Results of D2 Gastrectomy for Gastric Adenocarcinoma: 10-Year Experience in Thai Patients

Chakrapan Euanorasetr MD*,
Panuwat Lertsithichai MD, MSc*

** Department of Surgery, Faculty of Medicine, Ramathibodi Hospital, Mahidol University*

Background: *The therapeutic value of D2 gastrectomy in the curative treatment of gastric adenocarcinoma is controversial outside Japan.*
Material and Method: *The authors retrospectively reviewed the medical records of 97 patients with gastric adenocarcinoma who underwent curative D2 gastrectomy between October 1995 and September 2005.*
Results: *Subtotal gastrectomy was performed in 42/97 patients (43%) and total gastrectomy in 55/97 patients (57%), with an average number of 38 lymph nodes (range, 22-82) and 48 lymph nodes (range, 24-126) removed, respectively. Overall morbidity rate was 17% (16/97). There was no hospital mortality. The 5-year overall and 5-year disease-free survival rates were 59% and 46%, respectively. The 5-year disease-free survival rate for each TNM stage was 100% for stages IA and IB, 75% for stage II, 78% for stage IIIA, 28% for stage IIIB and 4% for stage IV. Of the 43/97 patients (44%) who had metastasis to the level 2 (N2) lymph nodes, 14/43 patients (33%) survived more than 5 years.*
Conclusion: *The D2 gastrectomy can be performed with low morbidity and mortality, and may increase the cure rate and survival of Thai gastric adenocarcinoma patients, at least in experienced centers.*

Keywords: *Gastric adenocarcinoma, D2 gastrectomy, Morbidity, Mortality, Survival*

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Although the incidence of gastric cancer has been declining over the past 50 years, especially in Western countries, it remains the fourth most common cancer worldwide. Gastric cancer is the second leading cause of cancer death, accounting for 10.4% of cancer deaths globally[1]. In Thailand, it is the eighth leading cancer in males and the ninth in females. In 1997, the age-standardized incidence rate of gastric cancer was 4.1 per 100,000 per year in Thai males and 2.6 per 100,000 per year in Thai females[2].

Surgery is the only potentially curative treatment for gastric cancer. However, there is controversy as to the extent of lymph node dissection for achieving optimal results. Surgery with more radical lymph node dissection (D2 gastrectomy) is often compared with less radical surgery (D1 or D0 gastrectomy). Several non-randomized trials from specialized centers in the West showed a stage-specific survival benefit of D2 gastrectomy[3-8]. In contrast, two large randomized multicenter trials from the West showed a significant increase in postoperative complications and hospital mortality after D2 gastrectomy, compared with D1 gastrectomy, without survival benefit[9-12]. In Japan, where the 5-year survival rate is twofold to threefold higher than in the West[13], D2 gastrectomy is considered the standard treatment for gastric cancer for more than three decades[14]. The Japanese claims in favor of D2 gastrectomy were based on historical comparisons[15,16]. Low morbidity and mortality rates and survival benefit might also be reproduced in Thailand if surgical techniques were the same as in Japan.

D2 gastrectomy is a relatively new procedure in Thailand, but the trend in surgical treatment of gastric cancer in this country during the past five years has been towards D2 gastrectomy. The purpose of the present study was to evaluate the long-term results of

Correspondence to : Euanorasetr C, Department of Surgery, Faculty of Medicine, Ramathibodi Hospital, Mahidol University, Bangkok 10400, Thailand. Phone: 0-2201-1315, Fax: 0-2201-1316, E-mail: racen@mahidol.ac.th

D2 gastrectomy in a group of Thai gastric adenocarcinoma patients undergoing potentially curative resection. This is the first report of D2 gastectomy for gastric adenocarcinoma from Thailand.

Material and Method

In a 10-year period between October 1995 and September 2005, 97 patients with histologically confirmed gastric adenocarcinoma underwent curative D2 gastrectomy at the Department of Surgery, Ramathibodi Hospital, Mahidol University, Thailand. Patients underwent D2 gastrectomy if no distant metastasis, no gross peritoneal dissemination, no locally advanced disease precluding curative resection, no serious concomitant diseases, and no liver cirrhosis were present. For each patient, demographic and clinical information, operative notes, and pathological reports were reviewed and relevant data extracted for analysis. The Hospital's Ethics Review Committee approved the study.

Surgery was considered curative when there was no gross residual tumor after surgery ("R0" surgery) and resection margins were histologically free from cancer cells[17]. The authors used a combination of both the Japanese classification and UICC/AJCC TNM staging system in the present study. Pathological staging according to the TNM classification, 6th edition (2002)[17], was used to compare the present results with other series. Lymph node dissection and lymph node station was classified according to the Japanese classification, second English edition (1998)[14].

Operative morbidity was defined as any complication that occurred after surgery, and mortality was defined as death during hospitalization. Pancreatic fistula was defined as fluid drainage with a high level of amylase activity (greater than 500 U/L) persisting for more than two weeks[18]. High-amylase fluid drainage persisting for less than two weeks was defined as prolonged drainage.

Recurrence was classified as loco-regional, peritoneal or distant. Loco-regional recurrence included any new dominant mass in the gastric bed, regional lymph node metastasis in the upper abdomen or anastomotic recurrence. Peritoneal recurrence was documented by the presence of cancer cells in the ascitic fluid or by the presence of peritoneal nodules on imaging studies. Tumors involving the ovaries were considered peritoneal metastases. Distant metastasis was defined according to the specific organs involved. Extra-regional lymph node metatstases were considered distant metastasis.

