Comparison of survival of surgical resection and conservative treatment in patients with gastric cancer aged 80 years or older: a single-center experience

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Purpose: With the increase in the average life expectancy, the elderly population continues to increase rapidly. However, no consensus has been reached on the feasibility for surgical resection due to the high morbidity and mortality rate after surgical treatment in elderly patients caused by aging and underlying diseases.
Methods: This study was performed with patients aged 80 years and older. The subjects were classified into 2 groups as follows: the surgical resection group consisting of 61 patients, and the conservative treatment group consisting of 39 patients suitable for curative resection.
Results: Mean age and clinical stages in the conservative treatment group were higher than those in the surgical resection group. There was no significant difference in sex, location of the lesion, histological type, or underlying disease. The mean survival time of surgical resection group and conservative treatment group was respectively 52.1 ± 2.66 months and 37.1 ± 5.08 months ($P < 0.05$) for clinical stage 1 disease, 41.7 ± 5.16 months and 22.4 ± 6.07 months ($P = 0.004$) for stage 2 disease, and 31.7 ± 9.37 months and 10.6 ± 1.80 months ($P = 0.049$) for stage 3 disease. However, as for the extent of lymph node resection for the different stages, we observed no significant difference between the 2 groups.
Conclusion: Surgical resection in all clinical stages, except stage 4, showed a higher survival rate than conservative treatment. To minimize postoperative surgery complications, limited lymph node dissection should also be considered.
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Key Words: Stomach neoplasms, 80 and over aged, Mortality

INTRODUCTION

With the average life expectancy of the South Korean population in 2013 being 81.94 years, the elderly population in South Korea continues to increase rapidly. In 2010, the middle-aged group accounted for most of the population, which shows a bell-shaped age distribution. South Koreans in their 20s and younger accounted for 37.3% of the total population; those in their 30s to 50s, for 47.2%; and those in their 60s and older, for 15.5%. However, the shape of the population pyramid will change into an inverted triangle by the year 2060, when the current baby boomers will be in their 80s and when people in their 60s and older will account for the largest portion of the South Korean population at 47.4%. In addition, life expectancy among the elderly has also increased continuously, with life expectancy at 80 years and older having increased by 5.06 years in 1970 to 9.53 in 2013 and those at 90 years and older having increased by 5.14 years [1]. The occurrence and treatment of cancer in elderly patients according to such aging trends are gradually adding to its importance.

In South Korea, stomach cancer is the most common type of primary cancer in men (incidence at 85.1 persons per 100,000

population; age-standardized incidence at 63.3 persons per 100,000 population) and the second most common cause of death due to cancer in women (incidence at 41.1 persons per 100,000 population; age-standardized incidence at 25.1 persons per 100,000 population) [2]. In addition, it is the second (after lung cancer) most common cause of death due to cancer in the elderly aged 80 years and older. The increase in life expectancy from the removal of gastric cancer is 8.39 years. However, no consensus has been reached on the feasibility for surgical resection due to the high morbidity and mortality rates after surgical treatment in elderly patients caused by aging and underlying diseases. Therefore, in this study, we aimed to compare survival rates between surgical resection and conservative treatment in elderly patients with stomach cancer who were aged 80 years and older from a single institution, for the purpose of finding the significance of surgical resection for elderly patients with stomach cancer.

METHODS

This study was performed with patients aged 80 years and older who visited the gastrointestinal surgical center of Asan Medical Center for 2 years between July 1, 2009, and June 30, 2011. All of the patients underwent esophagogastroduodenoscopy and CT. Patients who were clinically not capable of undergoing curative resection because of clinical stage IV stomach cancer and those who received endoscopic submucosal dissection or endoscopic mucosal resection were excluded. Patients with insufficient medical records and those who were not followed up after diagnosis because there was no way of contacting them or their caregivers were also excluded from the study. Finally, the subjects were classified into 2 groups as follows: (1) the surgical resection group consisting of 61 patients who underwent surgical treatment; and (2) the conservative treatment group consisting of 39 patients suitable for surgical resection but had underlying diseases and surgical risks, and also patients or family members who decided against surgical resection, therefore conservative treatment group consisted of only bypass operation because of high risk of resection, chemotherapy, or observation. A retrospective analysis of medical records was performed for the 2 groups. Age at diagnosis, sex, underlying diseases, length of survival from the time of diagnosis, clinical stage, and location and histological classification of the lesion were examined in both groups. In the surgical resection group, histological stage, surgical methods, anastomotic technique, level of lymph node dissection, hospital stay duration, and acute postoperative complications were additionally investigated by using the patients' medical records. As for the patients who did not undergo follow-up in the same institution during the process of conservative treatment, whether surgery and chemotherapy

were undergone and whether death occurred in another institution, were checked after obtaining approval by contacting their caregivers via wired communication.

