

Quality of life changes in elderly patients after gastrectomy: perspective of an aged Asian society in the 2010s

Ji Hyun Jung¹, Seung Soo Lee^{1,2}, Ho Young Chung^{1,2}

¹Department of Surgery, Kyungpook National University Hospital, Daegu, Korea

²Department of Surgery, School of Medicine, Kyungpook National University, Daegu, Korea

Purpose: The study aimed to investigate how elderly gastric cancer patients do postoperatively in terms of quality of life (QoL) compared to younger patients. We also investigated how the QoL of elderly gastric cancer patients has changed over the last decade in the aging population.

Methods: We included 113 elderly (≥ 70 years) and 202 younger patients, who underwent distal gastrectomy for stage I gastric cancer during the 2010s. The European Organisation for Research and Treatment of Cancer quality of life questionnaires were used to assess preoperative and postoperative (3-month/1-year) QoL. The baseline QoL and postoperative QoL changes were compared. The elderly patients were further grouped into the early- and late-2010s groups, based on the year of surgery, and their QoL and clinical data were compared.

Results: The baseline QoL was significantly different on some scales (physical/role functionings, and pain/dyspnea/dysphagia) in favor of younger patients. The postoperative QoL changes were not different with the exception of emotional functioning (1-year postoperatively) in favor of younger patients. Compared to the early-2010s group, comorbidities were more frequent, and the proportion of stage IA cancer was higher in the late-2010s group. There were no QoL differences with the exception of insomnia and financial difficulties (3-months postoperatively) in favor of the late-2010s group.

Conclusion: Despite baseline QoL differences, elderly gastric cancer patients did as well as younger patients in terms of postoperative QoL changes. More elderly gastric cancer patients with comorbidities are undergoing gastrectomies nowadays and it does not cause them a significant QoL disadvantage.

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Key Words: Aging, Gastrectomy, Quality of life, Stomach neoplasms

INTRODUCTION

Since 2017, South Korea has officially become an aged society, with an aging rate exceeding 14% [1-3], and it is not uncommon for a surgeon to encounter elderly patients seeking surgical treatment after a cancer diagnosis. A number of organizations or organization subcommittees have been set up for the proper care and management of elderly patients [4], and, as part of this,

the Korean Surgical Society has recently launched the Korean Geriatric Surgery Society [5].

The tendency toward a high prevalence of comorbid conditions in elderly patients has frequently been reported [6,7], and their safety and well-being after cancer surgery have become tremendous concerns. Advanced age has often been reported as one of the influential factors associated with refusing surgery by cancer patients [8,9]. Concerns regarding

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Corresponding Author: Seung Soo Lee

Department of Surgery, Kyungpook National University Hospital, 130 Dongdeok-ro, Jung-gu, Daegu 41944, Korea

Tel: +82-53-200-5605, Fax: +82-53-421-0510

E-mail: peterleess@knu.ac.kr

ORCID: https://orcid.org/0000-0003-4398-6300

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disappointing recovery after successful surgery, along with frailty and overall life expectancy, have been suggested to influence their decision.

Although the mortality from gastric cancer alone is decreasing, it still is one of the most common cancers with high mortality in South Korea [10,11]. With the rapid aging of the population, cancer incidence and mortality are also increasing proportionally, and we expect to encounter more elderly gastric cancer patients over time. Thus, we need to verify the postoperative quality of life (QoL) of elderly gastric cancer patients to minimize patient dissatisfaction associated with the dismal gap between reality and expectations associated with gastric cancer and related surgery [12].

The aim of this study was to investigate how the QoL of elderly gastric cancer patients differed from that of younger patients during the perioperative period. We also compared the QoL outcomes between the early- and late-2010s to investigate how the QoL of elderly gastric cancer patients has changed over time in the aging population.

METHODS

Study design and participants

QoL and clinical data were retrospectively evaluated with approval from the Institutional Review Board (IRB) of Kyungpook National University Hospital (No. KNUH 2021-10-028). The IRB waived the requirement for informed consent for this study.

Between 2010 and 2019, a total of 566 patients, aged 55 years or older, underwent a distal subtotal gastrectomy for stage I gastric adenocarcinoma in our hospital. The stage grouping was in accordance with the 8th edition of the Union for International Cancer Control classification. The complete set of QoL data from the preoperative, postoperative 3-month, and postoperative 1-year periods were available for 318 of 566 patients. Patients with combined surgeries or histories of gastric resection that could influence their QoL were excluded, and one patient with combined surgery (total proctocolectomy with ileal pouch-anal anastomosis) for familial adenomatous polyposis and 2 patients with previous partial gastrectomies for benign gastric diseases were excluded. After these exclusions, data from 315 patients remained for the final analysis.

