

Study of the Value of Combined Multiorgan Resection in Surgical Treatment of Carcinoma of the Gastric Cardia

Xijiang Zhao¹
Jingtao Huang²
Peng Tang¹
Peng Ren¹

¹ Department of Esophageal Cancer, Cancer Hospital of Tianjin Medical University, Tianjin 300060, China

² Department of the Chest, Affiliated Xinhua Hospital of Dalian Medical University, Dalian 116021, China

Correspondence to: Xijiang Zhao.
Email: wangfengming188@163.com

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CJCO <http://www.cjco.cn> E-mail: cocr@eyou.com
Tel(Fax): 86-22-2352 2919

OBJECTIVE: To determine the value of resection of combined visceral organs in surgical treatment of gastric cardiac carcinoma.

METHODS: We retrospectively analyzed 217 random patients with carcinoma of the gastric cardia who underwent a gastric cardiac resection. The patients had been treated as follows: 186 with partial gastrectomy, 31 with total gastrectomy, 97 with a combined-visceral resection, of which 82 underwent a splenectomy plus partial pancreatectomy, 10 with splenectomy alone and 5 with partial hepatectomy and diaphragmatectomy.

RESULTS: The total patients were divided into 3 groups: 128 with a gastrectomy alone, 10 with gastrectomy and splenectomy, and 82 with gastrectomy and splenectomy plus pancreatectomy. The operating times for these 3 groups were respectively 3.0 h, 3.1 h and 3.8 h. The hospitalization times were respectively 23.8 d, 31.2 d and 25.9 d. No differences in post-operative complications were found between these 3 groups. There were 92 patients who underwent a gastrectomy combined with a splenectomy and (or) the pancreatectomy, in which 92 No.10 lymph nodes were eliminated, with an average of one in each patient. Among the 125 patients not receiving a splenectomy but with elimination of lymph nodes, 82 underwent a gastrectomy combined with partial pancreatectomy, of which 107 lymph nodes were eliminated for the No. 11 group, with an average of 1.3 in each patient. There was a statistically significant difference between the 2 groups. The overall survival rates were similar in the 3 groups showing no statistical differences, but was higher in the Stage III patients with a combined resection of multi-organs. For patients in the Stage IV without resection of multi-organs, the survival rate was higher, but there was no significant difference between the 2 groups.

CONCLUSION: It is difficult to determine precisely the involvement of para-tumorous organs with the eye during an operation. Combining a splenectomy with a pancreatectomy does not increase the post-operative complications following surgical treatment for carcinoma of the gastric cardia. The combination of a splenectomy and partial pancreatectomy results in a higher survival rate and has an important significance for eliminating the lymph nodes of group 10 and 11, especially for patients in Stage III. In the application of a resection combining multi-organs, the doctor should make every effort to decrease the trauma and the complications based on the condition that the cancerous tissue is totally resected.

KEYWORDS: Carcinoma of gastric cardia, surgical treatment, combined devisceration

INTRODUCTION

The incidence of carcinoma of the gastric cardia is rapidly increasing. Despite the increasing incidence, the overall prognosis is poor, with 5-year survival rates of approximately 15%^[1]. It

remains as one of the leading causes of cancer death worldwide. Because of its poor prognosis, multiple types of surgical treatments have been attempted to improve survival. Despite improved diagnostic techniques, most patients present in an advanced tumor stage. A radical resection, often involving extended multiorgans, remains as the best chance for a cure, but the optimal extent of resection in recent years has become more controversial. In this retrospective study, we have investigated the value of a combined extended multiorgan resection for treatment of gastric cardia carcinoma.

MATERIALS AND METHODS

Gastric cardia carcinoma was defined as a lesion located within 2 cm distal to the anatomic esophago-gastric junction. Between January 1983 and December 1998, 217 patients with gastric cardia carcinoma underwent gastrectomy and were registered into the study at the Department of Esophageal Cancer of the Tianjin Cancer Hospital. Of them, 97 patients underwent gastrectomy with a combined resection of other organs macroscopically invaded noted during surgery. These included 82 patients with a tail pancreatectomy plus splenectomy, 10 with a splenectomy alone, 5 with a partial hepatectomy, 5 with a partial diaphragmectomy. The patients who only underwent an exploration, and who were lost during follow-up 5 years postoperation, were excluded from this study.

