Complications and Survival Rate of Patients Over 80 Years Old Who Underwent Laparoscopic Gastrectomy for Gastric Cancer

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Purpose: As the life expectancy increases, the population of elderly patients increases. We evaluated the complications and survival rate of patients over 80 years old, who underwent laparoscopic gastrectomy.

Methods: A retrospective analysis was conducted for a total of 1,912 patients, who underwent surgery with stomach cancer from 2008 to 2016. We analyzed postoperative complications and the survival rate between the middle old (70~79, n=255) group and the very old (≥ 80 , n=37) group.

Results: Among 1,912 patients, 255 people in the middle old group and 37 people within the very old group underwent laparoscopic gastrectomy. We confirmed that there was no significant difference except for the age ($p<0.001$) between the two groups. Overall complications were not statistically significantly different between the Middle old (70~79) group and the very old (≥ 80) group, 11.8% and 16.2%, respectively. There were also no statistically significant differences in severe complications beyond Clavien-Dindo classification Grade III. Risk factors for overall complications were higher in males than in females ($p=0.002$). Overall survival was statistically significantly lower with very old group ($p<0.001$).

Conclusion: Laparoscopic gastrectomy in gastric cancer patients over 80 years of age is feasible and safe in terms of complications. However, considering the life expectancy, it seems necessary to pay attention to the patients who apply surgery.

Keywords: Elderly, Stomach cancer, Complications, Gastrectomy

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INTRODUCTION

The number of elderly population is increasing worldwide, and the number of elderly patients with gastric cancer also increases.¹ Similarly, in South Korea, in the statistics of patients who underwent gastrectomy, the percentage of patients aged 71 or over increased to 9.1% in 2009 and 25.3% in 2014.²

In a study of patients over 80 years of age, surgical treatment has shown a better prognosis over supportive care.³ However, due to the concerns of postoperative complications and mortality, there are many difficulties in decision of surgical treatment.^{4,5}

In this study, we divided the middle old (70~79) group and the very old (≥ 80) group to compare postoperative complica-

tions and the survival rate between the two groups.

MATERIALS AND METHODS

Patients

In this retrospective study, from September 2008 to December 2016, 1,912 patients who underwent gastrectomy with gastric cancer at OOOOO University, OOOO hospital were included. Patients were divided into middle old (70~79, n=255) group and the very old (≥ 80 , n=37) group.⁶ Patients were included, who only underwent laparoscopic gastrectomy.

All patients underwent D1+or D2 lymph node dissection, according to the guidelines of the Japanese Society of Gastric Cancer.⁷ The surgical method was selected by the surgeon, according to the location of cancer lesion and the condition of the patient. The resection method and anastomosis method(Biloth I, Billoth II, Roux-en Y) were determined by the surgeon according to the situation of the operation filed. Proximal gastrectomy used double tract reconstruction. Most patients were treated according to a standardized clinical pathway. On the second POD, patients were allowed to start drinking clear fluid. On the third POD, a soft diet was started to patients. Drainage tubes were removed after soft diet if the drainage fluid was clear.

Postoperative complications were classified to Clavien-Dindo classification.⁸ Severe complications defined as higher than grade III. The average follow-up period was 28.3 ± 20.8 months (range 0~97 months).

Statistical analysis

Statistical analysis was performed using IBM SPSS Statistics ver. 21.0 (IBM Co., Armonk, NY, USA).

Patient age, gender, American Society of Anesthesiologist (ASA), tumor size, Operative time, body mass index (BMI), No. of resected lymph nodes, Comorbidity, TNM stage according to the 7th TNM classification,⁹ Extent of Operation, overall survival was included in the analysis. Differences between the two groups were analyzed using the Student's t test for continuous variables and the Chi square or Fisher's exact tests for proportions. Patient survival was evaluated using the Kaplan-Meier method and analyzed using the log-rank tests. A p value < 0.05 from the two-tailed test was defined significant.

Table 1. Clinicopathologic characteristics of two groups

Variables	Age (70 ~ 79) (n = 255)	Age (≥ 80) (n = 37)	p value
Age, year	73.8 $\pm$ 2.7	81.3 $\pm$ 1.5	<0.001
Sex			0.329
Male	139 (54.5)	17 (45.9)	
Female	116 (45.5)	20 (54.1)	
ASA SCORE			0.559
1	39 (15.4)	8 (21.6)	
2	198 (78.0)	26 (77.0)	
3	17 (6.7)	3 (8.1)	
Tumor size, cm	3.4 $\pm$ 2.3	3.5 $\pm$ 2.3	0.791
Operative time, min	191.5 $\pm$ 43.6	183.8 $\pm$ 33.3	0.210
Body mass index, kg/m ²	23.9 $\pm$ 3.5	22.8 $\pm$ 2.4	0.720
No. of resected lymph nodes	30.4 $\pm$ 11.8	29.8 $\pm$ 11.3	0.769
Estimated blood loss, ml	90.8 $\pm$ 64.0	102.7 $\pm$ 96.3	0.142
Comorbidity			0.858
Yes	156 (61.2)	22 (59.5)	
No	99 (38.8)	15 (40.5)	
T stage			0.576
T1	194 (76.1)	25 (67.6)	
T2	27 (10.6)	4 (10.8)	
T3	19 (7.5)	4 (10.8)	
T4	15 (5.9)	4 (10.8)	
N stage			0.480
N0	195 (76.5)	27 (73.0)	
N1	35 (13.7)	4 (10.8)	
N2	17 (6.7)	3 (8.1)	
N3	8 (3.1)	3 (8.1)	
Stage, n			0.196
I	200 (78.4)	27 (73.0)	
II	37 (14.5)	4 (10.8)	
III	18 (7.1)	6 (16.2)	
Extent of operation			0.481
Distal gastrectomy	225 (88.2)	35 (13.5)	
Total gastrectomy	17 (6.7)	0 (0)	
Proximal gastrectomy	13 (5.1)	2 (5.4)	