The patients were grouped into younger and older groups by age (<70 years vs. ≥70 years), and there were 202 and 113 patients available for each group. To understand the QoL trends in older patients during the 2010s, the older patients were further grouped by their year of surgery into the early-2010s (2010–2014, n = 67) and the late-2010s (2015–2019, n = 46) groups.

QoL assessment

The Korean version of the European Organisation for Research and Treatment of Cancer quality of life questionnaire (EORTC QLQ) core (-C30) and gastric cancer-specific (-STO22) modules were used to assess QoL [13]. All patient responses were self-reported without clinician intervention. Preoperative QoL was evaluated upon admission of the patient for surgery. Postoperative QoL was evaluated at scheduled visits to our outpatient department at 3-months and 1-year postoperatively. The patients were asked to respond to 52 items for each time period, and the responses were transformed into 24 scale scores of 0–100 in accordance with the scoring manual provided by the EORTC. A lower score indicated better QoL with 6 exceptions. For the global health status/QoL scale and the 5 functional scales (physical, role, cognitive, emotional, and social), a lower score indicated worse QoL.

Statistical analysis

The clinical and QoL outcomes of the younger (<70 years) and older (≥70 years) groups were compared. In the older group, the outcomes in the early and late 2010s were further compared. The demographic values were compared using chi-square tests for categorical variables and Student t-tests for continuous variables. The QoL outcomes were compared using Student's t-tests. A P-value of less than 0.05 was considered statistically significant. All statistical analyses were performed using IBM SPSS Statistics for Windows, ver. 25.0 (IBM Corp., Armonk, NY, USA).

RESULTS

Patient characteristics

The mean ages of the younger and older patients were 62.1 ± 4.5 and 74.4 ± 3.4, respectively (P < 0.001). There were 20 (9.9%) and 25 patients (22.1%) with comorbidities among the younger and older patients, respectively (P = 0.005). Cardiac conditions and histories of other malignancies were 2 of the most common comorbidities in both groups (Table 1).

There were no significant differences in surgical procedures and treatment outcomes between the groups. There were 13 younger patients (6.4%) and 7 older patients (6.2%) with postoperative complications, and the difference was not statistically significant. Among the grade III complications, there were 2 cases of wound closures in younger patients, and 1 case of bleeding control in older patients. The rest were cases of fluid collection controlled by percutaneous catheter drainage.

Baseline quality of life and postoperative shifting

During the preoperative period, the global health status/QoL was not significantly different between the younger and older patients (Table 2). However, the older patients

Table 1. Patient characteristics of younger (<70 years) and elderly (≥70 years) gastric cancer patients from the 2010s

Characteristic	Age group (yr)		P-value
	<70	≥70	
No. of patients	202	113	
Sex			0.126
Female	70 (34.7)	49 (43.4)	
Male	132 (65.3)	64 (56.6)	
Age (yr)	62.1 ± 4.5	74.4 ± 3.4	<0.001*
Body mass index (kg/m ²)	23.8 ± 2.9	23.6 ± 2.9	0.522
Comorbidity			0.005*
No	182 (90.1)	88 (77.9)	
Yes	20 (9.9)	25 (22.1)	
Cardiac condition	7	15	
Cerebrovascular condition	5	2	
Renal condition	1	0	
Past history of other malignancies	7	8	
Stage ^{a)}			0.005*
IA	186 (92.1)	92 (81.4)	
IB	16 (7.9)	21 (18.6)	
Surgical route			0.229
Open	139 (68.8)	85 (75.2)	
Laparoscopy	63 (31.2)	28 (24.8)	
Anastomosis			0.748
Billroth I	180 (89.1)	102 (90.3)	
Billroth II	22 (10.9)	11 (9.7)	
No. of retrieved lymph nodes	32.1 ± 14.0	30.7 ± 15.1	0.390
Postoperative hospital stay (day)	8.0 ± 4.4	8.1 ± 3.5	0.792
Postoperative complications			0.993
No	189 (93.6)	106 (93.8)	
Yes ^{b)}	13 (6.4)	7 (6.2)	
Grade I	5	5	
Grade II	3	0	
Grade III	5	2	
Grade IV	0	0	
Grade V	0	0	

Values are presented as number only, number (%), or mean ± standard deviation.

^{a)}Stage grouping was based on the 8th edition of the Union for International Cancer Control classification. ^{b)}Complications were classified according to the Clavien-Dindo classification.

*P < 0.05, significant difference between the groups.

exhibited significantly worse QoL on scales evaluating physical functioning (P = 0.001), role functioning (P = 0.011), pain (P = 0.011), and dyspnea (p = 0.045) on the EORTC QLQ-C30, and dysphagia (P = 0.035) on the EORTC QLQ-STO22.

Regarding the extent of postoperative QoL shifts after surgery, there were no significant differences between the younger and older patients with the exception of emotional functioning at 1-year postoperatively (P = 0.046).

