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ORIGINAL ARTICLE – GASTROINTESTINAL ONCOLOGY

Guidelines for Extended Lymphadenectomy in Gastric Cancer: A Prospective Comparative Study

Oktar Asoglu, MD[1], Tugba Matlim, MD[1], Atilla Kurt, MD[2], Semen Yesil Onder, MD[3], Enver Kunduz, MD[1], Hasan Karanlik, MD[1], Bulent Sam, MD[4], Yersu Kapran, MD[3], and Dursun Bugra, MD[5]

[1]Department of General Surgery, Istanbul Faculty of Medicine, Istanbul University, Istanbul, Turkey; [2]Department of General Surgery, School of Medicine, Cumhuriyet University, Sivas Merkez, Turkey; [3]Department of Pathology, Istanbul Faculty of Medicine, Istanbul University, Istanbul, Turkey; [4]Turkish Republic Ministry of Justice Forensic Medicine Institution, Istanbul, Turkey; [5]Department of General Surgery, Istanbul American Hospital, Istanbul, Turkey

ABSTRACT

Aims. To assess the efficacy of extended lymph node dissection in gastric cancer and to identify factors affecting lymph node detection.

Methods. A prospective study of 126 gastric cancer patients was conducted. Patients eligible for curative resection received total gastrectomy and extended lymphadenectomy (D2) and paraaortic lymph node sampling as the standard of care (study group). Supramesocolic total lymphadenectomy of the upper gastrointestinal tract was performed on 23 autopsy cases as a control group.

Results. Fifty-five gastric carcinoma patients were included in the study group. Median age was 58 years (range 31–80 years); 14 patients were female (25 %), and 41 were male (75 %). The median number of lymph nodes harvested from the specimen was 47 (24–95), and the median number of metastatic lymph nodes was 15 (1–71). In contrast, in the autopsy comparative group, the median number of harvested lymph nodes was 72 (50–91). The median number of stational lymph nodes excised (lymph nodes excised from stations 4, 5, 10, 11, 12, and 16) was significantly higher in the control group than in the study group ($P < 0.05$). Lymph node detection was adversely affected by body mass index (BMI) ($P < 0.03$). In the study group, stations 5, 12, 11, and 10 had the highest lymph node absence (LNA) (noncompliance) ratio with percentages of 53, 36, 33, and 22 %, respectively. In the autopsy group, LNA (noncompliance) was not detected.

Conclusions. Lymph nodes should be dissected by surgeons with sufficient technical and anatomical experience, and then examined and counted by experienced pathologists to reduce the occurrence of LNA. The results of this anatomical study can serve as a guideline to assess the success of lymph node dissection during gastric cancer surgery. Similar studies should be conducted in every country to establish national guidelines.

Atilla Kurt was clinical fellow in General Surgery Department of Istanbul Medical Faculty during the study.

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O. Asoglu, MD
e-mail: asoglu.oktar@yahoo.com

Gastric adenocarcinoma is a locoregional disease with high tendency for nodal metastasis. Therefore, nodal status remains one of the most critical independent predictors of patient survival after gastrectomy.[1,2] Despite a lower incidence in the Western world, the 5-year survival rate for gastric adenocarcinoma is between 20 % and 40 %.[3] In contrast, in Southeast Asia, especially in Japan, the postoperative survival rate has risen to 70 % through systematic stationary lymph node dissection and early disease detection.

Gastrectomy and extended lymphadenectomy is the mainstay treatment modality for advanced gastric carcinoma; however, the number of lymph nodes harvested during surgery varies between clinics, surgeons, and countries. The aim of the present study is to answer the following questions: Can all lymph nodes be removed by extended lymphadenectomy? And what is the normal lymph node anatomical count at the sites of interest defined by the Japanese Research Society for Gastric Cancer (JRSGC)? A prospective study was designed to answer these questions. All surgery was performed by a single expert surgeon. Extended lymphadenectomy was performed according to

JRSGC guidelines. Autopsy cases were used as a comparative group to assess the extent of lymphadenectomy achieved in live patients.

