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HOW I DO IT

A Simplified Two-Step Technique for Extended Lymphadenectomy During Resection of Gastroesophageal Malignancy: Early Results Compared to En Bloc Dissection

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Abstract

Background Extended lymph node dissection (ELND) remains an important component of curative intent resection of mid-stage gastric cancer (GC). Benefits include enhanced staging accuracy, extending regional disease control, and optimizing potential curability. ELND during gastrectomy remains underutilized in US centers due to a low prevalence of GC operations.

Methods The traditional en bloc ELND was modified into a two-step technique to facilitate greater ease of dissection with better exposure. After completion of the gastrectomy component, retrogastric nodes are dissected in a separate, contiguous specimen. Resulting data were compared to outcomes after en bloc resection.

Results Of 179 consecutive patients undergoing gastrectomy, 129 underwent an ELND (73%). There were 97 men and 32 women, with a median age of 64 years (range 24–98). The median total LN count was 25 (3–86). The two-step dissection yielded an average of 18.3 (± 8.5 S.D.) perigastric and 12.1 (± 5.8) retrogastric nodes. Two-step LND was associated with lower estimated blood loss (265 vs. 448 ml, $p = 0.0005$), lower transfusion requirements (6 vs. 28%, $p = 0.007$), greater mean total LN counts (30 vs. 26, $p = 0.03$), and a greater rate of obtaining at least 15 or 20 LNs (91 vs. 77% and 83 vs. 65%, $p = 0.05$). Major morbidity (overall 16%), length of stay, and survival outcomes were not different.

Conclusions The two-step LND technique as described was found to be associated with favorable operative and postoperative outcome parameters and an excellent LN yield. It can be recommended for standard ELND indications in the absence of macroscopically abnormal LNs.

Keywords Gastric cancer · Extended lymphadenectomy · D2 dissection · Two-step technique

Introduction

Gastric cancer (GC) remains a challenging disease to treat effectively. Despite its ongoing decline in incidence and mortality within the US population and despite a trend in improving overall survival, the diagnosis of GC at an advanced stage remains common, and the overall survival outlook for affected individuals remains limited.[1] While operative therapy for potentially curable mid-stage GC provides the only curative option and the best chance for long-term disease control, recurrence rates and related disease-specific lethality remain high.[2] Over the past decade, multidisciplinary treatment options have become standard of care for potentially curable, mid-stage gastric and gastroesophageal junction (GEJ) cancer.[3] Perioperative chemotherapy or preoperative chemoradiation can reduce disease burden, improve margin-negative (R0) resections, and lead to better long-term survival.[4,5] Consequently, there has been an increase in the utilization of adjuvant therapies for resectable GC based on national registry data.[6]

Surgical and oncologic principles for the operative care of GC remain important to optimize functional recovery and long-term survival potential.[7] Minimizing the risk for postoperative morbidity through patient selection, preoperative conditioning, and postoperative care appears to be best accomplished through proper surgical expertise within specialized centers. Achieving complete (R0) resections

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seems necessary for curative outcomes.[8] In addition, extended lymph node dissection (ELND) remains an important component of curative intent resection of mid-stage gastric cancer. Benefits of ELND include enhanced staging accuracy, extending regional disease control and optimizing potential curability. Population-based data registries have shown a correlation between increased total lymph node (LN) counts and greater survival.[9,10] Since 2010, the American Joint Committee for Cancer (AJCC) cancer TNM staging criteria call for a minimum of 16 LNs to be examined after curative gastrectomy,[11] and the Commission on Cancer (CoC) of the American College of Surgeons (ACS) has issued a quality improvement measure in 2014 of 15 or more LNs to be removed and examined, with an expected performance rate of 80% (https://www.facs.org/quality-programs/cancer/ncdb/qualitymeasures). Despite prospective randomized trial-based evidence for a disease-specific survival benefit of ELND during curative-intent gastrectomy even in Western patients,[12] it continues to be debated and remains underutilized in US centers.[13,14] The reasons are numerous, but include initially conflicting trial results with confounding hazards from associated splenectomy and distal pancreatectomy in the Dutch and MRC trials,[15–17] unproven benefits in the era of preoperative multimodality therapy, and limited familiarity of the ELND technique by some surgeons performing GC operations, in part due to the low prevalence of GC in the USA. In addition, when compared to Asian data, patients in the USA tend to present at older age, with greater body mass index (BMI) and a greater rate of proximal tumors, all increasing complexity of operative management.[18,19] Currently, approximately 70% of GC patients appear to undergo gastrectomy in ACS-CoC accredited centers of which not all are high-volume centers[14]; it is thus obvious that many patients with curable GC will continue to depend on meeting operative quality standards when treated by surgeons with limited GC case numbers outside highly specialized centers in the future.