Early vs. the late 2010s: older patients

The patient characteristics in the early- and late-2010s groups of older patients are summarized in Table 3. Comorbidities were more common in the late-2010s group than in the early-2010s group (16 patients [34.8%] vs. 9 patients [13.4%], respectively; P

= 0.007). The proportion of stage IA gastric cancer was higher in the late-2010s groups (P = 0.025). The surgical procedures and treatment outcomes were not significantly different between the groups with the exception of the number of retrieved lymph nodes (33.5 ± 16.5 and 26.6 ± 11.8 in the early- and late-2010s groups, respectively; P = 0.017). In terms of baseline QoL assessed in the preoperative period, there were no significant differences between the groups (Table 4). Regarding the extent of QoL shifting after surgery, there were no significant differences between the groups with the exception of differences during the 3-month postoperative period in favor of the late-2010s group for insomnia (P = 0.044) and financial difficulties (P = 0.021).

Table 2. Baseline and postoperative QoL of younger (<70 years) and elderly (≥70 years) gastric cancer patients from the 2010s

Variable	Baseline QoL						QoL changes								
	<70 yr			≥70 yr			Postoperative 3 mo			Postoperative 12 mo					
	No.	Mean ± SD	P-value	No.	Mean ± SD	P-value	No.	Mean ± SD	<70 yr	≥70 yr	No.	Mean ± SD	P-value		
EORTC QLQ-C30	191	64.0 ± 22.9	108	61.7 ± 22.6	0.417	170	1.3 ± 26.6	104	6.0 ± 31.4	0.206	149	3.6 ± 24.2	89	-1.0 ± 24.1	0.156
Global health status/QoL scale ^{a)}	200	85.3 ± 15.6	112	78.4 ± 19.1	0.001*	201	-3.2 ± 18.9	113	-2.7 ± 20.5	0.839	201	2.0 ± 14.2	110	0.7 ± 15.1	0.458
Functional scale ^{a)}	200	90.9 ± 15.9	112	85.0 ± 21.3	0.011*	202	-8.8 ± 24.9	113	-6.0 ± 25.3	0.346	202	2.6 ± 21.3	113	1.5 ± 26.1	0.686
Physical functioning	200	80.6 ± 20.3	112	82.6 ± 18.3	0.400	202	5.1 ± 22.9	113	6.3 ± 21.3	0.638	201	0.5 ± 17.5	113	-3.6 ± 16.9	0.046*
Role functioning	200	86.8 ± 16.1	112	83.8 ± 18.0	0.134	202	1.7 ± 18.5	113	2.2 ± 20.1	0.831	201	-3.5 ± 16.3	113	-4.1 ± 19.1	0.751
Emotional functioning	200	85.6 ± 20.8	111	87.4 ± 20.3	0.460	200	0.8 ± 25.9	112	-1.2 ± 28.6	0.542	196	2.0 ± 19.4	112	-0.3 ± 25.7	0.367
Cognitive functioning	200	20.7 ± 20.0	112	22.4 ± 20.9	0.472	201	7.7 ± 22.8	113	8.8 ± 22.5	0.684	201	-2.5 ± 17.6	113	-0.9 ± 23.6	0.530
Social functioning	200	7.8 ± 15.0	111	7.7 ± 14.4	0.958	202	2.1 ± 21.1	113	4.3 ± 20.1	0.364	202	-0.8 ± 17.4	112	-0.4 ± 20.7	0.863
Symptom scale/item ^{b)}	200	8.8 ± 15.7	112	14.9 ± 22.3	0.011*	200	4.2 ± 18.1	113	0.7 ± 24.2	0.156	200	-1.2 ± 18.2	111	-0.9 ± 21.2	0.907
Fatigue	199	11.9 ± 21.1	110	17.6 ± 25.0	0.045*	199	0.2 ± 25.8	113	-1.5 ± 25.0	0.585	198	1.2 ± 21.6	111	1.8 ± 27.6	0.838
Nausea and vomiting	198	14.6 ± 24.3	111	15.6 ± 25.7	0.742	199	-3.0 ± 27.0	110	-1.2 ± 26.7	0.573	196	0.9 ± 24.2	106	2.2 ± 25.7	0.651
Pain	200	11.0 ± 21.7	111	12.0 ± 19.5	0.683	200	4.3 ± 29.2	112	7.1 ± 26.6	0.401	196	0.3 ± 52.5	111	-1.8 ± 28.4	0.691
Dyspnea	198	13.1 ± 20.9	111	18.3 ± 24.9	0.065	201	3.0 ± 27.7	112	0.0 ± 31.3	0.384	201	-0.5 ± 25.7	110	0.3 ± 27.6	0.798
Insomnia	198	10.9 ± 18.6	108	13.9 ± 23.3	0.259	201	7.3 ± 25.0	113	3.8 ± 27.7	0.258	201	1.5 ± 26.5	110	1.8 ± 25.5	0.916
Appetite loss	191	16.8 ± 25.8	110	17.6 ± 27.4	0.795	200	-1.3 ± 30.8	112	-1.5 ± 30.8	0.966	199	1.0 ± 23.2	112	0.0 ± 26.8	0.729
Constipation	199	5.9 ± 10.5	111	8.9 ± 12.6	0.035*	198	7.1 ± 16.1	112	6.8 ± 15.6	0.884	194	-3.9 ± 13.7	110	-4.4 ± 15.1	0.755
Diarrhea	199	13.3 ± 15.9	111	14.8 ± 17.0	0.450	199	4.1 ± 18.5	112	3.0 ± 20.8	0.623	197	-1.5 ± 15.9	111	-2.8 ± 18.8	0.520
Financial difficulties	199	11.1 ± 16.1	111	11.0 ± 15.9	0.960	198	0.8 ± 20.0	112	2.4 ± 17.7	0.474	196	1.0 ± 17.1	111	-1.4 ± 18.1	0.259
EORTC QLQ-STO22 ^{b)}	199	7.1 ± 10.7	111	6.7 ± 11.8	0.739	198	7.1 ± 16.8	112	8.9 ± 16.8	0.360	194	-2.6 ± 14.9	110	-1.6 ± 15.8	0.562
Dysphagia	199	23.5 ± 20.3	110	24.1 ± 23.1	0.794	198	5.3 ± 24.4	112	7.3 ± 27.3	0.503	196	-0.2 ± 20.8	110	-3.5 ± 22.0	0.191
Pain	197	20.3 ± 26.0	111	26.1 ± 28.9	0.071	198	-2.2 ± 28.5	112	1.5 ± 32.1	0.298	194	2.7 ± 24.1	109	-1.5 ± 29.2	0.195
Reflux	195	7.0 ± 17.0	111	6.6 ± 16.1	0.839	197	4.1 ± 23.5	111	6.6 ± 25.7	0.378	192	-4.2 ± 19.4	106	-2.5 ± 23.3	0.514
Eating restrictions	195	16.9 ± 24.7	110	19.4 ± 26.5	0.415	197	13.0 ± 30.9	112	15.8 ± 35.5	0.478	193	-2.2 ± 28.7	110	-7.9 ± 30.6	0.110
Anxiety	72	25.0 ± 31.0	40	30.8 ± 27.6	0.324	77	6.5 ± 33.8	50	8.0 ± 28.2	0.794	46	2.9 ± 28.0	31	-1.1 ± 32.8	0.570