MATERIALS AND METHODS

The study design was prospective. Data were collected from 126 gastric carcinoma patients referred to the General Surgery Department of Istanbul University Medical Faculty between January 2006 and July 2009; 55 of the 126 patients were enrolled in the study. In addition, extended lymphadenectomy was performed on 23 fresh autopsy cases (comparative group). Ethical approval was obtained from the Istanbul University Medical Faculty Local Ethics Committee (2009/1822) and the Ethics Committee of the Forensic Medicine Institute of the Turkish Republic Ministry of Justice Department (2009/547).

Preoperative Evaluation

Preoperative patient evaluation and staging included physical examination, complete blood count and biochemical parameters, chest X-ray, abdominal computed tomography (CT), and upper gastrointestinal (GI) endoscopy. Tumors were classified into three groups according to predominant anatomical site: antrum, corpus or cardia. Patients with diagnosis of gastric carcinoma were informed of the study and signed a consent form preoperatively.

Inclusion and Exclusion Criteria

Patients with histologically confirmed diagnosis of gastric carcinoma were included if clinical data predicted that surgical resection would be curative.

Patients were evaluated according to the American Society of Anesthesiologists classification. Those included were under 80 years of age with no serious respiratory, urinary, and/or cardiovascular insufficiency (IV). Patients with remnant stomach cancer and/or concomitant tumor, and those who had previously undergone neoadjuvant chemotherapy or chemoradiotherapy were excluded. The case distribution according to the exclusion criteria is presented in Table 1.

Age, sex, body mass index (BMI), and cause of death were recorded for the comparative autopsy cases. Exclusion criteria included: intraabdominal or visceral malignancy, hematologic or lymphatic pathology, penetrating firearm or sharp object injury to the abdomen, previous abdominal surgery, and age under 16 or over 70 years.

Surgical Technique

Total gastrectomy and extended lymphadenectomy with paraaortic lymph node (PAN) sampling was performed as the standard surgical approach for patients eligible for curative resection. The abdominal cavity was reached by supraumbilical midline incision. The entire abdominal cavity was evaluated carefully to rule out metastasis. For paraaortic lymph node sampling, the inferior vena cava and aorta were revealed by the Kocher maneuver. Paraaortic lymph nodes, which are found between the celiac artery and the superior mesenteric artery (16a2 and 16b1), were removed and sent to the pathology room for frozen-section evaluation. If metastasis was diagnosed, either limited or extended lymphadenectomy was performed, depending on the presence of comorbidities. Dissection continued with the release of the greater omentum, the anterior sheath of the transverse mesocolon, and the pancreatic capsule. Bursectomy was then performed. After finding the trunk of Henle, the right gastroepiploic artery and vein became visible, and the lymph nodes of station 6 were dissected following ligation of these vessels at their origin. The pancreas and the duodenum were then liberated from the hepatic flexure. Thereafter, the omentum minus was released from the liver margin and the right gastric artery was ligated at its origin. The lymph nodes of station 5 were then dissected. The common hepatic artery was revealed, and the lymph nodes of station 8, surrounding this artery, were excised. The lymph nodes of station 11, which are present in this area, were removed with dissection of the splenic artery. The lymph nodes of station 9 were removed with the dissection of truncus coeliacus. Splenectomy was conducted for cases where there was suspicion of splenic hilus invasion or suspicion that station 10 might not have been dissected adequately. The hepatogastric ligament was divided at the point closest to the liver to reach the right margin of the diaphragm. In this area, the lymph nodes of stations 1 and 2 were removed. In all cases, Roux-en-Y anastomosis was performed for intestinal integrity. The