In this paper, clinical stage was determined according to the American Joint Committee on Cancer (AJCC) 7th edition, based on CT results [3]. In addition, underlying diseases were quantified according to the comorbidity component scoring system of the Charlson Comorbidity Index [4].

For statistical analysis, independent-sample t-test, chi-square test, and Fisher exact test were used for comparison between the 2 groups. Survival curves were created by using the Kaplan-Meier curves, which were verified by the log-rank test. The risk of death due to surgery was analyzed by using the Cox regression model. All statistical analyses were derived using the PASW Statistics ver. 18.0 (SPSS Inc., Chicago, IL, USA).

RESULTS

The surgical resection and conservative treatment groups consisted of 61 and 39 subjects, respectively. Their mean age at the time of diagnosis were 82.36 ± 2.21 years and 83.64 ± 3.36 years, respectively, indicating older age in the conservative treatment group. Regarding clinical stage, as determined according to the AJCC 7th edition, stage 1 (stage IA and IB), 2 (stage IIA and IIB), and 3 (stages IIIA, IIIB, and IIIC) were found in 38, 16, and 7 subjects, respectively, in the surgical resection group, and in 13, 13, and 13 subjects in the conservative treatment group. The clinical stages in the conservative treatment group were statistically significantly higher than those in the surgical resection group. The most common locations of the lesions in each group were lower third and lesser curvature side. The most commonly observed gross type was type IIc in early gastric cancer and Borrmann type 3 in advanced gastric cancer. Moderately differentiated type of tubular adenocarcinoma was also commonly observed. The comorbidity component scores of the Charlson Comorbidity Index were calculated for the underlying diseases. The scores in the surgical resection and conservative treatment groups were 0.34 ± 0.73 and 0.38 ± 0.85 (P = 0.800), respectively. The 2 groups had no significant difference in sex, location of the lesion, histological type, and underlying disease (Table 1).

Of the 61 patients who underwent surgical resection, 20 underwent laparoscopic surgery and 41 underwent open surgery. Furthermore, of the 61 patients, 13 underwent total gastrectomy, and 48 underwent distal gastrectomy. During distal stomach resection, Billroth I anastomosis was performed in 35 patients; Roux-en-Y gastrojejunostomy in 6 patients; and Billroth II anastomosis in 7 patients. The level of lymph node dissection was D0 in 3 patients, D1 or D1+ in 31, and D2 or D2+ in 27. The mean number of retrieved lymph nodes was 27.02 ± 9.79 (range, 4–46). The postoperative hospital stay was 10.16 ± 6.26

Table 1. Comparison of clinicopathologic profiles of surgical resection and conservative treatment group

Variable	Surgical resection (n=61)	Conservative treatment (n=39)	P-value
Age (yr)	82.36 ± 2.21	83.64 ± 3.36	0.039
Comorbidity component score	0.34 ± 0.73	0.38 ± 0.85	0.800
Sex			0.140
Male	46 (75.4)	24 (61.5)	
Female	15 (24.6)	15 (38.5)	
Clinical stage			0.007
Stage 1 (IA:IB)	38 (21:17)	13 (7:6)	
Stage 2 (IIA:IIB)	16 (8:8)	13 (6:7)	
Stage 3 (IIIA:IIIB:IIIC)	7 (5:2:0)	13 (11:2:0)	
Tumor location			0.482
Lower third	47 (77.0)	25 (64.1)	
Middle third	6 (9.8)	7 (17.9)	
Upper third	7 (11.5)	6 (15.4)	
Entire	1 (1.6)	1 (2.6)	
Tumor position			0.226
Anterial wall	12 (19.7)	3 (7.7)	
Posterial wall	11 (18.0)	8 (20.5)	
Lesser curvature	28 (45.9)	15 (38.5)	
Greater curvature	8 (13.1)	8 (20.5)	
Circular	2 (3.3)	3 (7.7)	
Macroscopic gross type			0.117
I	3 (4.9)	2 (5.1)	
IIa	11 (18.0)	1 (2.6)	
IIb	7 (11.5)	1 (2.6)	
IIc	8 (13.1)	5 (12.8)	
III	1 (1.6)	1 (2.6)	
B1	0 (0)	1 (2.6)	
B2	11 (18.0)	10 (25.6)	
B3	17 (27.9)	13 (33.3)	
B4	3 (4.9)	5 (12.8)	
Histologic type			0.085
Tubular adenocarcinoma			
Well differentiated	9 (14.8)	9 (23.1)	
Moderately differentiated	26 (42.6)	13 (33.3)	
Poorly differentiated	21 (34.4)	9 (23.1)	
Mucinous adenocarcinoma	2 (3.3)	0 (0)	
Signet ring cell	2 (3.3)	3 (7.7)	
Unknown	1 (1.6)	5 (12.8)	