QoL, quality of life; No., number of available responses; SD, standard deviation; EORTC QLQ, European Organisation for Research and Treatment of Cancer quality of life questionnaire; EORTC QLQ-C30, EORTC QLQ core; EORTC QLQ-STO22, EORTC QLQ stomach.

^{a)}Higher scores (or positive changes) represent better (or improved) QoL. ^{b)}Lower scores (or negative changes) represent better (or improved) QoL.

*P < 0.05, significant difference between the groups.

Table 3. Patient characteristics of elderly gastric cancer patients from the first and second half of the 2010s

Characteristic	Early 2010s	Late 2010s	P-value
No. of patients	67	46	
Sex			0.255
Female	32 (47.8)	17 (37.0)	
Male	35 (52.2)	29 (63.0)	
Age (yr)	74.3 ± 3.5	74.4 ± 3.2	0.941
Body mass index (kg/m ²)	23.2 ± 3.0	24.2 ± 2.8	0.089
Comorbidity			0.007*
No	58 (86.6)	30 (65.2)	
Yes	9 (13.4)	16 (34.8)	
Cardiac condition	4	11	
Cerebrovascular condition	0	2	
Renal condition	0	0	
Past history of other malignancies	5	3	
Stage ^{a)}			0.025*
IA	50 (74.6)	42 (91.3)	
IB	17 (25.4)	4 (8.7)	
Surgical route			0.477
Open	52 (77.6)	33 (71.7)	
Laparoscopy	15 (22.4)	13 (28.3)	
Anastomosis			0.103
Billroth I	63 (94.0)	39 (84.8)	
Billroth II	4 (6.0)	7 (15.2)	
No. of retrieved lymph nodes	33.5 ± 16.5	26.6 ± 11.8	0.017*
Postoperative hospital stay (day)	7.9 ± 3.2	8.4 ± 4.0	0.422
Postoperative complication			0.361
No	64 (95.5)	42 (91.3)	
Yes ^{b)}	3 (4.5)	4 (8.7)	
Grade I	2	3	
Grade II	0	0	
Grade III	1	1	
Grade IV	0	0	
Grade V	0	0	

Values are presented as number only, number (%), or mean ± standard deviation.