Minimizing conceptual complexity and outlining standard operative components of a D2 lymphadenectomy technique would be helpful in this respect. Rather than following concepts of having to dissect LN stations identified by numbers that vary based on the gastrectomy extent and tumor location, a more intuitive approach would be to free celiac, hepatic, and splenic arteries of surrounding lymphatic and adipose tissues after the actual gastrectomy with inclusion of perigastric (level I) nodes. An operative technique was developed accordingly with the intent to simplify the operative components and potentially render such approach more widely usable. The present study is seeking to analyze intraoperative and early postoperative outcomes in an early experience with such modified ELND that employed a separate, two-step approach to gastrectomy and lymphadenectomy.

Methods

Operative Technique

A traditional en bloc ELND of left gastric, celiac, hepatic, and splenic artery LNs was modified to facilitate greater ease of dissection with better exposure. The resulting two-step technique includes a similar initial gastrectomy process of gastric mobilization with inclusion of perigastric LNs, omentum, and proximal and distal specimen transection as determined by tumor location and extent. The specimen is then elevated to expose the retrogastric tissues at the left gastric artery (LGA) pedicle (Fig. 1a). This is followed by transection of the left gastric lymphovascular pedicle, freeing the main gastric specimen (Fig. 1b). Left gastric artery pedicle transection is not recommended if grossly abnormal left gastric LNs are encountered, so that macroscopic tumor-containing tissues are not divided. To avoid any spillage, lymphovascular tissue control with ligatures, hemostatic clips, or an energy sealing device is recommended for this step. After completion of the gastrectomy component, the field with remaining retrogastric nodes is more easily exposed (Fig. 1c). These are now dissected in a separate, contiguous specimen. This process includes dissection of all perivascular lymphatic and adipose soft tissues around common hepatic, left gastric, splenic, and celiac arteries, effectively exposing these vascular structures. For a complete dissection, the LGA is usually transected again after vascular control at its origin (Fig. 1d). Careful attention is paid to not harm vascular connections to the pancreatic parenchyma. The resulting specimen contains all "retroperitoneal" LNs that are relevant for a D2 dissection, consistent with the proposed systematic mesogastric dissection,[20] just accomplished in two steps (Fig. 1e). Splenic hilar LNs are not routinely dissected, unless the primary cancer location involves fundus or the mid-stomach at the greater curvature. A spleen-preserving technique for this maneuver has been described earlier.[21] A completed second-step retrogastric lymphadenectomy can be recognized by exposed common hepatic, splenic, and celiac arteries (Fig. 1f). With hemostasis accomplished, the reconstruction can be performed as usual.

Patient Data Analysis

Data related to this technique were collected prospectively in a single-surgeon US academic oncology practice within three institutions. The study cohort was comprised of consecutive patients undergoing gastrectomy or transabdominal esophagogastrectomy for a malignant process of the stomach or GEJ with ELND during a period of 15 years between 1997 and 2012. Patients requiring esophagectomy for distal esophageal or Siewert type 1 GEJ cancers were not included. Indications for D2 dissections were similar between en bloc and two-step ELND, and included any potentially curative

