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ORIGINAL ARTICLE – OPEN ACCESS

The Effect of Lymph Node Dissection on Gallstone Formation in Patients Undergoing Total Gastrectomy for Gastric Adenocarcinoma

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ABSTRACT

Objective: Formation of gallbladder stone is frequently observed after resection for gastric cancer. Extended lymph dissection is shown to be among risk factors.

Materials and Methods: We compared patients with limited lymphatic dissection (D1) and extended lymphatic dissection (D2) in terms of gallstone formation and complications.

Results: We observed gallbladder stone formation in 13 (12.8%) patients. Gallbladder stone formation was observed in 11.1% of patients in the D1 group and in 14.3% of patients in the D2 group, but no statistically significant difference was found between lymphatic dissections. Of 13 patients, 5 (38.4%) were symptomatic and 3 (23.1%) developed choledocholithiasis. Five patients who were symptomatic were operated without any problems. The groups did not show a statistically significant difference in terms of cumulative survival times. While patients who underwent D2 dissection had more formed gallbladder stone, there were no significant differences between the groups.

Conclusion: The complications related to gallbladder stone developed after gastrectomy can be safely managed.

Keywords: Gallstone, total gastrectomy

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INTRODUCTION

Gastric cancer is one of the most frequent cancers causing death worldwide; and gastrectomy constitutes the basis of surgical treatment (1). Gallstone formation after curative surgery is a common complication, and its prevalence is reported to be 15%– 25% higher than the general population (2, 3). It is thought that the dissection of the hepatic branch of the vagus, bypassing of the duodenum, and the changes in the release of cholecystokine cause the gallbladder stone formation after gastrectomy (4–6). Some publications propose that the extension of the lymph node dissection, in addition to gastrectomy, suggests an increase in the incidence of gallbladder stones (3, 7). Patients with asymptomatic gallbladder stones after gastrectomy may develop severe biliary complications over time requiring surgical treatment (8, 9). Although some authors advocate prophylactic cholecystectomy during gastric resection to prevent potential complications associated with gallbladder stone, there is no consensus on this issue (9, 10).

This study aimed to compare the patients who underwent total gastrectomy with D1 and D2 dissection for gastric cancer, in the General Surgery clinic of Çukurova University Faculty of Medicine, in terms of gallbladder disease after curative resection.

MATERIALS and METHODS

The study included patients who underwent total gastrectomy and R-Y esophagogastrostomy for curative surgery due to gastric adenocarcinoma in Çukurova University Faculty Of Medicine General Surgery Clinic between January 2010 and January 2015; stage 4 patients, patients who underwent subtotal gastrectomy, patients with mortality in the six-month follow-up, patients who had previously undergone cholecystectomy or who received simultaneous cholecystectomy with curative surgery due to gallstones, and patients whose gallbladders couldn't be evaluated with a control ultrasound in the postoperative period were excluded from the study. All patients underwent distant metastasis screening by thorax and abdominal computerized tomography. Before the operation, all patients were evaluated by abdominal ultrasonography (US) for gallbladder pathology. Patients were evaluated for abdominal gallbladder pathology by abdominal ultrasonography in 3, 6, and 12 months postoperatively. According to these criteria, we divided 101 patients who underwent total gastrectomy into two groups as D1 and D2 according to lymph node dissection. We used TNM (2010) system for pathological tumor staging. We created a common database by examining patient files and hospital information system records. We retrospectively evaluated the patient data using this database. Demographic characteristics, lymph node dissection type, additional organ resection, pathologic stage, number of lymph nodes removed, and survival according to the pathological stage

Table 1. Demografic characteristics and findings

	D1 (n=45)		D2 (n=56)		p
	n	%	n	%	
Sex					
Male	32	70.2	36	64.3	0.467
Female	13	29.8	20	35.7	
Age	56.0±11.9		58.3±13.2		0.370
Mean±SD med (Min.-Max.)	60 (29–77)		58 (33–87)		
LN	19.78±17.4		38.0±15.0		**0.001**
Mean±SD med (Min.-Max.)	19 (5–35)		36 (12–80)		
Stone formation duration–month	5.8±1.3		10.0±7.2		0.234
Mean±SD med (Min.-Max.)	5 (5–8)		8 (2–24)		
Additional organ resection					
Appendectomy	0	0.0	1	1.8	0.445
Colectomy	1	2.2	0	0.0	
Oophorectomy	0	0.0	1	1.8	
Splenectomy	3	6.7	5	8.9	
Splenectomy + distal pancreatectomy	0	0.0	2	3.6	
None	41	91.1	47	83.9	
Stage					
1A	4	8.9	1	1.8	**0.227**
1B	3	6.7	5	8.9	
2A	7	15.6	0	0.0	
2B	5	11.1	8	14.3	
3A	6	13.3	5	8.9	
3B	6	13.3	13	23.2	
3C	14	31.1	24	42.9	
USG					
Stone not formed	40	88.9	48	85.7	0.636
Stone formed	5	11.1	8	14.3	
Symptomatic					
Asymptomatic	4	80.0	4	50.0	0.279
Symptomatic	1	20.0	4	50.0	