^{a)}Stage grouping was based on the 8th edition of the Union for International Cancer Control classification. ^{b)}Complications were classified according to the Clavien-Dindo classification.

*P < 0.05, significant difference between the groups.

DISCUSSION

Even though QoL disadvantages in elderly gastric cancer patients were apparent by the absolute values in some scales, the extent of postoperative QoL shifting was not very different from that of the younger patients. Compared to the first half of the 2010s, more elderly patients with comorbidities underwent surgery with equivalent or better (insomnia and financial difficulties at 3-months) QoL outcomes during the second half of the 2010s.

While there are a number of studies on general surgical outcomes in elderly gastric cancer patients, very little is known about their QoL. In terms of surgical outcomes, several studies suggested comparable outcomes for complications or morbidities in elderly and younger patients [14-16]. While

these studies defined the elderly groups by an age of 70 years or older, one study defined the elderly group using the age of 80 years or older [17], which showed higher complication rates for pneumonia, delirium, and urinary tract infections in the elderly group. While the same may not be true for patients with extreme age, at least in patients in their 70s, there were consistent results, showing surgical morbidities at a rate comparable to that of younger patients.

However, unlike surgical morbidities, the reported outcomes on the QoL of elderly patients were inconsistent. Before the widespread use of generic QoL tools in the form of a self-answered questionnaire [18,19], several tools were used to attempt to measure QoL, and the Spitzer QoL index was one of them [20]. A previous report assessed postoperative QoL in elderly gastric cancer patients using the Spitzer QoL index [21]

Table 4. Baseline and postoperative quality of life of elderly (≥70 years) gastric cancer patients from the first and second half of the 2010s

Variable	Baseline QoL						QoL changes								
	Early 2010s			Late 2010s			Postoperative 3 mo			Postoperative 12 mo					
	No.	Mean ± SD	P-value	No.	Mean ± SD	P-value	No.	Mean ± SD	P-value	No.	Mean ± SD	P-value			
EORTC QLQ-C30	63	62.3 ± 22.5	45	60.9 ± 23.1	0.757	66	4.4 ± 32.8	38	8.8 ± 29.0	0.498	58	0.1 ± 24.3	31	-3.2 ± 24.0	0.533
Global health status/QoL scale ^{a)}	66	77.1 ± 20.5	46	80.3 ± 17.0	0.383	67	-2.2 ± 23.4	46	-3.4 ± 15.5	0.752	66	1.4 ± 14.8	44	-0.4 ± 15.5	0.540
Functional scale ^{b)}	66	84.8 ± 22.2	46	85.1 ± 20.3	0.943	67	-7.5 ± 27.3	46	-4.0 ± 22.3	0.475	67	1.7 ± 26.6	46	1.1 ± 25.7	0.897
Physical functioning	66	82.4 ± 19.7	46	82.8 ± 16.3	0.923	67	6.1 ± 23.1	46	6.5 ± 18.6	0.925	67	-2.9 ± 18.5	46	-4.6 ± 14.5	0.592
Emotional functioning	66	83.3 ± 19.6	46	84.4 ± 15.5	0.754	67	3.0 ± 23.2	46	1.1 ± 14.7	0.595	67	-4.2 ± 20.2	46	-4.0 ± 17.6	0.947
Cognitive functioning	65	86.9 ± 21.1	46	88.0 ± 19.1	0.775	67	-1.5 ± 32.3	45	-0.7 ± 22.5	0.892	67	-1.0 ± 25.9	45	0.7 ± 25.6	0.728
Social functioning	66	24.1 ± 22.1	46	20.0 ± 19.1	0.319	67	8.2 ± 24.2	46	9.7 ± 20.0	0.738	67	-0.3 ± 23.3	46	-1.7 ± 24.3	0.765
Symptom scale/item ^{b)}	65	7.9 ± 15.9	46	7.2 ± 12.0	0.801	67	4.5 ± 19.6	46	4.0 ± 21.1	0.899	67	2.2 ± 21.3	45	-4.4 ± 19.3	0.094
Fatigue	66	14.6 ± 21.6	46	15.2 ± 23.5	0.895	67	0.5 ± 24.1	46	1.1 ± 24.7	0.900	66	0.0 ± 21.9	45	-2.2 ± 20.3	0.590
Nausea and vomiting	65	16.4 ± 23.7	45	19.3 ± 27.1	0.560	67	0.5 ± 20.5	46	-4.3 ± 30.3	0.347	66	1.0 ± 27.4	45	3.0 ± 28.3	0.717
Pain	65	13.8 ± 25.6	46	18.1 ± 26.0	0.392	64	3.1 ± 26.4	46	-7.2 ± 26.2	0.044*	62	0.5 ± 28.6	44	4.5 ± 21.1	0.432
Dyspnea	65	10.8 ± 18.7	46	13.8 ± 20.6	0.427	66	6.1 ± 23.3	46	8.7 ± 31.0	0.609	66	1.0 ± 25.5	45	-5.9 ± 32.0	0.207
Insomnia	65	19.5 ± 24.9	46	16.7 ± 25.1	0.559	67	-3.0 ± 32.7	45	4.4 ± 29.0	0.220	66	1.0 ± 26.8	44	-0.8 ± 29.2	0.744
Appetite loss	62	15.6 ± 26.1	46	11.6 ± 18.9	0.308	67	1.0 ± 25.3	46	8.0 ± 30.8	0.207	64	1.6 ± 26.2	46	2.2 ± 24.7	0.902
Constipation	66	15.2 ± 26.9	44	21.2 ± 27.9	0.257	67	4.0 ± 30.4	45	-9.6 ± 29.8	0.021*	67	1.5 ± 30.9	45	-2.2 ± 19.3	0.475
Diarrhea	66	8.2 ± 12.5	45	9.9 ± 12.8	0.507	67	6.8 ± 15.5	45	6.8 ± 15.9	0.998	66	-2.4 ± 14.7	44	-7.4 ± 15.3	0.082
Financial difficulties	66	15.5 ± 16.7	45	13.7 ± 17.6	0.581	67	1.2 ± 21.3	45	5.6 ± 20.0	0.268	67	-1.7 ± 19.2	44	-4.4 ± 18.3	0.469
EORTC QLQ-STO22 ^{b)}	66	11.5 ± 16.6	45	10.1 ± 14.9	0.649	67	1.1 ± 18.9	45	4.3 ± 15.7	0.344	67	0.0 ± 18.6	44	-3.4 ± 17.4	0.334
Dysphagia	66	6.6 ± 12.6	45	6.9 ± 10.6	0.915	67	8.4 ± 14.7	45	9.6 ± 19.6	0.700	66	-0.3 ± 16.3	44	-3.5 ± 14.9	0.288
Pain	65	25.4 ± 24.7	45	22.3 ± 20.6	0.500	67	5.0 ± 25.6	45	10.7 ± 29.5	0.275	67	-2.2 ± 21.6	43	-5.7 ± 22.7	0.414
Reflux	66	26.3 ± 29.5	45	25.9 ± 28.3	0.952	67	3.5 ± 30.8	45	-1.5 ± 34.0	0.424	66	-5.1 ± 30.0	43	3.9 ± 27.4	0.119
Eating restrictions	66	4.5 ± 12.9	45	9.6 ± 19.6	0.131	66	6.6 ± 22.8	45	6.7 ± 29.8	0.984	63	0.0 ± 22.4	43	-6.2 ± 24.4	0.180
Anxiety	66	19.2 ± 27.5	44	19.7 ± 25.2	0.922	67	14.4 ± 32.9	45	17.8 ± 39.3	0.627	66	-4.5 ± 31.4	44	-12.9 ± 28.9	0.163
Dry mouth	19	26.3 ± 26.2	21	34.9 ± 28.8	0.332	31	8.6 ± 25.8	19	7.0 ± 32.5	0.849	21	6.3 ± 34.3	10	-16.7 ± 23.6	0.066
Taste															
Body image															
Hair loss															