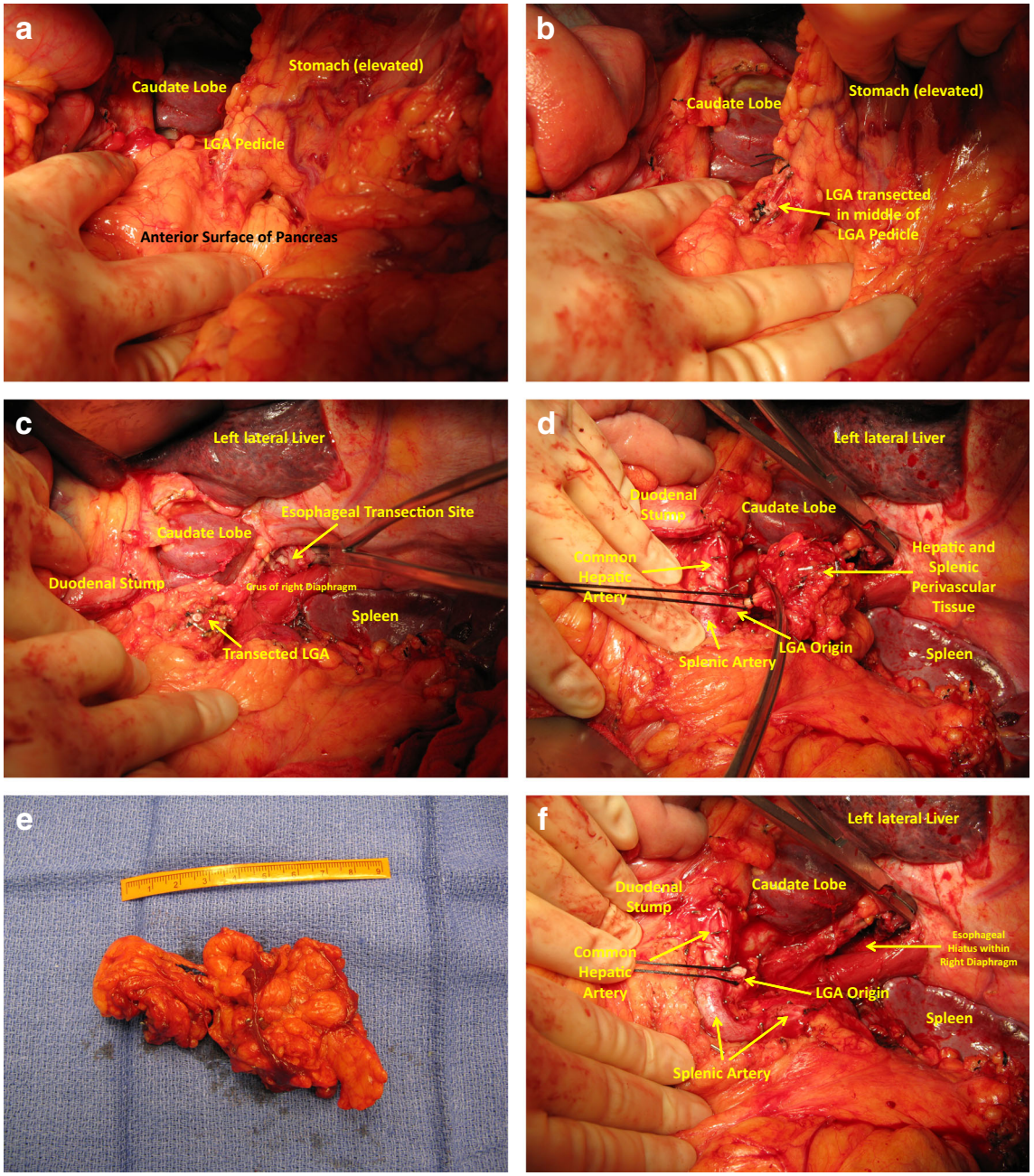

Fig. 1 Key steps of a two-stage lymphadenectomy. **a** Isolation of the left gastric artery (LGA) pedicle after distal gastric mobilization. **b** Transection of the LGA pedicle: LGA division. **c** Findings after completion of gastrectomy: transected esophagus clamped. **d** Second-step retroperitoneal lymphadenectomy: division of LGA at origin after mobilizing hepatic and splenic perivascular tissue. **e** Second-step lymphadenectomy specimen. **f** Findings after completion of hepatic, splenic, and celiac lymphadenectomy

intent resection of clinically mid-stage gastric or GEJ cancer (> T1 or N+ disease without evidence for extraregional metastasis). Clinicopathologic information, therapeutic parameters, and outcome data were summarized with descriptive and frequency statistics. Preoperative treatment intent, i.e., curative or in need for symptom control (termed palliative), had been charted prospectively. Postoperative morbidity was graded according to the classification proposed by Dindo-Clavien; complication grades of 3 and greater were considered major events. Results after two-step ELNDs were compared to those obtained with en bloc resections using chi-squared contingency analysis for categorical data. Continuous data were analyzed with two-sided *t* tests or Mann-Whitney analysis as appropriate based on data distribution. Multiple logistic regression was performed for outcome parameters of interest to control for confounding variables. For survival analysis, Kaplan-Meier statistics with log rank comparison were used. Significance of group differences was accepted at $p < 0.05$.

