showed any significant differences between the two groups (Table 3).

Please cite this article in press as: Bartella AK, et al. Preoperative assessment of the risk of postoperative death in patients with oral squamous cell carcinoma: a consideration beyond age, sex, and stage of cancer. *Br J Oral Maxillofac Surg* (2017), https://doi.org/10.1016/j.bjoms.2018.03.006