QoL, quality of life; No., number of available responses; SD, standard deviation; EORTC QLQ, European Organisation for Research and Treatment of Cancer quality of life questionnaire.

^{a)}Higher scores (or positive changes) represent better (or improved) QoL. ^{b)}Lower scores (or negative changes) represent better (or improved) QoL.

*P < 0.05, significant difference between the groups.

and found that both younger (65–74 years) and older (>74 years) age groups showed good QoL outcomes, which were comparable to the outcomes reported by another study in much younger patients (<65 years) [22].

There have been more recent attempts to assess the QoL of elderly gastric cancer patients using the EORTC QLQs, which are designed in the form of self-answered questionnaires and are commonly used currently. In an attempt to assess the QoL of elderly gastric cancer patients after laparoscopic gastrectomy [15], QoL comparisons were made up to 1-year postoperatively in 21 elderly patients and 50 young patients, which showed no QoL disadvantage for elderly patients. In contrast, in a study comparing the QoL of 57 elderly and 74 young patients up to a year after surgery, QoL disadvantages in elderly patients with significant postoperative deteriorations on multiple scales were reported [14]. The study included patients in more physically demanding circumstances, such as those with advanced-stage gastric cancer or undergoing adjuvant chemotherapy, and the results were somewhat inconsistent with the outcomes of other studies, including ours. We constructed a larger pool of patients consisting of 113 elderly and 202 younger patients during a longer time period of a decade. We also controlled the homogeneity of the study group and minimized external influences by limiting our inclusion criteria to those with stage I gastric cancer only. Having a larger pool of homogeneous patients in our study might have resulted in conflicting outcomes without disadvantages for elderly patients in terms of the extent of postoperative QoL deteriorations on most scales.

