

# When Eastern Surgeons Meet Western Patients: A Pilot Study of Gastrectomy with Lymphadenectomy in Caucasian Patients at a Single Korean Institute

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East Asian surgeons generally report lower morbidity and mortality rates for gastrectomy with D2 lymphadenectomy than do surgeons in Western countries; however, the disparity remains unexplained. The aim of this article was to determine the feasibility and safety regarding cases in which East Asian surgeons perform such procedures in Caucasian patients (CPs). Twelve CPs underwent gastrectomy with lymphadenectomy for gastric cancer at Yonsei University Severance Hospital, Seoul, Korea between June 2011 and April 2014. Procedures performed included total gastrectomy (7 of 12, 58%), distal gastrectomy (4 of 12, 33%), and completion total gastrectomy (1 of 12, 8%). Nine patients (75%) underwent D2 lymphadenectomy, and D1+ lymphadenectomy was performed in three others (25%). In four patients (33%), combined resections were carried out. The median values of surgical parameters were as follows: operative time, 266.5 min (range, 120–586 min); estimated blood loss, 90 mL (range, 37–350 mL); retrieved lymph node count, 37.5 (range, 22–63); and postoperative hospital stay, 13.7 days (range, 5–63 days). No mortality was encountered, although two patients (17%) experienced complications (both Clavien-Dindo classification grade IIIa anastomotic leakages), which were successfully managed by conservative treatment. In the hands of East Asian surgeons, mortality and short-term morbidity appears to be acceptably low in CPs subjected to gastrectomy with lymphadenectomy for gastric cancer.

**Key Words:** Gastric cancer, gastrectomy, lymphadenectomy, Caucasians

## INTRODUCTION

The standard curative treatment for gastric cancer (GC) in East Asia is gastrectomy with D2 lymphadenectomy.<sup>1,2</sup> To date, however, it remains unclear whether the East Asian approach to

gastrectomy with lymphadenectomy is feasible and safe in Western patients and whether it is reproducible in terms of mortality and morbidity. Thus, in the present study, we examined a series of Caucasian patients (CPs) subjected to gastrectomy with lymphadenectomy at a single institution with the intent of addressing this issue from the point of view of both surgeon-related and patient-related factors.

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## CASE REPORT

Between June 2011 and April 2014, 12 CPs underwent gastrectomy for GC at Yonsei University Severance Hospital, Seoul, Korea. In all patients, tumor depth, nodal status, and disease stage were classified in accordance with the American Joint Committee on Cancer Staging (7th edition).<sup>3</sup> Based on the Jap-

anese Gastric Cancer Treatment Guidelines (3rd edition),<sup>4</sup> the extent of each lymphadenectomy was also stipulated.

Complication data were prospectively evaluated according to the Clavien-Dindo Classification.<sup>5</sup> Major complications corresponded with grade IIIa or greater. All surgeons at our institute had performed more than 200 gastrectomies with D2 lymphadenectomy procedures prior to the current cohort and perform over 150 gastrectomies for GC annually. This project was conducted in accordance with the Declaration of Helsinki and was approved by the Institutional Review Board of Yonsei University Severance Hospital (4-2014-0499).

Baseline characteristics and perioperative results of all patients are summarized in Table 1, and pathological characteristics are shown in the Supplementary Table 1 (only online). The details of the clinicopathological characteristics and perioperative results of each patient are shown in Tables 2 and 3. The median age of CPs (males, 8; females, 4) was 62.5 years (range, 40–71 years), with a median body mass index of 24.8 kg/m<sup>2</sup> (range, 18.6–45.9 kg/m<sup>2</sup>). The native countries of CPs were as follows: Russia, 7; the United States, 2; Ukraine, 2; and Kazakhstan, 1. All were considered medical tourists, defined as non-resident travelers to Korea for GC treatment. Minimally invasive surgery was performed in six CPs (50%). The types of procedures performed included total gastrectomy (7 of 12, 58%), distal gastrectomy (4 of 12, 33%), and completion total gastrectomy (1 of 12, 8%). Nine patients (75%) underwent D2 lymphadenectomy, with the remaining three (25%) undergoing D1+ dissections. Combined resection was performed in four patients (33%): one cholecystectomy for gallbladder stone, one partial colectomy for direct tumor invasion of the transverse colon, one thyroidectomy for thyroid cancer, and one thymectomy for thymoma. Median values of surgical parameters were as follows: operative time, 266.5 min (range, 120–586 min); estimated blood loss, 90 mL (range, 37–350 mL); retrieved lymph node count, 37.5 (range, 22–63); and postoperative hospital stay, 8 days (range, 5–63 days). No mortality occurred, although two patients (17%) developed anastomotic leakages (both Clavien-Dindo classification grade IIIa).

