Asian Journal of Surgery (2017) xx, 1–7

Available online at www.sciencedirect.com

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journal homepage: www.e-asianjournalsurgery.com

ORIGINAL ARTICLE

# Risk factors for severe weight loss at 1 month after gastrectomy for gastric cancer

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Received 22 December 2016; received in revised form 15 February 2017; accepted 16 February 2017

**KEYWORDS**
body weight loss;
gastrectomy;
gastric cancer

**Summary** *Background:* Body weight loss (BWL) is frequently observed in gastric cancer patients who undergo gastrectomy for gastric cancer. The risk factors for severe BWL after gastrectomy remain unclear.
*Methods:* The present study retrospectively examined patients who underwent curative gastrectomy for gastric cancer between January 2012 and June 2014 at Kanagawa Cancer Center. All patients received perioperative care based on the enhanced recovery after surgery protocol. The %BWL value was calculated based on the percentage of body weight at 1 month after surgery in comparison to the preoperative body weight. Severe BWL was defined as %BWL $>$ 10%. The risk factors for severe BWL were determined by both univariate and multivariate logistic regression analyses.
*Results:* There were 278 patients examined. The median age of the patients was 68 years. The operative procedures included total gastrectomy [$n = 97$; open ($n = 61$) and laparoscopic {$n = 36$)] and distal gastrectomy ($n = 181$). Surgical complications of grade $\geq 2$ (as defined by the Clavien–Dindo classification) were observed in 37 patients, these included: pancreatic fistula ($n = 9$), anastomotic leakage ($n = 5$), and abdominal abscess ($n = 3$). There were no cases of surgery-associated mortality. Both univariate and multivariate logistic analyses demonstrated that surgical complications, and total gastrectomy were significant risk factors for severe BWL.

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http://dx.doi.org/10.1016/j.asjsur.2017.02.005

*Conclusions:* Surgical complications and total gastrectomy were identified as being significant risk factors for severe BWL in the 1st month after gastrectomy. To maintain body weight after gastrectomy, physicians should pay careful attention to patients who undergo total gastrectomy and those who develop surgical complications.


## 1. Introduction

Gastric cancer is the fourth most common human malignant disease and the second most frequent cause of cancer-related death worldwide.[1] A complete resection is essential for the cure of localized gastric cancer.

Body weight (BW) loss (BWL) is common in patients who undergo gastrectomy for gastric cancer. Previous studies have demonstrated that after gastrectomy, patients typically lose 10—20% of their preoperative BW.[2] BWL is associated with a worse outcome in patients who undergo palliative or adjuvant chemotherapy.[3,4] For example, Andreyev et al[3] found that patients with BWL received significantly less chemotherapy and developed greater toxicity. Previously, we analyzed the patients who underwent curative gastrectomy and S-1 adjuvant chemotherapy, and found that a BWL of $>$ 15% at 1 month after surgery was the only significant risk factor for the discontinuation of S-1 adjuvant chemotherapy.[4]

Previous studies showed that BWL could be affected by perioperative factors. Including the reduction of oral intake and exercise.[5] However, those factors were not standardized in the conventional perioperative care practices that were applied in those studies. Recently, an (ERAS) program has been introduced in the perioperative care of gastrectomy patients.[6] The ERAS program incorporates a number of factors, including early oral intake and exercise. We standardized the use of the ERAS program in the perioperative care of gastric cancer surgery patients. However, the BWL of the gastrectomy patients who receive perioperative care according to the ERAS program remains to be fully clarified. Moreover, as mention above, recent studies focus on the early phase period, such as 1 month after surgery. However, there was no report to focus on BWL at 1 month after surgery. If the risk factors for BWL after gastrectomy are identified, then physicians will be able to better support the patients with risk factors, which might lead to the improved continuation of palliative and adjuvant chemotherapy or a reduction in the side effects associated with chemotherapy.

This study investigated the risk factors that affected BWL at 1 month after gastrectomy in gastric cancer patients; all of them received perioperative care using the ERAS program. The patients of this study started oral take earlier than previous studies.

## 2. Patients and methods

### 2.1. Patients

The patients were selected from the prospective database of the Kanagawa Cancer Center, Department of Gastrointestinal Surgery, Yokohama, Japan, according to the following criteria: (1) a histologically-proven gastric adenocarcinoma; (2) curative gastrectomy for gastric cancer as a primary treatment between January 2012 and June 2014; (3) no experience of BWL before surgery; and (4) the performance of a BW measurement within 1 week before surgery and at 1 month after surgery.

### 2.2. Surgical procedures and perioperative care

All patients received either distal or total gastrectomy with nodal dissection for gastric cancer. In principle, a D1 or a D1+ lymphadenectomy is indicated for cT1N0 tumors, and D2 is applied for cN+ or cT2-T4 tumors, regardless of the approach. Spleen-preserving D2 total gastrectomy was permitted in this study.

All patients received perioperative care using the ERAS program after gastrectomy. The details of this program have been reported in a previous study.[6] In brief, the patients were allowed to eat until midnight on the day before the surgery and were required to drink the contents of two 500 mL plastic bottles containing oral rehydration solution until 3 hours before surgery. The patients' nasogastric tubes were removed immediately after surgery. Oral intake was initiated on postoperative day (POD) 2, beginning with water and an oral nutritional supplement. The patients began to eat solid food on POD 3, starting with rice gruel and soft food on POD 3 and advancing in three steps to regular food intake on POD 7. The patients were discharged on POD 7 when they had achieved adequate pain relief and soft food intake, had returned to their preoperative mobility level and exhibited normal laboratory data.

### 2.3. Evaluation and statistical analysis

A BW measurement was performed within 1 week before surgery and at 1 month after surgery. The percentage of BW loss (%BWL) was defined by the following formula: %

Please cite this article in press as: Segami K, et al., Risk factors for severe weight loss at 1 month after gastrectomy for gastric cancer, Asian Journal of Surgery (2017), http://dx.doi.org/10.1016/j.asjsur.2017.02.005