The reason we designed this study to cover the long study period of a decade was to explore the shift in social and medical trends regarding elderly gastric cancer patients over the last decade. It has been reported that people undergo health screening when beneficial health outcomes are expected by doing so [23,24]. Due to the increased comorbidities and shorter life expectancy of older people, there are concerns about unmet expectations among older people, which is known to have a strong influence on their decisions not to undergo health screening. As we had a higher percentage of stage IA gastric cancer (92.1%) in the younger group, compared to 81.4% in the older group, we could presume that more younger people are undergoing screening endoscopies, enabling the earlier detection of gastric cancer. However, we found a huge increase in the percentage of stage IA gastric cancer in the older group from 74.6% in the early 2010s to 91.3% in the late 2010s. Based on similar reasoning, we could presume that this was reflected in the trends of higher desires for health among older people during the late 2010s, which led to more screening endoscopies.

Despite a higher percentage of comorbidities (34.8%) in elderly patients in the late-2010s group compared to 13.4% in the early-2010s group, patients in the late-2010s had comparable outcomes in terms of hospital stays, complications, and QoL.

This indicates that the decision-making trends for surgical treatment in older gastric cancer patients have shifted over the last decade with more of them opting for surgery, and that the current practice of performing more surgeries on older gastric cancer patients is producing comparable outcomes in terms of their surgical outcomes and QoL.

Our study highlighted the QoL of elderly gastric cancer patients which showed that the extent of their postoperative deterioration did not surpass that of the younger patients. Having this result drawn from a larger pool of homogeneous gastric cancer patients during a decade of clinical practice was the strength of our study. We often encounter elderly gastric cancer patients refusing surgery because of concerns regarding disappointing postoperative recovery. The current findings could become an essential piece of information that could influence their decisions. Moreover, evaluation of our responsiveness to the population aging was another strength of this study.

Our study had some limitations. First, this was a retrospective analysis based on those who had QoL outcomes available for the preoperative, 3-month, and 1-year postoperative periods. While it may be appropriate to discuss postoperative QoL and morbidities, conclusions regarding mortality cannot be made from our study because those who did not survive could not be included in the study as no QoL responses were available. Second, our study considered the patients aged 70 years and over as elderly reflecting the more traditional definition of the elderly rather than age 80 years and older. In fact, more studies are defining the elderly as age 80 years and older to reflect the real clinical practice in the aging population; however, we still do not have enough QoL data collected in patients aged 80 years and over to make a conclusion. We plan to investigate the QoL of patients in their 80s in the future when the sufficient sample size is obtained in the specific age group. Third, our focus was on the QoL of elderly gastric cancer patients, and we did not have data on other parameters such as nutritional profiles and body composition. Even though those were not the focus of our study, having them available for background information could assist in our understanding. Devising a prospective study with such parameters would provide a better understanding, including the mortality, of elderly gastric cancer patients.

Our findings must not be misunderstood as equivalent QoL scores in older and younger patients. The baseline QoL itself during the preoperative period favored younger patients on 2 functional scales (physical and role) and 3 symptom scales (pain and dyspnea on the EORTC QLQ-C30, and dysphagia on the EORTC QLQ-STO22) while the extent of the postoperative changes was not different.

In conclusion, despite baseline QoL differences, elderly gastric cancer patients did as well as younger patients in terms of relative QoL changes after surgery. More elderly gastric

cancer patients with comorbidities underwent surgeries in the late 2010s; nonetheless, they did not suffer disadvantages in QoL changes. Thus, the fear of disappointing QoL after surgery alone should not be regarded as a critical determinant in refusing gastrectomy by elderly patients. We need to continue to keep up with the higher desire for health, manifesting in elderly patients.