All analyses were performed with the StatView software package for Macintosh computers (SAS, Cary, NC).

Results

Of 179 consecutive patients undergoing gastrectomy during the study period for a spectrum of neoplastic conditions ($n = 148$) and some benign indications ($n = 31$), an ELND was performed in 129 individuals with proven or suspected malignancy (73%). There were 97 men and 32 women, with a median age of 64 years (range 24–98). Resections included distal/subtotal ($n = 53$, 41%), total ($n = 48$, 37%), and proximal gastrectomies (including transabdominal esophagogastric resections, $n = 28$, 22%). All operations were elective and non-emergent, and all but three were open resections. The median total LN count was 25 (range 3–86). The described two-step LND technique was performed in 35 patients, compared to 94 traditional en bloc LNDs. Demographic and clinicopathologic parameter comparisons between these two groups are listed in Table 1. A two-step dissection was performed predominantly in the second half of the study period, and was affiliated with primary tumor location, preoperative curative or palliative intent, preoperative therapy, elevated BMI, gastrectomy type, additional extragastric resection, and tumor T category as well as overall stage. There were no differences between the two groups regarding gender, age, ASA class (74 vs. 62% ASA 3 or 4), use of diagnostic laparoscopy (86 vs. 77%), or incision type (9 vs. 4% thoracoabdominal, all others abdominal). In the two-step ELND group, more esophageal anastomoses were conducted, and the reconstruction technique associated with more primary esophagogastrostomies (26 vs. 10%) or small bowel interpositions (11 vs. 2%), but fewer B2 reconstructions (0 vs. 11%, $p = 0.004$).

A group comparison of operative findings and outcomes is listed in Table 2. No group differences were observed for case duration or the frequency of spleen preservation. A two-step LND was associated with lower average estimated blood loss, a lower rate of blood loss of greater than 500 ml (11 vs. 29%, $p = 0.034$), lower transfusion requirements, and fewer R1 or R2 resections. When controlled for BMI, treatment intent,

Table 1 Patient, disease, and treatment characteristics

Variable	Category or unit	Total cohort	En bloc	Two-step	*p* value
Patients		129	94 (73)	35 (27)	NA
Gender	Male	97 (75)	67 (71)	30 (86)	NS
	Female	32 (25)	27 (29)	5 (14)	
Age	Median, years (range)	63 (24–98)	67 (24–98)	62 (40–86)	NS
Diagnosis	Gastric AC	91 (71)	76 (81)	15 (43)	0.02
	GEJ cancer	30 (23)	10 (11)	20 (57)	
	Others	8 (6)	8 (9)	0	
BMI	Median, kg/m^2 (range)	25.7 (13.2–50.9)	25.0 (13.2–50.9)	30.2 (18.7–42.5)	0.03
Resection intent	Curative	118 (91)	83 (88)	35 (100)	0.03
	Palliative	32 (25)	28 (30)	4 (11)	0.03
Preoperative therapy		38 (29)	10 (11)	28 (80)	< 0.0001
Resection type	Total	48 (37)	34 (36)	14 (40)	0.0002
	Subtotal inclusion distal	53 (41)	47 (50)	6 (17)	
	Proximal	28 (22)	13 (14)	15 (43)	
Additional organ resection		26 (20)	24 (26)	2 (6)	0.01
Multivisceral resection		11 (9)	10 (11)	1 (3)	0.02
Esophageal anastomosis		76 (59)	47 (50)	29 (83)	0.0007
T category (patients with AC only)	T0–1	32 (26)	22 (25)	10 (29)	0.006
	T2	33 (27)	28 (32)	5 (15)	
	T3	45 (37)	29 (33)	16 (47)	
	T4	12 (10)	9 (10)	3 (9)	
Stage group (patients with AC only)	0–2	65 (53)	47 (53)	18 (53)	0.0007
	3	32 (26)	17 (19)	15 (44)	
	4	25 (21)	24 (27)	1 (3)	

Numbers reflect patient *n*, with percentages in parentheses (percent within columns for subcategories or percent of all patients within either dissection group; percentages are rounded) unless listed otherwise. Sums of resection intent percentages do not match 100 due to overlap of curative and palliation intent combined

AC adenocarcinoma, GEJ gastroesophageal junction, NA not applicable, NS not significant, BMI body mass index