RESULTS

Clinicopathologic characteristics

Clinicopathologic findings of the 292 patients are summarized in Table 1. The average age in the middle old group was 73.8 ± 2.7 years, while the average age in very old group was 81.3 ± 1.5 years (range, 80~84 years; $p < 0.001$). There was no statistical difference between the two groups for gender, American Society of Anesthesiologist (ASA), tumor size, Operative time, body mass index (BMI), No. of resected lymph nodes, Comorbidity, TNM stage according to the 7th TNM classification (9), Extent of Operation.

Postoperative outcomes

Postoperative outcomes are shown in Table 2. Overall complications (grade II or higher) occurred with similar frequency in the middle old group and very old groups (11.8 vs. 16.20 %; $p = 0.426$). Severe complications (grade III or higher) were also similar between the 2 groups (6.7 vs. 5.4 %; $p = 1.000$). The 2 groups were similar in terms of operation time. The 2 groups were similar in terms of hospital stay, time to first flatus, mortality. The cause of death of the mortality case of very old group is pneumonia.

Risk factors for complication in elderly patients

Risk factors for complication in elderly patients in Table 3. Risk factors for overall complications (grade I or higher) in the elderly patients (≥ 70 years) were only gender, in the uni-

variable analysis [Odds ratio 1.4, 95 % confidence interval (CI) 0.7~2.8; $p = 0.002$]. There are no risk factors for severe complications (grade III or higher) in elderly patients (≥ 70 years).

Survival of middle old (70~79) and very old (≥ 80) patients

Fig. 1 shows the overall survival of middle old (70~79) and very old (≥ 80) patients. The mean follow-up period was 86.3 ± 2.7 months (95% confidence interval [CI], 83.8~93.9

Table 3. Risk factors for complication in elderly patients

	Overall complication (grade I or higher ^a)			p value
	No (n=256)	Yes (n=36)	Odds ratio (95% CI)	
Age, years				0.426
70 ~ 79	225 (87.9)	30 (83.3)		
≥ 80	31 (12.1)	6 (16.7)		
Sex			1.4 (0.7 ~ 2.8)	0.002
Male	128 (50.0)	28 (77.8)		
Female	128 (50.0)	8 (22.2)		
Estimated blood loss, ml				0.098
<100	198 (77.3)	27 (75.0)		
≥ 100	58 (22.7)	9 (25.0)		
Body mass index, kg/m ²				0.459
<25	167 (65.2)	21 (58.3)		
≥ 25	89 (34.8)	15 (41.7)		
ASA score				0.732
1, 2	238 (93.0)	33 (91.7)		
3	18 (7.0)	3 (8.3)		
Comorbidities				0.855
No	99 (38.7)	15 (41.7)		
Yes	157 (61.3)	21 (58.3)		
Extent of resection				0.704
DG, PG	240 (93.8)	35 (97.2)		
TG	16 (6.3)	1 (2.8)		
pN stage				1.000
N0	192 (75.0)	30 (83.3)		
N1 ~ N3	64 (25.0)	6 (16.7)		
TNM stage				1.000
I, II	235 (91.8)	33 (91.7)		
III	21 (8.2)	3 (8.3)		

Table 2. Postoperative outcomes with morbidity and mortality according to group

	Age (70 ~ 79) (n=255)	Age (≥ 80) (n=37)	p value
Overall complication (grade I or higher ^a)			0.426
No	225 (88.2)	31 (83.8)	
Yes	30 (11.8)	6 (16.2)	
Severe complication (grade III or higher ^a)			1.000
No	238 (93.3)	35 (94.6)	
Yes	17 (6.7)	2 (5.4)	
Hospital stay, days	11.4 ± 8.4	11.9 ± 5.8	0.937
Time to first flatus	3.3 ± 1.6	3.8 ± 2.1	0.098
Mortality	0	1 (2.7) ^b	0.127

^aClavien-Dindo classification; ^bPneumonia.