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Conflicts of Interest

No potential conflict of interest relevant to this article was

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ORCID iD

Ji Hyun Jung: <https://orcid.org/0000-0003-3603-9751>

Seung Soo Lee: <https://orcid.org/0000-0003-4398-6300>

Ho Young Chung: <https://orcid.org/0000-0001-7264-0865>

Author Contribution

Conceptualization, Project Administration: SSL, HYC

Formal Analysis, Investigation: JHJ, SSL

Methodology: SSL

Writing – Original Draft: JHJ, SSL

Writing – Review & Editing: All authors

REFERENCES

1. Korea Statistical Information Service. Projected population by age group (province) [Internet]. Daejeon: Statistics Korea; c2019 [cited 2021 Oct 21]. Available from: https://kosis.kr/statHtml/statHtml.do?orgId=101&tblId=DT_1BPB003&conn_path=12.
2. Han JW, Kim TH, Kwak KP, Kim K, Kim BJ, Kim SG, et al. Overview of the Korean Longitudinal Study on Cognitive Aging and Dementia. *Psychiatry Investig* 2018;15:767-74.
3. Hyun KR, Kang S, Lee S. Population aging and healthcare expenditure in Korea. *Health Econ* 2016;25:1239-51.
4. Yoo HJ. 50 Years of the Korean Geriatrics Society. *Ann Geriatr Med Res* 2018;22:159-66.
5. Min SK. Geriatric vascular surgery: time to build optimal resources for the perioperative care of elderly and fragile vascular patients. *Vasc Specialist Int* 2021;37:19.
6. Jørgensen TL, Hallas J, Friis S, Herrstedt J. Comorbidity in elderly cancer patients in relation to overall and cancer-specific mortality. *Br J Cancer* 2012;106:1353-60.
7. Williams GR, Mackenzie A, Magnuson A, Olin R, Chapman A, Mohile S, et al. Comorbidity in older adults with cancer. *J Geriatr Oncol* 2016;7:249-57.
8. Kaltenmeier C, Malik J, Yazdani H, Geller DA, Medich D, Zureikat A, et al. Refusal of cancer-directed treatment by colon cancer patients: risk factors and survival outcomes. *Am J Surg* 2020;220:1605-12.
9. Gaitanidis A, Alevizakos M, Tsalikidis C, Tsaroucha A, Simopoulos C, Pitiakoudis M. Refusal of cancer-directed surgery by breast cancer patients: risk factors and survival outcomes. *Clin Breast Cancer* 2018;18:e469-76.
10. Guideline Committee of the Korean Gastric Cancer Association (KGCA), Development Working Group & Review Panel. Korean Practice Guideline for Gastric Cancer 2018: an evidence-based, multi-disciplinary approach. *J Gastric Cancer* 2019;19:1-48.
11. Jung KW, Won YJ, Kong HJ, Lee ES. Community of Population-Based Regional Cancer Registries. Cancer statistics in Korea: incidence, mortality, survival, and prevalence in 2015. *Cancer Res Treat* 2018;50:303-16.
12. Calman KC. Quality of life in cancer patients: an hypothesis. *J Med Ethics* 1984;10:124-7.
13. Yun YH, Park YS, Lee ES, Bang SM, Heo DS, Park SY, et al. Validation of the Korean version of the EORTC QLQ-C30. *Qual Life Res* 2004;13:863-8.
14. Han DS, Ahn J, Ahn HS. Are the elderly patient's changes in the health-related quality of life one year after gastrectomy for stomach cancer different from those in young patients? *Ann Surg Treat Res* 2021;100:8-17.
15. Mohri Y, Yasuda H, Ohi M, Tanaka K, Saigusa S, Okigami M, et al. Short- and long-term outcomes of laparoscopic gastrectomy in elderly patients with gastric cancer. *Surg Endosc* 2015;29:1627-35.
16. Biondi A, Cananzi FC, Persiani R, Papa V, Degiuli M, Doglietto GB, et al. The road to curative surgery in gastric cancer treatment: a different path in the elderly? *J Am Coll Surg* 2012;215:858-67.
17. Takeuchi D, Koide N, Suzuki A, Ishizone S, Shimizu F, Tsuchiya T, et al. Postoperative complications in elderly patients with gastric cancer. *J Surg Res* 2015;198:317-26.
18. Cella DF, Tulsky DS, Gray G, Sarafian B, Linn E, Bonomi A, et al. The Functional Assessment of Cancer Therapy scale: development and validation of the general measure. *J Clin Oncol* 1993;11:570-9.
19. Aaronson NK, Ahmedzai S, Bergman B, Bullinger M, Cull A, Duez NJ, et al. The

- European Organization for Research and Treatment of Cancer QLQ-C30: a quality-of-life instrument for use in international clinical trials in oncology. *J Natl Cancer Inst* 1993;85:365-76.
20. Spitzer WO, Dobson AJ, Hall J, Chesterman E, Levi J, Shepherd R, et al. Measuring the quality of life of cancer patients: a concise QL-index for use by physicians. *J Chronic Dis* 1981;34:585-97.
21. Wu CW, Lo SS, Shen KH, Hsieh MC, Lui WY, P'eng FK. Surgical mortality, survival, and quality of life after resection for gastric cancer in the elderly. *World J Surg* 2000;24:465-72.
22. Wu CW, Hsieh MC, Lo SS, Lui WY, P'eng FK. Quality of life of patients with gastric adenocarcinoma after curative gastrectomy. *World J Surg* 1997;21:777-82.
23. Breslau ES, Gorin SS, Edwards HM, Schonberg MA, Saiontz N, Walter LC. An individualized approach to cancer screening decisions in older adults: a multilevel framework. *J Gen Intern Med* 2016;31:539-47.
24. Sazlina SG. Health screening for older people-what are the current recommendations? *Malays Fam Physician* 2015;10:2-10.