Table 2 Findings and operative outcomes

Variable	Category (*U*)	Total cohort	En bloc	Two-step	*p* value
Total patients	*n*	129	94	35	NA
Duration of operation	min, mean (IQR)	359 (120)	351 (120)	378 (128)	NS
Blood loss	ml, mean (IQR)	363 (356)	448 (308)	265 (150)	0.0008
PRBC transfusions	Units per patient, mean	0.4	0.5	0.17	NS
PRBC transfusion	%	21	28	6	0.007
Spleen preservation	%	94	93	97	NS
R category	R0 R1	104 (81) 10(8)	72 (77) 7 (8)	32 (91) 3 (9)	0.05
	R2	14 (11)	14 (15)	0	
Total LN count	*n*, mean *n*, median (range)	27.3 25 (3–86)	26.2 23.5 (3–86)	30.4 30 (13–57)	0.03
Positive LN count	*n*, mean	5.5	6.7	3.4	NS
Negative LN count	*n*, mean	20.7	19.5	27.0	0.008
15+ LNs total		104 (81)	72 (77)	32 (91)	0.05
> 15 LNs for curative intent ELND		100 (78)	69 (73)	31 (89)	NS (0.067)
20+ LNs for curative intent ELND		90 (70)	61 (65)	29 (83)	0.048
Postoperative morbidity	None Minor	82 (64) 26 (20)	61(65) 20 (21)	21 (60) 6 (17)	NS
	Major	21 (16)	13 (14)	8 (23)	
Length of stay	day, median (range)	10 (5–66)	10 (5–58)	9 (7–66)	NS

Numbers reflect patient *n*, with percentages in parentheses (percent within columns for subcategories or percent of patients within dissection group; percentages are rounded) unless listed otherwise

PRBC packed red blood cells, LN lymph node, IQR interquartile range, NA not applicable, NS not significant

preoperative therapy, resection type, and additional organ resections, the two-step technique did not demonstrate any significant differences compared to the en bloc technique regarding length of operation, transfusion need, or the likelihood for > 15 or 20 or more LNs to be identified; only a significantly reduced probability for an estimated blood loss of > 500 ml was linked to the two-step technique (odds ratio 0.175, 95% confidence interval 0.034–0.910, $p = 0.038$).

The two-step dissection yielded an average of 18.3 (± 8.5 S.D.) perigastric and 12.1 (± 5.8) retrogastric nodes; the median number of positive perigastric nodes was 1 (range 0–20), compared to 0 positive retrogastric LNs (range 0–5). This translated into greater mean total LN counts and a greater rate of obtaining at least 15 or 20 LNs with a two-step dissection. Despite the lack of difference in positive LN counts, the mean ratio of positive over total LNs was lower after this approach (11 vs. 26%, $p = 0.01$). With 16% of patients developing a major complication overall, there were no group differences regarding morbidity grade, lethal events (1 vs. 5), or overall length of hospital stay (LOS). However, subsets of patients with short LOS (< 8 days, 44 vs. 29%) or extended LOS (15+ days, 24 vs. 9%) were both greater after two-step dissections ($p = 0.008$).

Among 35 patients with a documented site of disease recurrence, only one after en bloc resection involved a hepatoduodenal LN, together with peritoneal disease. All other first sites of recurrences involved peritoneum ($n = 22$), liver ($n = 12$), lungs ($n = 3$), spine ($n = 1$), or leptomeningeal tissues ($n = 1$), with five cases presenting with multiple synchronous recurrences. The actuarial overall survival for the entire cohort was 51% at 5 years, without significant differences between the two LND groups.

Discussion

Extended retrogastric lymphadenectomy carries an important role in the curative-intent operative management of mid-stage adenocarcinomas of the stomach and GE junction. Although the concept that involved lymph nodes merely represent indicators and not governors of more widespread metastatic disease certainly carries some validity,[22] at least two prospective randomized trials have shown either overall and cancer-specific survival benefit after ELND in form of D2 or D3 dissection.[12,23,24] In some early trial reports in Western patients that have failed to show these benefits, confounding risks such as increased operative mortality through splenectomy or pancreatectomy in the D2 dissection groups have been shown to affect results.[15,16,25] In the more recent Italian trial it has been demonstrated that D2 dissections can be done safely in Western patients, too, when these operative parameters are