Patient characteristics are listed in Table 1. The subjects ranged in ages from 34 to 83 years (median 59 years) and included 193 men and 24 women.

All patients were classified according to the staging system of the UICC (1997) as follows: Ia, 1(0.5%); Ib, 10(4.6%); II, 20(9.2%); IIIa, 85(39.2%); IIIB, 71 (32.7%); IV, 30(13.8%). The pathologic types of carcinoma were classified according the WHO classification as well as the PTNM classification of the UICC. These include papillary adenocarcinoma, 42(19.4%); ductal adenocarcinoma, 57(26.3%); poorly-differentiated adenocarcinoma, 72 (33.2%); muciform adenocarcinoma, 26(12.0%); muCo-cellular carcinoma, 19(8.8%) and adenosquamous cell carcinoma 1(0.5%).

Confirmation of invasion of adjacent organs was established macroscopically in 51 patients(23.5%). The tissues and numbers invaded were the pancreas, 29(13.4%); diaphragm, 17 (6.3%); lesser omenta, 3; and one each in the mesentery, left adrenal gland; contra lateral pleura and one spleen metastasis.

The extent of resection depended on the tumor size and the ability to save the resection margins. Proximal gastrectomy was performed in 186 patients and total gastrectomy in 31 patients. The presence

or absence of macroscopically apparent invasion of adjacent organs and the ability to facilitate the dissection of lymph nodes determined whether a combined-extended multiorgan resection would be performed.

Table 1. Characteristics of patients.

Characteristics	Patients
Sex	
Male	193
Female	24
Age (mean. years)	59(34-83)
Histology	
Papillary	42(19.4%)
Ductal	57(26.3%)
Poorly differentiated	72(33.2%)
Muciform	26(12.0%)
Muco-cellular	19(8.8%)
Adeno-squamous	1(0.5%)
Stage of carcinoma	
Ia	1
Ib	10
II	20
IIIa	85
IIIB	71
IV	30
Primary tumor	
Invading adjacent organs	51
Invading pancreas	29
Invading diaphragm	17
Invading lesser omenta	3
Invading left adrenal gland	1
Invading mesentery	1
Invading contralateral pleura	1
Metastatic spleen	1
Type of operation	
Gastrectomy only	128
Gastrectomy with splenectomy	10
Gastrectomy with Pancreatic splenectomy	82
Proximal gastrectomy	186
Total gastrectomy	31
Operative time (hr. mean)	
Gastrectomy only	3.7
With splenectomy	3.1
With pancreatic-splenectomy	3.8
(Length of hospital stay)	
Hospitalizing time (d. mean)	
Gastrectomy only	23.8
With splenectomy	31.2
With pancreatic-splenectomy	25.9
Post-operative complication	
Subphrenic abscess	1
Others	0

RESULTS

All the patients were divided into three groups consisting of these numbers: gastrectomy alone, 128; gastrectomy with splenectomy, 10; and gastrectomy with pancreatic-splenectomy, 82. Among the latter group, 9 patients were considered to have a macroscopically invaded pancreas and spleen during the

operation, but of which only 2 patients were microscopically diagnosed to have infiltration of the pancreatic serosal capsule. Histological examination of the specimen revealed only 1 patient to have metastasis in the spleen in all of the 92 patients with splenectomy. The mean operating times for these 3 groups were respectively 3.7 h, 3.1 h and 3.8 h. The mean post-operative hospitalization times were respectively 23.8 d, 31.9 d and 25.9 d. The post-operative complications were not statistically different among the 3 groups. One subphrenic abscess occurred post-operatively in a patient with a panereatico-splenectomy without a pancreatic fistula, acute pancreatitis and post-operative diabetes.

Among the 92 patients who underwent a gastrectomy and splenectomy, including a combined pancreatico-splenectomy, 92 lymph nodes were dissected in station 10 (median 1/patient). Station 10 lymph nodes could not be dissected in 125 patients who underwent a gastrectomy without splenectomy. Eighty-two patients underwent a resection of the pancreatic body and tail in which 107 lymph nodes from station 11 were dissected (median 1.3/patient). There was a statistically significant difference between the lymph node yield with these two types of operation (Table 2).