days (range, 6–44 days). The most common postoperative acute complications were intra-abdominal infection in 4 patients, followed by pneumonia in 2 patients, wound infection in 2, delayed intestinal obstruction in 1, anastomotic stricture in 1, and anastomotic leakage in 1. The patient with anastomotic leakage was discharged after undergoing reoperation and Roux-en-Y gastrojejunostomy conversion. Twenty-two patients of the surgical resection group should have received chemotherapy based on pathologic stage; however, only 11 patients received chemotherapy. The chemotherapy regimens were S1 (tegafur, gimeracil, oteracil), polysaccharide-k, doxifluridine, or combination of polysaccharide-k and doxifluridine.

Of the 39 patients in the conservative treatment group, 21 (53.85%) refused the surgical resection by themselves, and 9 (23.08%) by their family, and 8 (20.51%) decided based on their medical doctors' judgments. One patient agreed to surgical resection on doctors' recommendations; however, only bypass gastrojejunostomy was done because of duodenal second portion invasion of gastric cancer. Of the 39 patients, 8 patients only received chemotherapy by S-1, 1 patient bypass only, and the other 30 patients received supportive care only. The clinical disease stage was estimated to be stage 3 or higher in 6 of the 9 patients who selected conservative treatment based on their physician's opinion. In the remaining 3 patients, the clinical disease stage was estimated to be below stage 2. However, their general conditions in terms of the Eastern Cooperative Oncology Group performance status showed a score of 3 points or higher, which indicated a high risk of surgery [5].

In the comparison of survival rates between the surgical resection and conservative treatment groups, the mean survival time was respectively 52.1 ± 2.66 months and 37.1 ± 5.08 months (P < 0.05) for the patients with clinical stage I disease, 41.7 ± 5.16 months and 22.4 ± 6.07 months (P = 0.004) for the patients with stage II disease, and 31.7 ± 9.37 months and 10.6 ± 1.80 months (P = 0.049) for the patients with stage III disease, indicating that the surgery group had significantly longer survival time than the conservative treatment group (Fig. 1). However, when comparing survival according to the extent of lymph node resection for the different stages, we observed no significant difference between the 2 groups (Fig. 2). Even in the subgroup analyses based on age, sex, and clinical stages, we observed more favorable results from surgery than from conservative treatment (Fig. 3).

DISCUSSION

Stomach cancer stage is a major factor in determining the treatment method and predicting patient prognosis. Clinical stage is determined through physical examination, gastroscopy and ultrasonography, biopsy, and medical imaging tests (CT scan, etc.). For assessment of disease prognosis, clinical stage is less accurate than postoperative pathological stage. However, in the conservative treatment group, the histological stage was unknown. In this study, the 2 groups were compared based on clinical stage as determined according to computed tomographic results. In the surgical resection group excluding 3 patients of insufficient lymph node resection to estimate the accurate pathologic stage, the concordance between clinical stage and pathologic stage was fair (weighted κ = 0.345, P < 0.001) (Table 2).