managed well.[23] In addition, technical challenges with non-compliance or contamination of operative approaches have been identified as contributing trial-specific obstacles to detect possible group differences[26]; too extensive a LND for the D1 comparison group is likely also one of the reasons for the Italian study to have not resulted in a survival benefit.[27] In addition, there are numerous non-trial-based studies using large population databases that also indicate an association of increased (total or negative) LN counts and superior survival for both gastric and esophageal cancers.[9,10,28,29] These possible benefits linked to higher LN numbers appear to include node-negative patients.[30] While these data lack mechanistic proof, they remain strongly supportive of utilizing the total LN count as metric for extent of regional dissection and pathologic examination. Unfortunately, many prospective multidisciplinary trials do not report LN counts or other potential surgical quality metrics; those that do may fail to meet standard expectations, as partly displayed in Table 3. The recent Dutch trial of postoperative chemotherapy vs. chemoradiation after preoperative chemotherapy and gastrectomy with at least D1+ dissection highlights both the importance of complete reporting and the challenges to derive clear conclusions from such multimodality investigations: none of the postoperative treatments proved superior in a setting in which the cohorts had median LN counts of 21 or 19, respectively.[31]

Despite the growing body of literature suggestive for gastric cancer ELND benefits during the past 20 years, the surgical practice within the USA has not followed suit. Based on a recent National Cancer Data Base (NCDB) analysis, the median total LN count during gastrectomy for gastric cancer between 2004 and 2008 was reported as a mere 2, with a range from 0 to 76.[32] Fifteen LNs as a minimum were found in 42% of cases in the California SEER registry; this rate differed between unapproved (35%) and approved cancer programs (46%).[14] Even in tertiary centers with a specialty program in gastric cancer, D1 dissection rates (as supposed to D2) were still 37% between 2000 and 2012.[33] Among selected cases from the US Gastric Cancer Collaborative, the median LN count was reported as 16,[13] while in a separate study from the same collaborative 16 or more total LNs were reported to have been identified in only 65%.[34] Data from a single tertiary center suggested an association between increased body mass index (BMI) and lower total LN counts; 56% of patients had a BMI > 25, 23% > 30, but the median LN count

Table 3 Reported lymph node yields after gastrectomy in selected Western series

Data source categories	Series, trial, or institution (reference)	Years	Patient, *n*	Median total LN count (range)	Percent with > 15 total LNs
Population data	National Cancer Database (NCDB)[39]	1998–2011	22,409	11 (IQR 4–19)	35
	SEER[9]	1975–2000	5,109[a]	8 (1–75)	22
	French[40]	1976–1996	749	8.4 (mean)	18
Surgical trials	MRC trial (D2 group)[15]	1991–1998	200	17	
	Dutch trial[b41,42]	1989–1993	637	22 (1–106) [D2: 30 vs. D1: 17]	72[c]
	Italian trial[27]	1998–2006	267	30 (2–124) [D2: 33 vs. D1: 25]	
Multidisciplinary trials	French FNCLCC/FFCD[43]	1995–2003	219	19 (1–82)	
	MAGIC[44]	1994–2002	272[d]	14 (0–91)	49[c]
	CRITICS[31]	2007–2015	636	20 (IQR 14–27)	
US institutions	Roswell Park[45]	1985–2000	114	24 vs. 8[e]	54[c]
	New York University[46]	1998–2002	119	19 (1–121)	
	US Gastric Cancer Collaborative[34]	2000–2012	859[f]	17 (IQR 11–25)	65
	MSKCC[42]	1985–2009	1559	21 (0–84)	78[c]
	University of Florida[47]	2012–2014	28[g]	22 (6–53)	
	MD Anderson[48]	1995–2014	488	21 (IQR 14–29)	
	Current report (all patients)	1998–2013	129	25 (3–86)	78
	Current report (only two-step procedures)	2008–2013	35	30 (13–57)	89

LN lymph node, IQR interquartile range

[a] Only patients with at least one LN identified were included

[b] Data extracted from the original trial report and from a subsequent summary report

[c] Numbers represent percent of patients with 15 or more LNs examined

[d] Data from a tissue-based analysis of a trial patient subset

[e] Median LN counts only reported for groups of patients with > 15 LNs vs. for those with fewer LNs