## DISCUSSION

To our knowledge, the present article is the first patient series addressing short-term results when East Asian surgeons performed gastrectomy with lymphadenectomy in CPs. Our findings suggest that acceptable short-term outcomes are achievable in CPs through standard East Asian procedures.

Although the clinicopathological characteristics of our cohort did approximate those of previously reported Western studies (albeit a younger age range in the current study), current morbidity and mortality rates were lower than those of the earlier Western reports (morbidity, 23.6–46%; mortality, 2–13%).<sup>6–11</sup>

**Table 1.** Baseline Characteristics and Perioperative Results of Enrolled Patients

Variable	Caucasian patients (n=12)
Age (median, range) (yrs)	62.5 (40–71)
BMI (median, range) (kg/m <sup>2</sup> )	24.8 (18.6–45.9)
Sex	
Male	8 (67%)
Female	4 (33%)
Native country	
Russia	7 (58%)
United States	2 (17%)
Ukraine	2 (17%)
Kazakhstan	1 (8%)
Comorbidity	
Yes	4 (33%)
No	8 (67%)
Previous abdominal surgery	
Yes	5 (42%)
No	7 (58%)
ASA grade	
I	3 (25%)
II	7 (58%)
III	2 (17%)
Surgical approach	
Open	6 (50%)
Laparoscopy	1 (8%)
Robot	5 (42%)
Type of procedure	
Distal gastrectomy	4 (19%)
Total gastrectomy	7 (58%)
Completion total gastrectomy	1 (8%)
Reconstruction	
Billroth-I	1 (8%)
Billroth-II	2 (17%)
Roux-en-Y	9 (75%)
Extent of lymphadenectomy	
D2	9 (75%)
D1+	3 (25%)
Combined resection	
Yes	4 (33%)
No	8 (67%)
Operative time (median, range) (min)	266 (120–586)
Estimated blood loss (median, range) (mL)	90 (37–350)
Retrieved lymph nodes (median, range)	37.5 (22–63)
Transfusion	
Yes	0 (0%)
No	12 (100%)
Postoperative hospital stay (median, range) (days)	8 (5–63)
Mortality	0 (0%)
Morbidity	
Total	2 (17%)
Major (≥grade IIIa*)	2 (17%)

BMI, body mass index; ASA, American Society of Anesthesiologists.  
\*Clavien-Dindo classification.

The results of this case series suggest that morbidity and mortality rates in CPs undergoing gastrectomy with lymphadenectomy may be reduced if performed by experienced surgeons. According to the US Graduate Medical Education General Surgery Report (2012), current graduates performed 3.4 partial gastrectomies and 0.9 total gastrectomies during 5-year training programs.<sup>12</sup> It is well known that mortality rates of high-volume hospitals are lower than those of hospitals where surgeons have less exposure to procedures.<sup>13-15</sup> One potential strategy to overcome this shortcoming is the centralization of GC patients to specific centers, enabling surgeons to boost their experience through intensive short-term training.

On the other hand, morbidity and mortality rates of the present series seemed to be slightly higher than those of prior East Asian studies where East Asian patients were exclusively en-

rolled.<sup>16,17</sup> Additionally, in our previous article, which included 5839 Korean patients between 2005 and 2010, overall-complication, major-complication (Clavien-Dindo classification IIIa or greater), and mortality rates were 10.5% (612 of 5839), 5.8% (337 of 5839), and 0.4% (25 of 5839), respectively. This implies that surgical expertise is not the sole factor in observed morbidity and mortality differences of East Asian and Western countries. Patient-related factors are critical as well.