Endo et al. [6] performed a study that compared a group of patients who underwent surgery and a second group of patients who underwent conservative treatment of stomach cancer. The patients in both groups were 85 years and older. The results showed that surgery improved the survival rates of women, aged 85–89 years, and patients who had stage IB–IIC disease, whereas conservative treatment was considered a better choice than surgery for men, aged 90 years and older, and patients who had stage IA. In the present study, the women showed a lower mortality risk after curative resection than that in the men, but the difference was not statistically significant. In addition, the stage 1, 2, and 3 cases all showed that surgery can increase survival rate. Although risk increases with age, surgery was
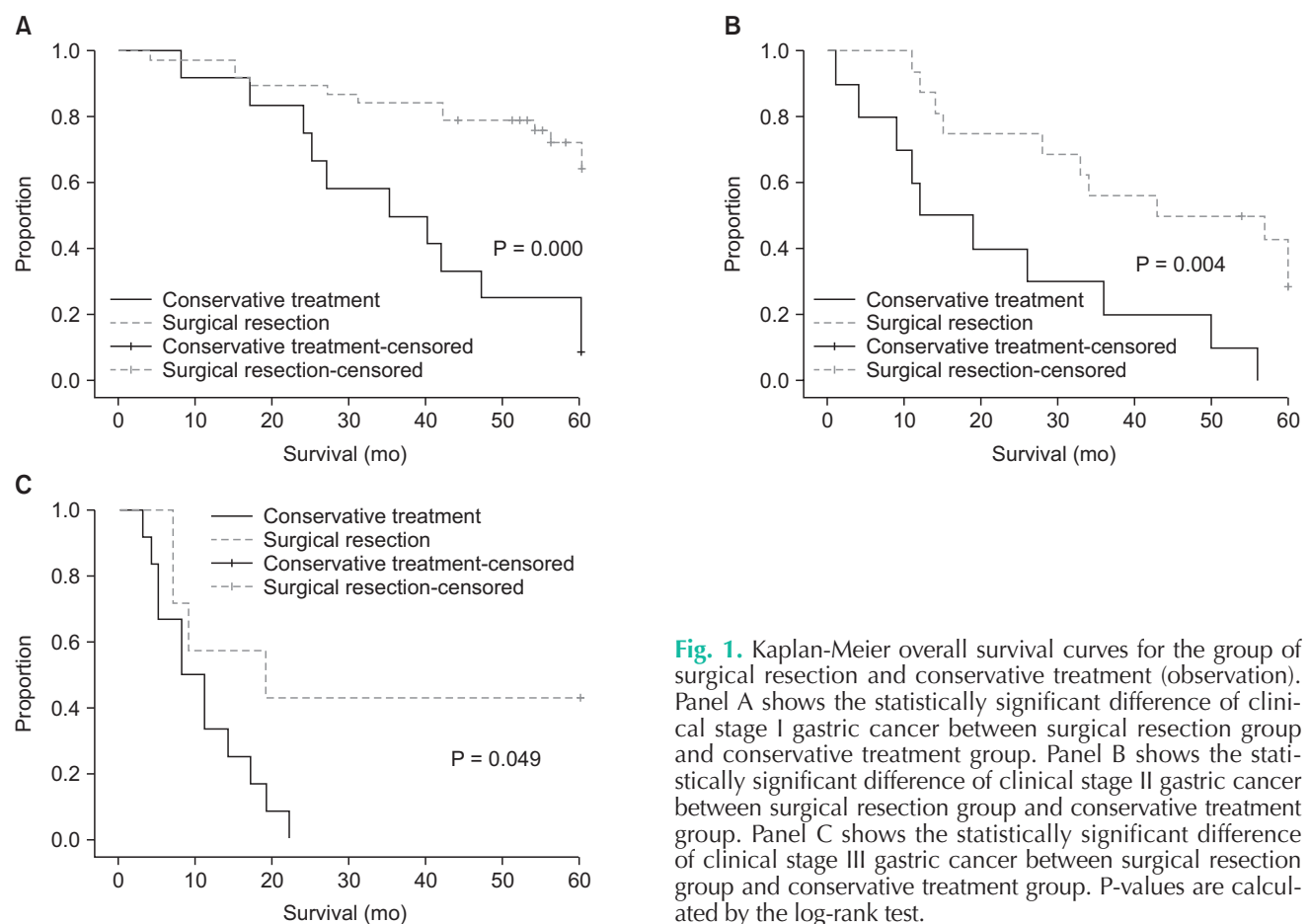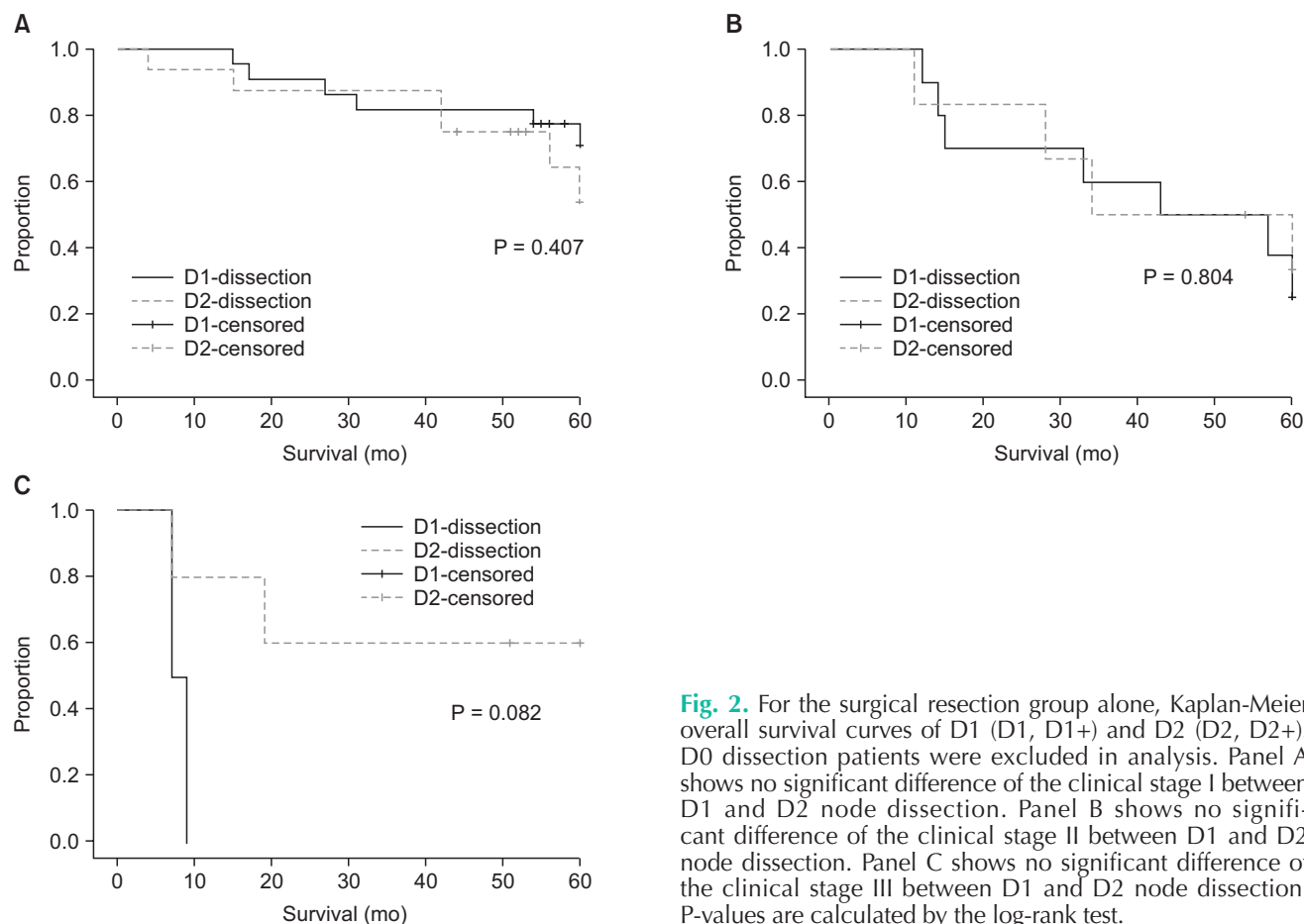