The survival rates of patients who underwent gastrectomy alone, gastrectomy with splenectomy and gastrectomy with pancreatico-splenectomy were similar without a significant difference (Table 3). The survival rate was higher in patients who underwent gastrectomy with a multiorgan resection in Stage III and also higher in the patients who underwent a gastrectomy without a multiorgan resection in Stage IV. Analysis of Stage III and Stage IV carcinoma for patients who underwent gastrectomy alone in comparison with patients who underwent a gastrectomy with splenectomy or with pancreatico-splenectomy, showed no statistically significant differences between these two staged groups (Table 4 and 5).

DISCUSSION

The reasons for a combined multiorgan resection for gastric cardia carcinoma commonly involved two fac-

tors: the first was that the carcinoma directly invaded the adjacent organs. Therefore a total or partial resection of the invaded organs was necessary to obtain a curative resection^[2]. The second reason was to facilitate more extensive regional lymph node dissection involving mainly the lymph node stations 10 and 11 and the pancreas and spleen.

Macroscopic invasion of adjacent organs was sometimes difficult to identify during the operation for carcinoma of gastric cardia. The rate of adjacent organ invasion and the accuracy of macroscopic identification should be completely known as they are helpful in providing a rational basis to choose the type of operation. Qin and Lin^[3] reported that among 439 cases, in only 25 cases was it possible to detect direct invasion into the pancreas (5.7%), and in 10 cases a direct invasion into the spleen (2.3%). After pathological examination of the pancreatic body and tail, they found 22 cases with pancreatic and splenic combined resection, only 4 cases (18.2%) with direct capsule invasion and 2 (9.1%) with invasion into the superficial parenchyma without metastasis to the lymph nodes within the pancreas and spleen. Okajima et al^[4] reported that there was only fibrous adhesion to the pancreas without cancerous invasion in 34.3% of the patients, cancerous invasion to the pancreatic capsule in 25%, and minimal cancerous invasion into the superficial pancreatic parenchyma in 21.9%. There were massive cancerous invasions to the deep pancreatic parenchyma in 18.8%. Monig et al.^[5] reported that 112 patients were treated surgically for primary gastric adenocarcinoma, in which infiltration of the spleen was noted only in two advanced cases of a diffuse type carcinoma (Stage IV) localized at the greater curvature. The autopsy study by The Chinese Pathological Group of Gastric Carcinoma^[6] showed that pancreatic invasion occurred in 18.6% and splenic invasion in 7.2% among the patients who died of advanced gastric carcinoma. Piso et al.^[7] noted that intraoperatively, true pancreatic invasion was difficult to differentiate from an inflammatory lesion, and suspected tumor infiltration of the pancreas was confirmed by histology only in 39% of the examined resected specimens.

In our study, pancreatic invasion was macroscopically suspected in 29 patients (13.4%) during operations. Among these, 14 patients were considered to receive a paliative resection because of a lack of a pancreatectomy, and 9 patients underwent a resection of the pancreatic body and tail (11.0%). For the 82 patients who underwent a resection of the pancreatic body and tail, infiltration of the pancreatic capsule was conformed by pathology only in 2 cases (22.2%), and infiltration of pancreatic parenchyma was not conformed at all. In all 92 patients who underwent gastrectomy with splenectomy (including 82 patients who underwent the pancreatico-splenectomy), splenic metastasis was confirmed by a pathologic examination in only 1 patient (1.0%).

Table 2. Lymph node yield per station.

Type of operation	Patients	LN yield	Median LN yield
Gastrectomy with Splenectomy(including pancreatectomy)	92	92	1
Gastrectomy only	125	0	0
Gastrectomy with resection of pancreatic body and tail	82	107	1.3

Table 3. Survival rate of combined multiorgan resection.

Operative type	Survival rate (%)						
	0 year	1 year	2 years	3 years	4 years	5 years	10 years
Gastrectomy only	100	61.5	44.3	32.8	24.6	16.0	16.0
with splenectomy With pancreatectomy	100	50.0	40.0	40.0	30.0	30.0	30.0
Splenectomy	100	68.8	46.8	28.6	27.3	26.0	20.8

Table 4. Survival rate for Stage III patients.