Western patients tend to be more obese than East Asian patients,<sup>7</sup> and obesity typically raises the risk of complications.<sup>18,19</sup> Anteroposterior girth in Western patients is often sizeable, creating a deep operative field that makes procedures more demanding. Furthermore, obese patients are prone to multiple comorbidities, such as cardiovascular disease and diabetes, which arguably increase morbidity and mortality.<sup>20</sup> In the

**Table 2.** Clinicopathological Characteristics of Each Patient

Patient	Age	Gender	Native country	BMI	ASAG	Comorbidity	PAS	T	N	Stage	Histology
1	47	M	USA	45.9	II	Seizure	Liposuction	pT1b	pN1	IB	Poor diff.
2	63	M	Kazakhstan	22.5	I	None	None	pT4a	pN3	IIIC	Poor diff.
3	71	M	Ukraine	24.5	II	None	None	pT1b	pN0	IA	Moderate diff.
4	53	M	Russia	33.6	III	Hypertension	None	pT2	pN0	IB	Poor diff.
5	62	M	Russia	24.7	II	None	None	pT2	pN2	IIB	Moderate diff.
6	61	M	Ukraine	28.4	III	None	STG	pT3	pN3	IIIB	Signet ring cell
7	42	M	Russia	19.8	I	None	None	pT4a	pN3	IIIC	Poor diff.
8	66	F	Russia	23.2	II	Hypertension	Appendectomy, cholecystectomy	pT3	pN2	IIIA	Moderate diff.
9	65	M	Russia	18.6	II	None	None	pT4b	pN3	IIIC	Poor diff.
10	40	F	USA	18.6	II	None	D&C	pT4a	pN3	IV	Poor diff.
11	67	F	Russia	26.7	I	None	TAH	pT4a	pN0	IIB	Signet ring cell
12	67	F	Russia	37.6	II	Hypertension	None	pT1b	pN1	IB	Poor diff.

BMI, body mass index; ASAG, American Society of Anesthesiologists grade; PAS, previous abdominal surgery; T, tumor depth; N, lymph node classification; M, male; F, female; USA, United States of America; STG, subtotal gastrectomy; D&C, dilatation and curettage; TAH, total abdominal hysterectomy; diff., differentiation.

**Table 3.** Perioperative Results of Each Patient

Patient	Approach	Type of procedure	ELD	CR	OT (min)	EBL (mL)	RLNC	Complication	PHS (days)
1	Robot	TG-RY	D2	None	586	350	33	Leak (IIIa)*	29
2	Robot	TG-RY	D2	None	300	65	46	Leak (IIIa)*	63
3	Open	DG-RY	D2	None	134	40	23	None	9
4	Robot	TG-RY	D1+, 8a, 9, 11p, 12a	None	291	80	30	None	8
5	Laparoscopy	TG-RY	D2	None	411	100	63	None	8
6	Open	CTG-RY	D2	None	276	300	22	None	8
7	Robot	DG-BII	D2	Gallbladder	310	100	36	None	5
8	Open	DG-BI	D2	Thyroid	120	37	40	None	7
9	Open	TG-RY	D1+, 8a, 9, 11p, 11d, 12a	Colon	257	250	33	None	9
10	Open	TG-RY	D2	None	128	50	39	None	5
11	Open	TG-RY	D2	None	150	250	43	None	8
12	Robot	DG-BII	D1+, 8a, 9	Thymus	216	35	42	None	5

ELD, extent of lymphadenectomy; CR, combined resection; OT, operative time; EBL, estimated blood loss; RLNC, retrieved lymph node count; PHS, postoperative hospital stay; TG, total gastrectomy; DG, distal gastrectomy; CTG, completion total gastrectomy; RY, Roux-en-Y reconstruction; BI, Billroth I reconstruction; BII, Billroth II reconstruction.

\*Clavien-Dindo classification.

present article, Patient 2 was of normal weight, whereas Patient 1 was an extremely obese and visibly high-risk patient, the likes of which are seldom seen in East Asian countries. It is thus easy to appreciate why morbidity and mortality increase when such patients are surgically treated, thus underscoring that patient factors cannot be ignored in this setting.

The present case series had two major limitations. First, the number of patients analyzed was clearly insufficient for conclusive results. We merely showed a possibility of achieving our procedure in CPs with less morbidity and mortality, and it is impossible to draw any further conclusions. Second, we focused only on short-term outcomes. Further investigations involving large numbers of patients and long-term monitoring are needed to confirm the feasibility, safety, and efficacy of standard East Asian surgery of GC, and such studies may elucidate the unique risk factors for complications in CPs who were treated by East Asian surgeons.

In conclusion, although patient-related factors are crucial and cannot be ignored, acceptably low mortality and morbidity rates were achieved in CPs when gastrectomy with lymphadenectomy was performed by experienced East Asian surgeons. Provided that experienced surgeons perform gastrectomy with lymphadenectomy in CPs, there is a possibility that the East Asian approach is feasible and safe.

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