TABLE 1 Exclusion criteria

Ineligible patients	(*n*)
Patients with severe disease precluding extended resection[a]	22
Neoadjuvant chemoradiotherapy	15
Distal subtotal gastric resection	14
Peritoneal carcinomatosis	12
Liver metastasis	2
Hepatica propria invasion	1
Performed other surgical procedures because of esophagus invasion	2
Specimens which were histopathologically investigated in another center	1
Proven not to be adenocarcinoma after surgery	1
Remnant gastric carcinoma	1

[a] Patients with comorbidities such as severe chronic obstructive lung disease (COLD) diabetes mellitus, cardiovascular risk factors, etc

lymph nodes were excised and placed in numbered boxes by the same surgeon in the operating room. All samples were submitted for pathological examination.

Autopsy Dissection

Lymph node dissection was performed on 23 cadavers to remove lymph nodes situated at stations 1–16 according to JRSGC guidelines. The inferior vena cava and aorta were revealed using the Kocher maneuver. Para-aortic lymph nodes, which lie between the celiac artery and the superior mesenteric artery (16a2 and 16b1), were removed, numbered, and boxed.

After PAN sampling, the anterior sheath of the transverse mesocolon and pancreatic capsule were dissected. The posterior side of the stomach was liberated. The fundus and cardia were dissected, and the paracardial stations excised. After transection of the esophagus, the stomach was liberated. The next step of cadaveric dissection was to divide the vascular structures and remove the gastric specimen entirely. The celiac trunk was divided from the aorta, and the hepatoduodenal ligament was divided at the hepatic hilus. The splenic artery, vein, and hilus were divided. All the vascular structures and stations were resected en bloc, which allowed complete sampling of the lymph nodes. This is the main difference between live and cadaveric dissection: during in vivo dissection, surgeons must preserve vascular structures while dissecting their origin, whereas in cadaveric dissection, all the fatty tissues, including vessels and lymph nodes, are sampled along with the gastric specimen. Dissection of the cardia and fundus and transection of the esophagus were performed before stational en bloc resection to prevent venous bleeding, another difference between live and cadaveric dissection. All stations were dissected, coded, and boxed by the same surgeon. All samples were stored and submitted for pathological examination.

Pathological Examination

The gastrectomy specimens and stationally dissected and coded lymph nodes of the patients and stationally dissected and coded lymph nodes of the autopsy cases were submitted to the Pathology Department of Istanbul University Medical Faculty. After fixation in formalin for 24 h, tissue samples were taken from the gastrectomy specimens and coded lymph nodes for conventional histopathological assessment. The following data were collected: prognostic parameters including localization, diameter, invasion depth, histological type, and degree of tumor differentiation, presence of vascular and perineural invasion including distance to proximal and distal surgical margins, number of lymph nodes removed from each station, and number of metastatic lymph nodes. For the autopsy cases, the total number of lymph nodes at each station was recorded.

Patient Characteristics

Data collected included: age, sex, body mass index, recommendation of neoadjuvant chemotherapy, concomitant tumor presence, mortality and morbidity, additional interventions required during gastric surgery/lymphadenectomy, and surgical complications. In addition, tumor localization, tumor diameter (cm), distal/proximal margins (mm), invasion depth, number of lymph nodes excised and number of metastatic lymph nodes at each site, histological type, differentiation grade, and lymphatic, vascular, and perineural invasion were recorded from pathology reports. All cases were staged using the tumor–node–metastasis (TNM) classification (6th edition).[4]

Absence of Lymph Nodes (Noncompliance) and Protocol Violation[5]

Potential protocol violations such as lymph node presence beyond certain dissection margins (classed as contamination) were assessed by counting the number of lymph nodes excised at each station. Since D2 dissection with PAN sampling was performed for all study cases, and since the study followed a standardized surgical technique, no protocol violations were detected. Lymph node absence (LNA noncompliance) was classified within certain dissection margins as follows:

(a) Minor LNA (noncompliance): lymph node absence at one or two stations
(b) Major LNA (noncompliance): lymph node absence at three or more stations

Surgical Mortality and Morbidity

Any death occurring during 30-day postoperative follow-up was considered a surgical mortality, and any surgical complication that developed within this period was considered a surgical morbidity. Surgical mortality and morbidity rates were calculated.