Operative types	Survival rate(%)						
	0 year	1 year	2 years	3 years	4 years	5 years	10 years
Gastrectomy only with pancreatic Splenectomy	100	59.1	39.8	25.8	20.4	17.2	13.6
	100	75.5	50.9	28.3	28.3	28.3	22.6

Table 5. Survival rate for Stage IV patients.

Operative types	Survival rate (%)						
	0 year	1 year	2 years	3 years	4 years	5 years	10 years
Gastrectomy only with pancreatectomy	100	54.5	36.4	36.4	27.3	18.2	9.1
Splenectomy	100	41.2	23.5	17.6	11.8	5.9	5.9

Although the lymph nodes at the splenic hilus (no.10) and those along the splenic artery (no.11) were generally classified as level 2 lymph nodes (N2), the metastatic rate was high. Lin^[7] reported that the lymph node metastatic rate at the splenic hilus (no.10) and those along the splenic artery (no.11) were 20% and 30% respectively for gastric cardia carcinoma. The incidences of no.10 or no.11 lymph node metastasis were as high as 24% and 30% for Tang^[8], 15.5% and 12.1% for Okajima and Isozaki^[4] and 24% for Sakaguchi et al.^[10] This reflected essentially the true incidences of no.10 and no.11 lymph node metastases. The autopsy examinations by the Chinese Pathological Group of Gastric Carcinoma showed that the metastatic rate of lymph nodes at the splenic hilus (no.10) was only 3.4% in carcinoma of the gastric cardia and fundus. Clinically, there were some special characteristics for lymph node metastasis in the area of the peripancreas and splenic hilus in gastric cardia carcinoma. Tang^[8] suggested that carcinoma of the stomach greater than 3 cm and Borrmann I, III and IV and poorly differentiated were prone to metastases to no.10 and no.11 lymph nodes. Sakaguchi et al.^[9] reported that the characteristics of gastric carcinoma with metastasis to the lymph nodes at the splenic hilus, and those along the splenic artery, included

a larger tumor (>4 cm), deeper penetration (T3, 4 tumors and, T2 tumor with gross serosal change), a number of lymph node metastasis, and infiltrative types.

In our surgical series, splenectomy or partial pancreatectomy was often performed simultaneously with gastrectomy to facilitate dissection of the lymph nodes around the splenic hilus and splenic artery. Splenectomy was absolutely necessary for dissection of the lymph nodes at the spleen (no.10), and partial pancreatectomy was also necessary for dissection of the lymph nodes along the splenic artery(no.11).The metastatic lymph node yield from the no.10 and no.11 lymph nodes was 0 in patients who underwent gastrectomy without splenectomy and partial pancreatectomy. Okajima and Isozaki^[4] suggested the indications for a splenectomy in patients with gastric cancer if a curative operation is expected, namely, 1) direct invasion to the pancreas or spleen; 2) metastasis to lymph nodes along the splenic artery or at the splenic hilus; 3) immunologic possibilities: preserving the spleen for Stage I II or III disease, splenectomy for Stage IV disease.

Gastrectomy with pancreatectomy also has shown a better curability. The study of Huang et al.^[11] showed that the 5 and 10 year survival rates

were respectively increased 14.2% and 15.9% for Stage III patients who underwent gastrectomy with pancreatico-splenectomy; but the results were similar for the Stage I, II and IV patients who underwent the same type operation, without a statistically significant difference. They suggested that an extensive radical resection should be performed for Stage III carcinoma patients with serosal invasion or lymph node metastasis in level two. Lin^[7] also reported that lymph node metastases were limited in peri-gastric lymph nodes for Stage I without adjacent organ invasion and distant metastasis, the dissection of peri-gastric lymph nodes was enough for those patients. For patients in Stage IV with distant metastasis, an extensive resection was not beneficial for survival and a simple surgical procedure was suitable. For those an extensive radical resection was necessary to be performed for Stage II and III carcinoma. The study of Wang et al.^[11] showed that the survival rate of patients who underwent a gastrectomy with pancreatico-splenectomy was much better for Stage III patients with lymph nodes metastasis. In our-series, there were no differences in the survival rates in the three groups (gastrectomy alone, gastrectomy combined with splenectomy and gastrectomy with pancreatico-splenectomy). However the patients receiving a gastrectomy alone and gastrectomy combined with pancreatico-splenectomy based on the staging, showed that the survival rate was higher in the Stage III with gastrectomy and pancreatico-splenectomy and higher in the Stage IV with gastrectomy alone, but the differences were not statistically significant.