D1: Limited lymphatic dissection group; D2: Extended lymphatic dissection group; LN: Lymph node; USG: Ultrasonography; SD: Standard deviation; Med: Median

were evaluated. Factors that may cause gallstone stone formation during follow-up were examined. The results were compared in these two groups. Before the operation, patients were informed about the operation, and a written consent was obtained.

Statistical Analyses

We compared the results in two groups. Chi square or Fisher Chi test were used to compare categorical variables between groups. In the comparison of continuous measurements between the groups, the distributions were controlled and Student t test was used for the parameters that normally distributed according to the number of variables. Mann–Whitney U test was used for the parameters not showing normal distribution. Kaplan–Maier method and log rank test were used for survival analyzes. In all tests, statistical significance level was taken as 0.05. Categorical measurements were summarized as numbers and percentages (n,%), and continuous measurements as means and standard deviations and (minimum-maximum). IBM SPSS Statistics for Windows, version 24 (IBM Corp., Armonk, NY, USA) package program was used for statistical analysis of the data.

RESULTS

During the study, 152 patients underwent elective curative surgery due to gastric adenocarcinoma. Among them, 9 patients with previous cholecystectomy, 13 patients with concurrent cholecystectomy, 17 patients lost in 6 months, and 12 patients without control US were excluded from the study. We evaluated the remaining 101 patients (68 males, 33 females) (Table 1). The mean age was

(mean±standard deviation; median) 56.0+11.9; 60 years in group D1 and 58.3+13.2; 58 in group D2 (p=0.370). The D1 dissection was performed in 45 patients and D2 dissection in 56 patients. Splenectomy was performed as an additional organ resection in ten patients. One patient who underwent additional organ resection developed asymptomatic gallbladder stone. Of 101 patients, 13 (12.8%) developed gallbladder stones. While eight patients were asymptomatic, five (4.9%) patients developed symptoms related to gallbladder stones. Three of the symptomatic patients had choledocholithiasis. Three patients who were not suitable for endoscopic retrograde cholangiopancreatography (ERCP) due to intestinal reconstruction after total gastrectomy, were operated. Two patients underwent choledochoduodenostomy and the other patient underwent choledochotomy and T-tube drainage. Two other patients with symptomatic gallbladder disease were treated with open cholecystectomy. No difference was observed between the D1 and D2 dissection groups in terms of stone formation frequency (p=0.636) and stone formation duration (p=0.234).While more lymph nodes were removed in the D2 group, the D1 and D2 groups did not show a statistically significant difference in terms of survival (p>0.05) (Fig. 1).

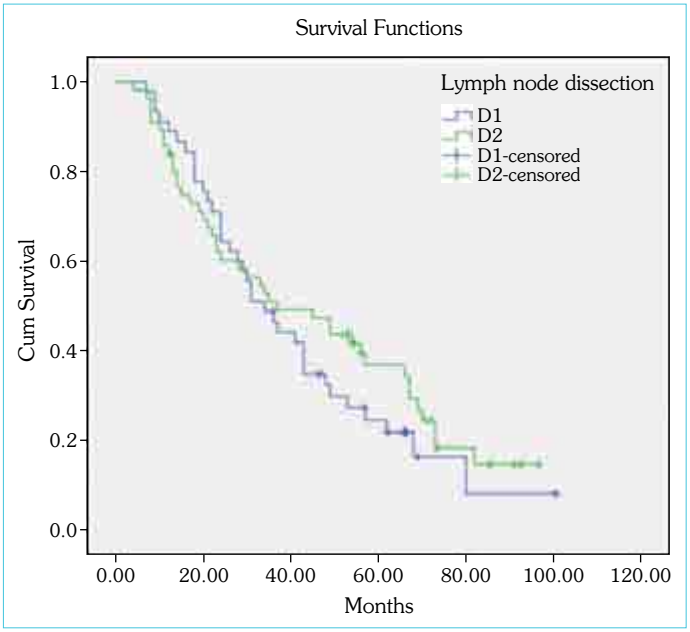

Figure 1. Total survival based on lymphatic dissection groups

DISCUSSION

Surgical or endoscopic resection is the only curative treatment for gastric cancer (8). Gallbladder stone is frequently seen after gastrectomy; and prophylactic cholecystectomy is controversial. While some of the patients do not have any symptoms, some may experience complications causing even choledoc duct stones, and this may be difficult to manage with ERCP in patients with Roux-en-Y reconstruction (7, 8, 11).