Statistics

Statistical analysis was performed using SPSS version 16.0 for Windows (Statistical Package for Social Sciences, Inc. Chicago, IL; ABD for Windows 16.0). Student's *t* test, the Mann–Whitney *U* test, analysis of variance (ANOVA), and Chi-squared tests were used to compare qualitative data and for demographic statistical analysis (mean, standard deviation, frequency). The 95 % confidence interval

(CI) was determined. p value < 0.05 was considered statistically significant.

RESULTS

Demographic Findings

Fifty-five gastric carcinoma cases were included in the study group. Median age was 58 years (range 31–80 years). Fourteen patients were female (25 %), and 41 were male (75 %). Comorbidity was observed in 54 % ($n = 33$) of cases. Heart disease was present in 19 cases, respiratory disease in 4 cases, and both respiratory and heart disease in 7 cases. The demographic data are presented in Table 2.

Pathologic Features

Most of the tumors (38 %) were located in the distal 1/3 of the stomach, 18 tumors (33 %) were located in the proximal 1/3, and 11 tumors (20 %) in the middle 1/3. Most of the tumors were advanced (stages III and IV) in stage. According to the TNM classification and with regard to lymph node numbers, 9 cases (16 %) were stage I, 3 cases (5 %) stage II, and 22 (40 %) stage III. Twenty-one patients (38 %) were stage IV because of more than 15 metastatic lymph nodes.

TABLE 2 Patient demographics and tumor characteristics

Sex: male/female	14 (25 %)/41 (75 %)
Age (median)	58 (31–80) ± 12
BMI (kg/m^2)	21 (19–45) ± 9.8
Tumor localization	
Proximal	18 (33 %)
Corpus	11 (20 %)
Distal	21 (38 %)
Diffuse	5 (9 %)
Tumor stage	
T1	4 (7 %)
T2	18 (33 %)
T3	33 (60 %)
T4	0 (0 %)
Nodal stage	
N0	9 (16 %)
N1	16 (29 %)
N2	9 (16 %)
N3	21 (38 %)
Clinical stage	
I	9 (16 %)
II	3 (5 %)
III	22 (40 %)
IV	21 (38 %)
R status	
R0	51 (93 %)
R1	4 (7 %)

TABLE 3 Median number of lymph nodes removed and mean number of tumor-positive lymph nodes in each station

Median number of lymph nodes removed				
Station number	Total number of lymph nodes harvested in study group	Total number of tumor-metastatic lymph nodes	Total number of lymph nodes harvested in autopsy group	$P < 0.05$
Station 1	3 (0–24)	0 (0–7)	3 (1–10)	0.411
Station 2	4 (0–13)	0 (0–6)	3 (1–7)	0.438
Station 3	4 (0–18)	1 (0–15)	6 (1–11)	0.83
Station 4	3 (0–12)	0 (0–9)	11 (4–17)	0.001
Station 5	0 (0–7)	0 (0–4)	2 (1–4)	0.006
Station 6	7 (1–17)	0 (0–16)	9 (4–18)	0.812
Station 7	6 (0–13)	0 (0–5)	6 (2–12)	0.42
Station 8	7 (0–17)	0 (0 -15)	3 (2–9)	0.484
Station 9	4 (1–25)	1 (0–8)	4 (1–7)	0.145
Station 10	1 (0–8)	0 (0–5)	5 (1–10)	0.001
Station 11	1 (0–10)	0 (0–4)	5 (2–11)	0.001
Station 12	1 (0–17)	0 (0–2)	4 (2–9)	0.003
Station 16	2 (0–20)	0 (0–4)	6 (1–12)	0.001