Generally, there were two major indications for splenectomy or pancreatico-splenectomy during the surgery for carcinoma of gastric cardia^[4]: (1) If there was a direct invasion of the spleen or pancreas. (2) If there were metastases to the lymph nodes at the splenic hilus or along the splenic artery. Based on the developmental anatomy, Lin^[7] reported that by removal of the pancreatic body and tail, spleen and stomach en bloc with a cutting out of the pancreas at the junction of the head and body, he was able to completely provide dissection of the lymph nodes at the splenic hilus and along the splenic artery. This technique was helpful in dissecting the lymph nodes of the peri-celiac artery and the major bronchus.

Pancreatic and splenic resection produces some complications, such as pancreatic juice leakage, acute pancreatitis, subphrenic abscess, and postoperative diabetes. Wang et al.^[11] reported that the postoperative complication rates were respectively 21.5% and 15.8% in patients who underwent gastrectomy combined with pancreatico-splenectomy and gastrectomy alone. The mortality rate was respectively 12.5% and

5.5% in those two groups. Huang et al.^[10] reported that the postoperative complication rates and mortality rates were respectively 14.1%, 11.1%, 4.6% and 3.9%. In our study, only 1 case of subphrenic abscess occurred in patients who underwent gastrectomy combined with pancreatico-splenectomy. There was no pancreatic juice leakage, acute pancreatitis or postoperative diabetes.

Although splenectomy had been advocated for clearance of the splenic hilar lymph nodes, whether or not to preserve the spleen has been vigorously debated. The spleen plays an important role in anti-tumor activity, eliminating the tumor after inoculation of a small number of tumor cells^[12]. Maruyama et al.^[13] reported that a total of 299 patients were treated by total gastrectomy associated with a pancreatic-preserving operation from 1976 to 1991; and 319 patients underwent a combined resection of the distal pancreas and spleen during the same period. The mortality rate of the pancreas-preserving (PP) group was lower than that of the pancreas-resection (PR) group: 0.3% versus 0.9%. The hospital death rate was 1.6% in the PP group and 3.1% in the PR group. Surgical complications related to the pancreas were also fewer in the PP group than in the PR group: 19.6% and 39.4%, respectively. Furukawa et al.^[14] reported that between 1981 and 1989, 110 patients were registered in a randomized controlled trial, which included total gastrectomy plus dissection of lymph nodes along the splenic artery, either with (55 patients: Group A) or without (55 patients: Group B) pancreas tail resection. The number of dissected lymph nodes was 4.6 in Group A and 4.1 in Group B. Blood loss in Group B was 904 ml and in Group A it was 994 ml. A post-operation pancreatic fistula occurred more frequently in Group A (14.5%) than in Group B (9.1%), but the difference was not statistically significant. Reduced glucose tolerance was 39% in Group A, but normal in Group B. The 5-year survival rate was 80.0% in Group A and 76.7% in Group B. They considered total gastrectomy with pancreas-preserving dissection of lymph nodes the splenic artery and splenectomy to be a rational method for treatment of patients with advanced cancer in the upper or middle part of the stomach.

Qin and Lin^[3] performed a radical resection of gastric carcinoma with pancreatic and splenic preservation (PSP) and functional clean LNS of the splenic hilus and along the splenic artery in 63 cases with gastric cancer. These cases were compared with those receiving a pancreatic and splenic combined resection (PSR). Postoperative complications, diabetes and mortality in the PSP(0%, 0%, 0%) were less than in the PSR group (40%, 10%, and 3.3%). The 5-YSR

and 10-YSR in the PSP cases (57.5%, 52.0%) were higher than that in the PSR group(37.0%, 30.0%). This operative procedure was particularly recommended for those patients with Stage II and Stage IIIa tumors, as those treated by PSP were markedly improved. Sakaguchi et al.^[9] proposed that splenectomy should be conducted in T2 cases with gross serosal change and in T3 cases with 4 tumors.

CONCLUSION

We conclude that a gastrectomy combined with extended multiorgan resection in patients with gastric cardia carcinoma is the operation of choice as it serves to ensure the oncological curability and at the same time reduce the trauma and the complications to a minimum.

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