Nutrition 58 (2019) 65–68

Contents lists available at ScienceDirect

Nutrition

journal homepage: www.nutritionjrnl.com

Applied nutritional investigation

Impact of preoperative cachexia on postoperative length of stay in elderly patients with gastrointestinal cancer

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ARTICLE INFO

Article History:
Received 20 March 2018
Received in revised form 22 May 2018
Accepted 8 June 2018

Keywords:
Cachexia
Postoperative length of stay
Elderly patients
Gastrointestinal cancer
Enhanced recovery after surgery

ABSTRACT

Objectives: The aim of the present study was to investigate the impact of preoperative cachexia on postoperative length of stay (LOS) in elderly patients with gastrointestinal cancer.
Methods: This prospective cohort study enrolled 98 patients (≥60 y of age) with gastric or colorectal cancer who were scheduled to undergo curative surgery and were categorized as either having cachexia or as being in a non-cachexia group. The definition of cachexia was patients with >5% loss of stable body weight over the previous 6 mo, a body mass index (BMI) <20 kg/m^2 and ongoing weight loss >2%, or sarcopenia and ongoing weight loss >2%. Multivariable Poisson regression analysis was performed with postoperative LOS as the dependent variable and the presence of cachexia as the independent variable, and age, sex, Eastern Cooperative Oncology Group performance status, education, cancer type, clinical stage, surgical approach, and the Charlson Comorbidity Index as confounding variables.
Results: Twenty-two patients (22.4%) were diagnosed with cachexia. Postoperative LOS was 17.1 ± 8.7 d in the non-cachexia group and 20.6 ± 10.8 d in the cachexia group. Multivariable Poisson analysis showed that preoperative cachexia was significantly associated with prolonged postoperative LOS after adjustment (2.41 d; 95% confidence interval, 0.28 to 4.55; $P = 0.027$).
Conclusions: Our results suggested that preoperative cachexia prolongs postoperative LOS in elderly patients with gastrointestinal cancer, implying that cachexia should be assessed and treated before surgery.

Introduction

Gastrointestinal (GI) cancer treatments mainly involve surgery, and enhanced recovery after surgery (ERAS) protocol is required to reduce surgical stress and accelerate recovery in patients. One of the parameters of ERAS is postoperative length of stay (LOS), and prolonged postoperative LOS has been shown to increase readmission rate [1], decrease the rate of overall survival [2], and increase hospitalization costs [3]. Therefore, postoperative LOS is a clinically and socially relevant problem.

The number of elderly patients with cancer is rising in Japan [4], and a previous study has reported that older patients who undergo laparoscopic gastrectomy experience prolonged postoperative LOS, implying that aging is a risk factor for prolonged postoperative LOS [5]. Therefore, it is necessary to identify the risk factors associated with prolonged postoperative LOS in the elderly.

Recently, cachexia has been receiving increasing attention because it potentially can be modifiable [6–10] and can have an effect on adverse outcomes such as postoperative complications [11], diminished physical functioning [12], and decreased survival [13]. Therefore, cachexia also may affect postoperative LOS. Cancer cachexia is a multifactorial syndrome defined by an ongoing loss of skeletal muscle mass (with or without loss of fat mass) that cannot be fully reversed by conventional nutritional support and leads to progressive functional impairment [14]. The prevalence of cachexia among all cancer patients is reportedly 16.6% to 80%, which is high compared with its prevalence in other diseases [11,15]. Furthermore, a previous report, using real-world data from the International Classification of Diseases-9 for the prevalence of cachexia (0.4%), has shown that patients diagnosed with cachexia experienced prolonged LOS compared with non-cachexia patients [16]. However, this rate is

This work was supported by the Japan Society for the Promotion of Science (grant no. 15 K01367). The authors have no conflicts of interest to declare.
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https://doi.org/10.1016/j.nut.2018.06.022
0899-9007/

much lower than that reported in previous studies and thus it is possible that the effect of cachexia on postoperative LOS was underestimated. In contrast, to develop accurate diagnostic criteria, experts in clinical cancer and cachexia research have issued a consensus statement to guide clinical decision making in the management of cachexia [14]. However, few studies have used this cachexia criteria. Furthermore, as the body type of Asians differs from that of Western populations [17], studies in Asian populations with the consensus cachexia criteria are necessary.

Thus, the present study aimed to investigate the impact of preoperative cachexia on postoperative LOS in elderly Japanese patients with GI cancer.

Participants and Methods

Study design and settings

This single-center prospective cohort study was conducted between December 2015 and April 2017 at an urban university hospital. The study was approved by the ethics committee of Kobe University Graduate School Health Science and was performed in accordance with the ethical standards established in the 1964 Declaration of Helsinki and its later amendments. All patients provided informed consent before participation.

Participants and eligibility criteria

We approached 133 Japanese patients with gastric or colorectal cancer for the study. Patients ≥60 y of age who were scheduled to undergo curative surgery were eligible. The exclusion criteria included the presence of simultaneous cancers or missing data. After excluding, 98 patients were selected.

Data collection and measurements

Data of demographic characteristics, preoperative treatment, and cancer cachexia before surgery were collected. Postoperative LOS and postoperative complications within 30 d after surgery were investigated at discharge.