Harvested Lymph Nodes

The median number of lymph nodes excised from the 55 gastric cancer patients was 47 (24–95), and the median number of metastatic lymph nodes found was 15 (1–71). In the control autopsy group, the median number was 72 (50–91). The numbers of lymph nodes harvested according to the JRSGC guidelines are presented in Table 3. In gastric cancer patients, the median number of lymph nodes harvested from stations 4, 5, 10, 11, 12, and 16 was lower than that in the autopsy group ($P < 0.05$). Factors with potential to affect lymph node detection in gastric cancer were assessed. The results showed that the number of lymph nodes harvested correlated inversely with BMI ($P < 0.03$) (Table 4).

Lymph Node Absence (LNA, Noncompliance)

In the study group, station 5 showed the highest LNA (noncompliance) (53 %), followed by the hepatoduodenal ligament station (station 12) with 36 %, the splenic artery station (station 11) with 33 %, and the splenic hilus station (station 10) with 22 %. LNA (noncompliance) was not

TABLE 4 Factors affecting lymph node retrieval

Patient- and tumor-related factors	Absence of lymph nodes	Presence of lymph nodes	$P < 0.05$
Age	59	62	0.62
Sex			0.601
Female (%)	93	7	
Male (%)	88	12	
BMI (kg/m^2)	24	21	0.03
Tumor diameter (cm)	1.4	1.5	0.89

detected in the autopsy group. The LNA ratios and the numbers of patients with LNA at each station are presented in Table 5. Additionally, patient distribution according to number of stations with LNA is presented in Table 6.

TABLE 5 Number of patients with LNA at each station

LNA frequency after D2 and PAN sampling		
Station	Number of patients	LNA (%)
1	4	7
2	5	9
3	4	7
4	8	14
5	29	53
6	1	2
7	2	4
8	4	7
9	0	0
10	18	33
11	12	22
12	20	36
16	9	16
Total	49	89

TABLE 6 Patient distribution according to number of stations with LNA

D2 dissection with PAN sampling		
Number of stations with LNA	Patients (*n*)	Percentage
1	12	22
2	16	29
3	14	25
4	5	9
5	2	4
6	0	0
0	6	0
Minor LNA (noncompliance)	18	33
Major LNA	21	38

Postoperative Mortality and Morbidity

Postoperative mortality occurred in two cases (3.6 %): one patient died of sudden respiratory failure while in intensive care 7 days postoperatively, and one patient died of pneumonia, pleural effusion, and acute respiratory distress syndrome 20 days after surgery. Morbidity occurred in 13 cases (24 %). Pneumonia (14 %) was a common cause of morbidity. Two cases underwent surgery for intraabdominal bleeding: in one of the patients, despite the lack of any active bleeding focus, long-term antibiotic use led to coagulopathy, while in the other patient bleeding from the splenic capsule led to splenectomy. Anastomotic leakage was observed in one case who required total parenteral nutrition and percutaneous drainage. Intraabdominal collection was observed in three cases. In two of them, percutaneous drainage was performed under CT guidance. The other patient who was ineligible for drainage was followed up with antibiotic therapy and made full recovery. No patient- or tumor-related factors were found to affect morbidity.

DISCUSSION

Regardless of tumor localization, the general tendency is to extract as many lymph nodes as possible through R0 resection and extended lymph node dissection. The invasion depth of the tumor, the existence of lymph node metastases, the number of lymph nodes harvested, and the presence of distant metastases are the most important prognostic factors.[6,7]

Noguchi et al. and Maruyama et al. showed that the metastatic lymph node count increases when the lymph node dissection width is expanded.[8,9] Therefore, the number of lymph nodes harvested is the best parameter known at present to evaluate the radicality of the surgical procedure. The numbers of lymph nodes harvested at each station in various gastric cancer studies are shown in Table 7.[5,10,11] The data show that the number of extracted lymph nodes varied greatly, particularly at station 5 where no lymph nodes were detected in most of the studies. Bunt et al. found no lymph nodes at station 5.[10] In addition, lymph nodes were not detected at other stations.[5,10,11]