[f] 117 patients with 0–6 total LNs had been excluded from the report

[g] Minimally invasive gastrectomy series

was only 14.[19] In comparison, in another single tertiary center the rate of 15 or more LNs after curative gastrectomy was reported at 79%.[18] All these reports suggest that there is not only a wide range of performance regarding regional dissection and pathologic examination but also significant room in most institutions for improvement in order to meet the AJCC staging standard of at least 16 or more LNs examined.[11] As shown in Table 3, most reports on LN counts after gastrectomy for GC in Western patients in the past 3 decades fall short of this goal. Results of the present series reflect the practice with a dedicated effort to perform D2 dissections in potentially curable GC settings. While its results with overall rates for 15+ LNs of 81% and > 15 LNs of 78% compare favorably to most other Western series, they also suggest that in a certain subset of patients one does appear to remain below this goal, and that the expected performance rate of 80% for 15 or more LNs to be removed and examined issued by the ACS-CoC appears to be a sensible target (https://www.facs.org/quality-programs/cancer/ncdb/qualitymeasures).

The described two-step LND technique has become the preferred approach during the later part of the study interval due to its perceived greater ease and utility. The concept of en bloc dissection was abandoned in cases without obvious gross left gastric artery node abnormalities in favor of an initial step removal of the main gastric and omental specimen, followed by better exposure and improved ability to perform the perivascular dissection. Although the group differences represent a longitudinal, non-randomized comparison over time, higher LN counts overall and lower blood loss and transfusion rates are likely linked to this dissection technique. A total LN examination rate of 91% for 15+ LNs and of 89% for 16+ total LNs, as obtained with two-step dissections, exceed those in most Western series (Table 3). The second dissection step allows the surgeon to focus on freeing the named retrogastric arteries from all surrounding lymphatic and adipose tissues, thus simplifying the concept and feasibility of D2 dissections, especially in obese patients, while at the same time generating a separate specimen that can render it easier for pathologists to identify LNs from these locations. This has been found particularly useful in patients with high BMI and extensive retroperitoneal fat. Although the dissection extent in both methods is the same, the perceived ease of performing the retroperitoneal dissection in a separate, second step is likely linked to better exposure with reduced retraction needs. In case of splenic hilar lymph node dissections to be undertaken for lesions of the fundus and proximal two thirds of the greater curvature, a spleen-preserving dissection technique has been employed,[21] which can also be accomplished well during the second dissection step. Overall, there have been no specific downsides encountered with this approach. Although nearly all procedures have been conducted as open operations, which is quite consistent with an University Health System Consortium report from between 2008 and 2013, in which 90% of gastrectomies were performed as open procedure,[35] the two-step technique appears suitable for minimally invasive operations as well. Although no patient in this series has been found to have developed isolated regional or intraperitoneal recurrences, the two-step technique is not recommended in settings where macroscopically involved nodes would be at risk to be transected. The overall safety and recovery impact appears satisfactory as well. Major morbidity rates of 23% after two-step technique and 14% after en bloc dissection were not statistically different, while the complexity of procedures due to a total or proximal gastrectomy rate of 83% was significantly greater in the two-step group. In a recent NSQIP analysis, gastrectomy led to major complications in 24% overall, with a 29% rate after total gastrectomy and 20% after distal resection.[36] A separate NSQIP data analysis of GE junction cancer resections showed a 40% major morbidity rate after total gastrectomy, with even greater rates after transhiatal or transthoracic esophagectomy procedures.[37] Therefore, our morbidity results related to the two-step technique appear overall quite acceptable.

It is acknowledged that the described ELND technique modification is a minor adjustment to the general practice of en bloc D2 dissection. However, it appears that any even incrementally small improvement to concept or conduct may become useful in a field that continues to struggle with relative underperformance, specifically in the USA. Similar challenges with LN dissection standards for colorectal cancer have been addressed through national quality guidelines, and overall results regarding recommended LN counts have since improved.[38] Being able to resort to a simple technique for gastric lymphadenectomy would appear useful, especially since a quality metric with a LN number target of at least 15, achieved 80% of the time as recommended by the ACS-CoC, is now in place. Recently, the concept of systematic mesogastric excision (SME) as part of gastrectomy for GC has been postulated, with the intent to simplify the understanding of and approach to retrogastric lymphadenectomy.[20] It is thought that the technique presented here can contribute to such concept, without the complexity or challenge of having to navigate several individual lymph node stations in the dissection process. Surgeons who engage in resections of potentially curable gastric or GEJ cancer, even on an occasional basis, should perform an acceptable ELND and ascertain a diligent pathologic examination. The described two-step technique can be recommended for standard ELND indications in the absence of macroscopically abnormal left gastric artery LNs.

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