Demographic data

Demographic data collected include age, sex, the Eastern Cooperative Oncology Group performance status (PS), and education, whereas preoperative treatment data included cancer type, clinical stage, surgical approach, comorbidity, and postoperative complications within 30 d after surgery; these data were collected from the medical records of patients. Comorbidity was assessed using the Charlson Comorbidity Index (CCI) [18], which assigns weight to specific diseases. Thus, comorbid conditions with a weighted score of 1 include myocardial infarction, congestive heart failure, peripheral vascular disease, cerebrovascular disease, dementia, chronic pulmonary disease, ulcer disease, mild liver disease, and diabetes mellitus, whereas those with a weighted score of 2 include diabetes mellitus with end-organ damage, any tumor, leukemia, and lymphoma. Moderate or severe liver disease has a weighted score of 3, whereas metastatic solid tumors and AIDS have a weighted score of 6 [19]. The total score is calculated by adding these weighted scores. Patients were classified into three groups based on total scores as 0, 1, and ≥2 [20]. Postoperative complications within 30 d after surgery were defined according to the Clavien–Dindo classification [21], and any postoperative conditions defined as Clavien–Dindo grade ≥II were identified as postoperative complications.

Postoperative LOS

Postoperative LOS was calculated as the duration between the day of surgery and the day of discharge from the GI ward.

Cancer cachexia

The definition of cachexia was patients with >5% loss of stable body weight over the previous 6 mo, a body mass index (BMI) <20 kg/m^2 and ongoing weight loss >2%, or sarcopenia and ongoing weight loss >2% [14]. Sarcopenia was defined as low muscle mass according to the Asian consensus definition [22]. Specifically, low muscle mass was defined as a skeletal muscle mass index (SMI) of <7 kg/m^2 for men and <5.7 kg/m^2 for women. Muscle mass was assessed using multifrequency bioelectrical impedance with eight tactile electrodes (InBody 430; Inbody Japan, Tokyo, Japan).

Statistical analysis

Patient characteristics were compared between those with and without cachexia using Student's *t* test for normalized variables, the Wilcoxon rank-sum test for non-normalized values, and χ^2 tests or Fisher's exact test for categorical values. If the exact count in any cell was <10, Fisher's exact test was applied. Poisson (identity link) regression analyses were performed with postoperative LOS as the dependent variable, and the presence of cachexia or patient characteristics as the independent variable. Covariates were selected on the basis of previous studies on LOS, and included the following variables, namely, age, sex, ECOG PS, education, cancer type, clinical stage, surgical approach, and CCI [23–25]. All statistical analyses were performed using the STATA 14.1 software (Stata Corp, College Station, TX, USA). $P < 0.05$ was considered statistically significant.

Results

Clinical and demographic characteristics were compared between patients with and without cachexia (Table 1). Twenty-two patients (22.4%) were classified as cachexia. No significant relationships were observed between cachexia and patient characteristics. Postoperative LOS was 17.1 ± 8.7 d in the non-cachexia group and 20.6 ± 10.8 d in the cachexia group.

Next, we used Poisson regression models to analyze the association between postoperative LOS and cachexia or patient characteristics (Table 2). Univariate Poisson regression analysis identified cachexia, age, sex, ECOG PS, cancer type, clinical stage, surgical approach, and CCI, as factors that significantly prolonged postoperative LOS. In multivariable Poisson analysis, cachexia significantly affected prolonged postoperative LOS after adjustment for age, sex, ECOG PS, education, clinical stage, surgical approach, and CCI (2.41 d; 95% confidence interval, 0.28 to 4.55; $P = 0.027$).

Discussion

The present study investigated the impact of preoperative cachexia on postoperative LOS in elderly Japanese patients with GI cancer. The results demonstrated that preoperative cachexia is associated with prolonged postoperative LOS.

Although a previous study on various diseases investigated an association between cachexia and LOS in the United States, that study did not use the consensus diagnostic criteria for cachexia [16], and the prevalence of cachexia was reported as 0.4%, which is much lower than that of previous studies [11,15]. It is, therefore,

Table 1
Baseline characteristics

	Non-cachexia (n = 76)	Cachexia (n = 22; 22.4%)	*P*-value
Age (y)†	71.9 ± 7.1	74.8 ± 7.7	0.133
Sex: Male, n (%)	52 (68.4)	18 (81.8)	0.289
ECOG PS, n (%)			0.501
0	64 (84.2)	17 (77.3)	
1	10 (13.2)	5 (22.7)	
2	2 (2.6)	0 (0)	
Education (y)†	12.7 ± 2.7	13.0 ± 3.3	0.533
Cancer type, n (%)			0.789
Gastric	39 (51.3)	12 (54.5)	
Colorectal	37 (48.7)	10 (45.5)	
Clinical stage, n (%)			0.768
0–2	61 (80.3)	17 (77.3)	
3–4	15 (19.7)	5 (22.7)	
Surgical approach, n (%)			0.689
Endoscopic	69 (90.8)	19 (86.4)	
Open	7 (9.2)	3 (13.6)	
CCI, n (%)			0.739
0	34 (44.8)	8 (36.4)	
1	14 (18.4)	5 (22.7)	
≥2	28 (36.8)	9 (40.9)	
Postoperative complication, n (%)	18 (23.7)	6 (27.3)	0.781

CCI, Charlson Comorbidity Index; ECOG PS, Eastern Cooperative Oncology Group performance status.
Data on age and education are expressed as mean (SD), and the others as n (%).
†Statistical analysis used by the Wilcoxon rank-sum test.