Although extended lymph node dissection width affects the detectable metastatic lymph node counts, another important issue which needs to be studied further is the lymph node counts in the stations of a human body. The question of how many lymph nodes are left behind after surgery and whether biological factors, in addition to anatomic placement, might affect node extraction, depends on how many lymph nodes should be present. Wagner and Sharma attempted to answer these questions.[11,12] The results of their studies and those of the present autopsy

TABLE 7 Number of lymph nodes removed at each station in published studies

Number of lymph nodes removed (median)				
Station	Present study, $n = 55$	Dutch study[5] (1998), $n = 331$	Dutch study[10] (1996), $n = 114$	Wagner study[11] (1991), $n = 36$
Station 1	3 (0–24)	3.4 (0–18)	3.2 (0–15)	2.1 (0–5)
Station 2	4 (0–13)	2.2 (0–10)	2.1 (0– 7)	2 (0–7)
Station 3	4 (0–18)	5.3 (0–36)	4.8 (0–16)	4.8 (1–16)
Station 4	3 (0–12)	5.3 (0–42)	4.7 (0–16)	1.4 (0–7)
Station 5	0 (0–7)	0.8 (0–17)	0.8 (0–5)	1.8 (0–6)
Station 6	7 (1–17)	4 (0–17)	3.9 (0–17)	2.7 (0–8)
Station 7	6 (0–13)	3 (0–17)	3 (0–10)	4.5 (0–11)
Station 8	7 (0–17)	2.7 (0–15)	2.5 (0–12)	Dissected with station 7
Station 9	4 (1–25)	3 (0–13)	3 (0–13)	4.2 (0–13)
Station 10	1 (0–8)	1.7 (0–12)	1.2 (0–9)	2.2 (0–7)
Station 11	1 (0–10)	2.3 (0–21)	2 (0–15)	2.1 (0–6)
Station 12	1 (0–17)			3.2 (0–8)
Station 16	2 (0–20)			1.2 (0–4)
Median	47	26	27	28

TABLE 8 Number of lymph nodes removed at each station from autopsy studies

Number of lymph nodes removed (median)			
Station	Present autopsy group	Wagner[11] autopsy group, $n = 30$	Sharma[12] autopsy group, $n = 10$
Station 1	3 (1–10)	2.2 (0–4)	3.56 (1–8)
Station 2	3 (1–7)	2 (0–5)	3.1 (2–7)
Station 3	6 (1–11)	4.5 (0–14)	5.4 (4–16)
Station 4	11 (4–17)	1.2 (0–7)	4.5 (3–14)
Station 5	2(1–4)	2.2 (0–5)	2.7 (2–8)
Station 6	9 (4–18)	2.7 (0–8)	2.9 (2–10)
Station 7	6 (2–12)	4.6 (1–5)	4.3 (3–10)
Station 8	3 (2–9)	Dissected with station 7	1.08 (0–3)
Station 9	4 (1–7)	4.2 (0–15)	3.4 (2–12)
Station 10	5 (1–10)	2.2 (0–6)	2.8 (2–8)
Station 11	5 (2–11)	2 (0–9)	1.4 (1–6)
Station 12	4 (2–9)	5.5 (2–12)	5.34 (2–14)
Station 16	6 (1–12)	2.5 (0–8)	3.6 (0–6)
Median	72 (50–91)	30 (17–44)	39 (24–52)

study are presented in Table 8. All three datasets show similar numbers of lymph nodes harvested during surgical procedures in patients with gastric cancer, which can most likely be explained by the use of the same surgical technique. In contrast, our autopsy dissection differed from the other studies in that the dissection included station 12, which consists of the hepatoduodenal ligament from the liver hilus to the duodenum, together with the main bile duct, portal vein, and hepatic artery, station 11 together with the splenic artery and vein, and pancreatic tissue, and station 10, which consists of the splenic hilus together with the vascular system and tail of the pancreas, and the truncus coeliacus with the aortic wall. Lymph nodes were found at all JRSGC stations.

