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Postoperative complications in elderly patients with gastric cancer

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ABSTRACT

Background: Elderly patients undergoing gastrectomy are expected to be at high risk of postoperative complications. This retrospective multicenter cohort study assessed complications and long-term outcomes after gastrectomy for gastric cancer (GC).

Methods: A total of 993 patients with GC who had undergone gastrectomy were included, comprising 186 elderly patients (age ≥ 80 y, E group) and 807 nonelderly patients (age ≤ 79 y, NE group). Preoperative comorbidities, operative results, postoperative complications, and clinical outcomes were compared between the groups.

Results: Clavien-Dindo grade ≥1 postoperative complications, pneumonia ($P = 0.02$), delirium ($P < 0.001$), and urinary tract infection ($P < 0.001$) were more common in the E group. Postoperative pneumonia was associated with mortality in this group ($P < 0.001$). Three patients (1.6%) died after surgery, each of whom had pneumonia. Severe postoperative complication was independently prognostic of overall (hazard ratio, 4.69; 95% confidence interval, 2.40–9.14; $P < 0.001$) and disease-specific (hazard ratio, 6.41; 95% confidence interval 2.92–14.1; $P < 0.001$) survival in the E group.

Conclusions: In elderly patients with GC, clinical outcomes are strongly associated with severe postoperative complications. Preventing such complications may improve survival.

1. Introduction

Over the past few decades, the proportion of the population that is elderly has increased both worldwide [1] and in Japan [2]. Inevitably, the number of elderly patients undergoing gastrectomy for gastric cancer (GC) has also increased. Because of age-related decreased functional reserve and comorbidities, the risks of postoperative complications and postoperative death may be high in elderly patients with GC. Although several studies [3–7] have reported the morbidity and mortality risks of surgical treatment for GC in patients aged ≥80 y, these studies did not identify any specific risk factors for postoperative complications in these patients. Of abdominal surgeries, gastrectomy is especially associated with postoperative pneumonia (POP) [8], which may lead to postoperative death. Therefore, POP prevention or treatment may be important to

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improve the surgical outcomes of gastrectomized patients. Postoperative complications are known to adversely affect overall and disease-specific survival in patients with GC [9,10], but studies on this topic have not investigated elderly patients. Thus, we sought to identify the characteristics and risk factors of postoperative complications in elderly patients with GC (age ≥ 80 y), as well as the effects of postoperative complications on their long-term postoperative survival.

2. Patients and methods

2.1. Patients selection

The study had a multicenter case-control design. We used clinicopathologic data on gastrectomized patients from Shinshu University Hospital, Nagano Prefectural Kiso Hospital, and Shinshu Ueda Medical Center. The study enrolled 993 consecutive patients who had GC and had undergone gastrectomy between January 2002 and December 2012 at any of the three hospitals. The patients were classified into an elderly group (age ≥ 80 y; E group; $n = 186$) and a nonelderly group (age ≤ 79 y; NE group; $n = 807$). Age was defined at the time of surgery. In terms of surgical indication, patients with GC with performance status 4 were excluded. Patients with potentially fatal comorbidities underwent limited lymph node dissections (LNDs), even for advanced GC, to reduce postoperative morbidity or mortality.

We retrospectively reviewed medical histories, clinicopathologic findings, operative findings, and postoperative complications. This study was approved by each institution's ethics committee.

2.2. Stage classification

Tumor depth, nodal involvement, and stage classification were determined according to the Japanese Classification of Gastric Carcinoma, third edition [11], which is compatible with the Union for International Cancer Control (UICC), seventh edition.

2.3. Surgical procedure selection

To secure R0 margins, open total, distal, or proximal gastrectomy was performed, depending on the location of the tumor. Palliative gastrectomy (defined as R1 or R2 resection) was also included. The extent of LND, including D1 and D2, was decided according to the Japanese Gastric Cancer Treatment Guidelines 2010 [12], but limited surgery was performed in several cases at high risk of routine LND. We usually performed gastrectomy with D2 LND for advanced GC and gastrectomy with D1 LND for early GC. Palliative gastrectomy was performed without routine LND.

2.4. Evaluation of clinicopathologic variables

The clinicopathologic features included age, gender, smoking and alcoholism, body mass index (BMI), comorbidities (including the Charlson comorbidity index [CCI]) [13], American Society of Anesthesiologist score, tumor location, tumor size, depth of invasion, lymph node metastasis, distant metastasis, and tumor-node-metastasis stage. We evaluated data from preoperative examinations and operative findings that might reasonably have influenced postoperative complications. Following Onodera *et al.* [14], the prognostic nutritional index (PNI) was calculated using the following formula: 10 × serum albumin (grams per deciliter) + 0.005 × total lymphocyte count (per millimeter cube).

2.5. Evaluation of postoperative complications

Postoperative morbidities were defined as complications occurring during the postoperative stay at the hospital. Complications were graded according to the Clavien-Dindo classification [15]. We included complications with grades ranging from 1–5; grade 3 or greater was defined as a severe complication. Hospital mortality after gastrectomy was defined as postoperative death from any cause within 30 d after surgery or death during postoperative hospitalization. Risk factors for postoperative complications that were characteristic in the E group were investigated, respectively.

2.6. Statistical analyses

Data were analyzed using Statistical Package for Social Sciences (SPSS), version 18.0 for Windows (IBM SPSS, Inc, Chicago, IL). Univariate analyses of clinicopathologic findings and postoperative complications were performed using the chi-square test, Fisher's exact test, or the Mann–Whitney U-test. The subsequent multivariate logistic regression analysis included factors that had significant associations in the univariate analyses. Survival rates were estimated using the Kaplan–Meier method and were compared using the log-rank test. The date of gastrectomy was used as the starting point of the survival analyses. Univariate and multivariate analyses of prognostic factors related to the survival were performed using the Cox's proportional hazards model. P values <0.05 were considered significant.

3. Results

3.1. Clinicopathologic features

Table 1 summarizes the background and operative data from the two groups. Of the 186 patients in the E group, 108 (58.1%) were male and 78 (41.9%) were female, with a mean (±standard deviation) age of 83.9 ± 3.1 y. Of the 807 patients in the NE group, 576 (71.4%) were male and 231 (28.6%) were female, with a mean age of 66.6 ± 9.5 y. Significant differences were found between the groups in terms of gender, alcoholism, and smoking habits. Cardiovascular and neurologic comorbidities were more frequently observed in the E group, whereas hepatobiliary comorbidity and diabetes mellitus were more frequent in the NE group. There were no significant differences in terms of pulmonary and urologic comorbidities. Moreover, there was no significant difference between the CCIs of the E group and the NE group; however, the American Society of Anesthesiologist score indicated that the E group included many patients with severe