Fig. 1. Kaplan-Meier overall survival curves for the group of surgical resection and conservative treatment (observation). Panel A shows the statistically significant difference of clinical stage I gastric cancer between surgical resection group and conservative treatment group. Panel B shows the statistically significant difference of clinical stage II gastric cancer between surgical resection group and conservative treatment group. Panel C shows the statistically significant difference of clinical stage III gastric cancer between surgical resection group and conservative treatment group. P-values are calculated by the log-rank test.

Fig. 2. For the surgical resection group alone, Kaplan-Meier overall survival curves of D1 (D1, D1+) and D2 (D2, D2+). D0 dissection patients were excluded in analysis. Panel A shows no significant difference of the clinical stage I between D1 and D2 node dissection. Panel B shows no significant difference of the clinical stage II between D1 and D2 node dissection. Panel C shows no significant difference of the clinical stage III between D1 and D2 node dissection. P-values are calculated by the log-rank test.

Fig. 3. Subgroup analysis of overall survival for the surgical resection group and conservative treatment group. HR, hazard ratio; CI, confidence interval.

Table 2. Clinical stage and pathologic stage of surgical resection group

Clinical stage	Pathologic stage			Total
	1 (IA–IB)	2 (IIA–IIB)	3 (IIIA–IIIC)	
1 (IA-IB)	27	6	3	36
2 (IIA-IIB)	4	5	6	15
3 (IIIA-IIIC)	0	3	4	7
Total	31	14	13	58

superior to conservative treatment in all age groups. However, in the present study, the patients aged 80–85 years accounted for the majority (n = 82), and only 3 patients were 90 years and older. Additional research would be needed to investigate the effects of curative surgery in patients older than 85 and 90 years.

The indications for surgical treatment in elderly patients with stomach cancer will be gradually expanded. This is because the morbidity and mortality rates from postoperative complications in elderly patients has continued to decrease over time, in the least, as a result of the improvement of performance of elderly patients and postoperative management, including surgical techniques and postoperative intensive care treatments [7]. In addition, as for the indications for surgical treatment, a well-known fact is that surgical resection or chemotherapy, if possible, is a better option than conservative treatment for improving patient quality of life [8,9]. According to a study conducted from 1987 to 2004 on the mortality rate within 90 days after abdominal surgery, the mortality rate was 8.1% in the patients aged 80 to 84 years, 12.6% in those aged 85 to 89 years, and 16.7% in those older than 90 years [10]. However, according to recent research on patients aged 70 years and older, no significant differences in complications, morbidity, and hospital stay duration after surgery were found between patients younger and those older than 80 years [11]. Similarly, no significant difference in morbidity rate after D2 lymph node dissection was found between patients younger and those older than 70 years old [12]. In our study, no postoperative deaths occurred within 90 days, and death occurred within 12 months after surgery in 6 patients, which accounts for only 9.8% of the study subjects. Among the 6 patients, 1 died from the progression of stomach cancer, 1 died from systemic weakness after surgery, and the other 4 died despite surgery for stomach cancer. The hospital stay of 15 patients (24.6%) was longer than 11 days because of complications after surgery.

Extended lymph nodes dissection does not improve the 5-year survival rate of elderly patients, but rather it was reported to increase mortality and morbidity already [13]. Therefore, during curative resection in elderly patients, a limited range of lymph node dissection is needed to reduce complications and morbidity. Moreover, this study showed no significant difference in survival rate between D1 and D2 lymph node dissections in the elderly.

This study is a retrospective study of medical records. Owing to the small number of subjects, controlling the risk factors that could have influenced survival rate was limited. Thus, we could not clearly present the surgical indications in the elderly patients. In addition, during the initial evaluation, we could not obtain enough information about the general conditions. Because of the selection bias of the conservative treatment group, this study is limited in that the prognosis of the patients in the curative resection group could have been better. In addition, most of the patients refused to undergo chemotherapy, received a reduced dose, or discontinued the treatment because of drug side effects, which made it impossible to analyze the effects of chemotherapy. In this study, a randomized comparative study would be impossible to perform because of ethical issues and rights in making decisions regarding treatment methods in accordance with the beliefs and values of the patients and their caregivers. However, if sufficient information on the surgical indications in elderly patients can be obtained through follow-up studies and additional data collection and analysis, it will be greatly helpful in patients' decision-making process.

In this study, among the elderly patients with stomach cancer, those in the conservative treatment group were older on average and showed higher clinical stage than those in the surgical resection group. However, surgical resection in all clinical stages, except stage 4, showed a higher survival rate than conservative treatment. Therefore, if surgical resection is possible for elderly patients with stomach cancer, it should actively be considered for these patients. To minimize postoperative surgery complications, limited lymph node dissection should also be considered.

CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

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