Low numbers of lymph nodes were detected at station 5 in both gastric cancer patients and autopsies. Higher numbers of lymph nodes were observed in autopsy cases at stations 10, 11, 12, and 16, which can most likely be explained by the complete extraction of stations with their vascular systems, a procedure that cannot be performed in live patients. Another possible explanation is the unclear anatomical boundary between adjacent stations 4 and 10, 7

TABLE 9 Noncompliance rates in different clinical trials

Trial	Surgery	Patient number (*n*)	Minor noncompliance (%)	Major noncompliance (%)	Overall noncompliance (%)
Present study	D2 + PAN sampling	55	33	38	89
Dutch trial[5]	D2	331	55	26	82
Dutch trial[5]	D1	380	65	16	80

and 8, and 9 and 11. In contrast, there was no difference in the number of lymph nodes at stations 1, 2, 3, 6, 7, 8, and 9 between live cancer patients and autopsy cases, since these sites can be dissected in the same manner in deceased and live patients. It is not possible to harvest lymph nodes in every station during extended lymphadenectomy in patients with gastric cancer, even when the surgery is performed by an experienced surgeon; however, the same surgeon can harvest lymph nodes at any station in autopsy cases.

In gastric cancer studies, differences in lymph node counts and the absence of lymph nodes at certain stations provide insight into surgery quality control and standardization. Bonenkamp et al. studied over 711 cases and found minor LNA in 55 %, major LNA in 26 %, and general LNA in 22 %.[5] A similar study was conducted by Bunt et al. in which general LNA was observed in 80 % of cases.[10] In the same study, the highest percentage of LNA was observed at station 5, followed by stations 10 and 11. Potential factors affecting LNA were assessed. In the present study, no relationship was detected between LNA and age, gender, tumor localization or tumor invasion depth. LNA percentages detected in clinical studies, including our own, are presented in Table 9. In our study, minor, major, and total LNA were observed in 33 %, 38 %, and 89 % of cases, respectively. LNA was the highest at station 5, followed by stations 12, 10, and 11, which is consistent with other studies. Anatomical challenge due to BMI was detected as the only significant parameter affecting LNA percentages in our study. Mistaken assessment of tumor localization, during either preoperative evaluation or tumor palpation during surgery, inadequate margins of dissection, or insufficient dissection due to lack of experience and attention of the surgeon can result in LNA. The other factors affecting lymph node detection are presented in Table 4. BMI had a significant effect in terms of lymph node detection. Presence of abundant fatty tissue can result in LNA during separation of stations, anatomic variation, and lack of clear boundaries between stations. Moreover, lack of surgical experience, lack of attention on the part of the pathologist, and excess fatty tissue during lymph node counting can also result in LNA. Higher BMI resulted in lower numbers of lymph nodes being harvested.

CONCLUSIONS

The number of lymph nodes harvested depends on biological factors, surgical technique, and experience. LNA can result from many factors such as BMI, biological factors, and anatomic characteristics. Surgeons with sufficient technical and anatomical experience should perform the dissection, and experienced pathologists should examine and count lymph nodes to reduce the occurrence of LNA. The results of this anatomical study can serve as a guideline for quality control of lymph node dissection during gastric cancer surgery. Similar studies should be conducted in every country to establish national guidelines. Because of individual variations, fewer than 25 lymph nodes harvested by extended lymphadenectomy should not be judged as inadequate; similarly, more than 25–30 should not be regarded as adequate.

Conflicts of Interest Oktar Asoglu and co-authors declare no conflicts of interest.

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