Table 3. Continued

	Severe complication (grade III or higher ^a)		Odds ratio (95% CI)	p value
	No (n=273)	Yes (n=19)		
Age, years				1.000
70 ~ 79	238 (87.2)	17 (89.5)		
≥80	35 (12.1)	2 (10.5)		
Sex				0.095
Male	142 (52.0)	14 (73.7)		
Female	131 (48.0)	5 (26.3)		
Estimated blood loss, ml				0.131
<100	211 (77.3)	14 (73.7)		
≥100	62 (22.7)	5 (26.3)		
Body mass index, kg/m ²				0.704
<25	175 (64.1)	13 (68.4)		
≥25	98 (35.9)	6 (31.6)		
ASA score				1.000
1, 2	253 (92.7)	18 (94.7)		
3	20 (7.3)	1 (5.3)		
Comorbidities				0.472
No	105 (38.5)	9 (47.4)		
Yes	168 (61.5)	10 (52.6)		
Extent of resection				1.000
DG, PG	257 (94.1)	18 (94.7)		
TG	16 (6.3)	1 (2.8)		
pN stage				1.000
N0	207 (75.8)	15 (78.9)		
N1 ~ N3	66 (24.2)	4 (21.1)		
TNM stage				1.000
I, II	250 (91.6)	18 (94.7)		
III	23 (8.4)	1 (5.3)		

^aClavien-Dindo classification; CI = confidence interval; ASA = American Society of Anesthesiologist; DG = distal gastrectomy; PG = proximal gastrectomy; TG = total gastrectomy.

months); patients in the middle old group had a mean overall survival of 88.8 ± 2.6 months (95% CI, 83.8~93.9 months); while patients in the very old group had a mean overall survival of 37.0 ± 2.8 months (95% CI, 31.5~42.4 months). Overall survival of the very old group was worse than the middle old group ($p < 0.001$).

Fig. 1. Overall survival of middle old (70 ~ 79) and very old (≥80) Patients.

DISCUSSION

The definition of the elderly has not been established yet. It is also the definition of elderly patients. It is classified as being over 70 years old,^{10,11} over 75 years old,^{4,12} over 80 years old^{13,14} by each research. As the life expectancy increases, patients who underwent surgery with stomach cancer tend to be increasing.² The expected life expectancy of the population over 80 years old is 9.5 years: 8.0 years and 10.3 years in men and women, respectively.¹⁵ In this study, we followed the classification of research defined by middle old and very old in the definition of elderly people.⁶

Gastric cancer occurs more frequently in men. In our study, the middle old group reflects these tendencies well (male:female=54.5%:46.5%). However, these male-female ratios are the opposite in the very old group (male:female = 45.9%:54.1%). It seems that women's average life expectancy is higher than men's life expectancy. For each group, there are no other statistical differences. The number of resected lymph nodes in the middle old group was like very old group ($p=0.769$). These results reflect that both groups lymph node dissection was properly implemented.

Overall, complication had no statistical significance, but very old group showed high frequency (11.8% vs 16.2%). On the other hand, severe complication showed low frequency of very old group (6.7% vs 5.4%). This seems to be the result of selection bias of the very old group. Patients with relatively good performance tend to undergo surgery. There is no difference between the ASA scores of both groups, which evidence supports this.

There are reports of an advanced stage of tumor growth,¹⁶ prolonged operation times and excessive blood loss,¹⁷ gender (male),¹³ ASA score¹⁴ as independent prognostic factors affect-

ing complications in elderly patients. In this study, only Gender (male) was risk factor in complications with univariable analysis. A man is higher in visceral obesity than women¹⁸ and is exposed to many risk factors such as smoking and drinking, from a cultural environment.¹⁹ There was one mortality in this study. An 83-year-old male patient without comorbidities, it was death from pneumonia. The postoperative care of elderly patients should carefully manage even unpredictable problems.

The mean overall survival of very old group in this study was 37.0 ± 2.8 months (95% CI, 31.5~42.4 months). Overall, survival of the very old group was worse than the middle old group ($p < 0.001$). Most of the deaths of the very old group were caused by natural cause, or other diseases, and not due to gastric cancer. The reason why the treatment plan cannot be easily applied to elderly patients is that there are many unpredictable variables. From the results of this study, laparoscopic gastrectomy is a safe and useful surgical procedure for gastric cancer patients over 80 years of age. However, from the standpoint of survival, it seems to be necessary to use a customized treatment strategy for each patient. Elderly patients, who are judged to be able to undergo surgical treatment, are thought to be useful for aggressive treatment.

This study has several limitations. Firstly, relatively well function patients who performed surgery. Secondly, the number of patients over 80 years old is small. Therefore, prospective studies on treatment strategies for elderly patients are needed.

Laparoscopic gastrectomy in gastric cancer patients over 80 years of age is feasible and safe in terms of complications. However, patients with the elderly have many unpredictable variables and it is difficult to predict life expectancy, so survival benefit must be considered carefully. Also, since there are possibilities that various problems may arise after surgery, it seems that more detailed post-operative care will be necessary.

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