In our study, gallbladder stone was seen 13.2% after total gastrectomy, which was within the frequency range of 10%–47% cited in previous reports (9).Gallbladder stones after gastrectomy may lead to further cholecystitis requiring further surgery, and subsequent cholecystectomy may be difficult and complicated due to previous surgery. In addition, the type of surgery is changed because the common bile duct stones can be accompanied by choledocholithiasis. In our study, 5 (38.4%) of 13 patients who developed gallbladder stones were symptomatic, and 3 (23.1%) developed occlusion obstructive jaundice due to choledocholithiasis. In three patients who developed choledocholithiasis, choledocexploration was performed because ERCP could not be performed in addition to cholecystectomy. Two patients with only cholelithiasis underwent open cholecystectomy. No complication related to interventions for symptomatic gallbladder or biliary tract disease occurred.

The width of lymph node dissection has been reported as a risk factor for gallstone disease that develops after gastrectomy (3, 7, 12). In a study of 805 patients, Akatsu found that gallstone disease was statistically significantly higher in the D2 dissection group (7). Fukagawa found in their series that the extent of lymph node dissection was a significant factor in gallstone formation after gastrectomy (9). In our series, gallbladder disease was found to be higher in the D2 dissection group compared to the D1 dissection group, but no statistically significant difference was found. Park, in their series of 1280 diseases, reported, similar to our study, whereas there was no statistical difference between D1 and D2 dissection, the D2 group had a higher percentage (12).

In a prospective study conducted by Inoue, because of regular ultrasound screenings performed in the early postoperative period on gastrectomy patients, it was found that 42% of the patients had sludge in their gallbladder in the first month after the gastrectomy, and the sludge disappeared in one year with the return of gallbladder contractility. They found 18.8% cholelithiasis in their series of 48 patients and reported that most of these developed after six months (6). Akatsu reported that gallbladder stone growth happened in a shorter time in the D2 dissection group compared to the D1 dissection group (7). In our study, there was no difference between the groups in terms of duration of gallbladder stone formation.

The exact answer to the question of "Is prophylactic cholecystectomy necessary?" in patients with gallstone disease during the gastrectomy operation has not been yet found. There are authors who suggest cholecystectomy in addition to gastrectomy in patients with gallbladder disease, but there are authors who even suggest cholecystectomy to prevent gallbladder stone disease that may occur in gastric surgeries with hepatoduodenal lymph node dissection (9). Another reason for rationalization of surgeons who suggested prophylactic cholecystectomy was that intestinal reconstructions made after gastric resection did not allow interventions for the biliary system such as ERCP (11–13).

Many authors recommend performing cholecystectomy simultaneously with gastric cancer surgery for existing gallbladder stones due to concerns about postoperative acute cholecystitis due to gallbladder disease (2, 14). In our series, cholecystectomy was performed in 5.9% of patients because of gallbladder disease discovered during gastrectomy, and we did not encounter any complications related to cholecystectomy in these patients. However, it is known that there are particular complications related to gall bladder surgery. While the study KH Jun et al. showed no statistically significant difference between the groups in terms of morbidity and mortality in the series of patients who underwent

prophylactic cholecystectomy with gastrectomy compared to those who only underwent gastric resection (15), Gillen et al. reported that simultaneous cholecystectomy results in high morbidity (16). In our series, 38.4% of patients who developed gallbladder stone after gastrectomy required surgical treatment, and this was found compatible with the ratio mentioned in the literature as between 19% and 46% (7, 15). In contrast, there are authors who argue that prophylactic cholecystectomy is not necessary (16, 17); in our study, 5 (4.9%) of 101 patients required surgical intervention for complications related to gallbladder stone, and none of them had postoperative morbidity or mortality due to the intervention. For a prophylactic cholecystectomy recommendation, we believe that a larger number of patients should be followed for a longer period. This study had several limitations, including its retrospective design. To evaluate the incidence of gallbladder stones after gastrectomy, prospective designed multicenter clinical studies are needed in larger patient groups.

Ethics Committee Approval: The study protocol was approved by the committee of Cukurova University of Medicine (Approval date: 01.02.2019 and Approval Number: 85/43).

Informed Consent: Written informed consent was obtained from all participants who participated in this study.

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