Surgical Technique

One surgeon (CE) performed D2 gastrectomy with curative intent on all patients. According to the Japanese classification, lymph nodes were grouped into three levels (N1 to N3) depending on tumor location (a diagram of gastric lymph node groupings can be found in reference 14). D2 gastrectomy includes total or subtotal gastrectomy with the dissection of lymph node levels (or tier) N1 and N2. Generally, when the tumor was located in the lower third of the stomach, a subtotal gastrectomy was performed, provided that a distance of at least five cm between the tumor and the proximal resection line was maintained. In other cases, total gastrectomy was performed.

Pancreas-preserving total gastrectomy was performed according to the Maruyama techniques[16]. Splenectomy was performed routinely in all cases of total gastrectomy to facilitate complete removal of the splenic hilar nodes (gr-10-node). Distal pancreatectomy was done only when there was direct tumor extension to the pancreas or when matted nodes were located along the splenic artery (group-11-node). Tumor-infiltrated adjacent organs (transverse colon, liver, or pancreas) were resected with the primary tumor en bloc, whenever potentially curative resection was possible.

Peritoneal washing was performed immediately after the abdomen was opened, and the fluid was obtained for cytological examination. This examination did not influence the decision to perform D2 gastrectomy because the result was reported one week after surgery. Its benefit was for the purposes of prognosis. Para-aortic nodes situated between the left renal vein and the inferior mesenteric artery (group 16b1 nodes) were removed for prognostic purposes.

For all total gastrectomy patients, gastrointestinal continuity was re-established by a stapled end-to-side anastomosis between the esophagus and a 40-cm. jejunal Roux-en-Y limb. Reconstruction after subtotal gastrectomy included a Billroth I, Billroth II or a Roux-en-Y gastrojejunostomy anastomosis.

Statistical analysis

Continuous variables were summarized as mean (standard deviation) or median (range) as appropriate. Categorical variables were summarized as counts and percentages. Overall survival and disease free survival were estimated using Kaplan-Meier methods. 95% confidence intervals (CI) were estimated using Greenwood's method. Cox (proportional hazards) regression was used to obtain univariable estimates of the association between each potential prognostic

Table 1. Clinicopathological characteristics

Characteristics	Number (%) (n = 97)
Sex	
Male:Female	51:46 (53: 47)
Age (years)	
Mean (sd)	58 (12)
Median (range)	59 (31 to 83)
Location of tumor	
Upper third	8 (8)
Middle third	16 (17)
Lower third	42 (43)
More than one third	31 (32)
Macroscopic findings	
Non scirrhous	83 (86)
Scirrhous (linitis plastica)	14 (14)
Histologic grade	
Well or Moderately-well differentiated	27 (28)
Poorly or Un-differentiated	70 (72)
Angiolymphatic invasion	
Absence	55 (57)
Presence	42 (43)
Peritoneal washing cytology	
Negative	75 (77)
Positive	22 (23)
T-category	
T1	4 (4)
T2	10 (10)
T3	72 (74)
T4	11 (11)
N-category	
N0	14 (14)
N1	36 (37)
N2	15 (16)
N3	32 (33)
M-category	
M0	94 (97)
M1	3 (3)
TNM stage grouping	
IA	2 (2)
IB	7 (7)
II	12 (12)
IIIA	27 (28)
IIIB	13 (13)
IV	36 (38)
Number of examined nodes	
Subtotal gastrectomy: median (range)	38 (22 to 82)
Total gastrectomy: median (range)	48 (24 to 126)
Number of positive nodes	
Subtotal gastrectomy: median (range)	3 (0 to 39)
Total gastrectomy: median (range)	14 (0 to 107)

factor and survival. Multivariable Cox regression was used to obtain a final set of independent prognostic factors. Graphical methods and various residuals (Schoenfeld and martingale residuals) were used to check the proportional hazards and link-function assumptions. Statistical significance was defined as a p-value of 0.05 or less. All statistical analyses were performed using STATA version 7 (Stata Corp, College Station, TX, USA).

Results

During a 10-year period from October 1995 to September 2005, 97 patients with gastric adenocarcinoma underwent curative D2 gastrectomy at Ramathibodi Hospital. Their clinicopathological features are presented in Table 1. Treatment-related variables and outcomes including length of follow-up, time to detection of recurrence and status at final follow-up are presented in Table 2.

Survival

Based on the Kaplan-Meier methods the estimated overall survival at five years was 59% (95% CI: 46% to 70%) and the estimated disease-free survival at five years was 46% (95%CI: 35% to 57%); see Fig. 1 and 2, respectively. The 5-year overall survival rate was 100% for stage IA and IB disease, 83% for stage II, 90% for stage IIIA, 32% for stage IIIB and 9% for stage IV; see Fig. 3. The 5-year disease-free survival rate was 100% for stage IA and IB disease, 75% for stage II, 78% for stage IIIA, 28% for stage IIIB and 4% for stage IV; see Fig. 4. Of the 43/97 patients (44%) treated with D2 gastrectomy whose cancer metastasized to the N2 level lymph nodes, 14/43 patients (33%) survived at least five years.

Morbidity and Mortality

Postoperative complications, re-operation, and mortality data are presented in Table 3. Postoperative complications developed in 16/97 patients (17%). The morbidity rate was higher in the total gastrectomy group than in the subtotal gastrectomy group (15/55 patients (27%) vs 1/42 patients (2%), respectively). One re-operation was required in a patient with leakage of the blind pouch at the defunctioning jejunal limb of the Roux-en-Y esophagojejunal anastomosis. There were no operative deaths.

Recurrence

Recurrent disease occurred in 43/97 patients (44%). Most patients (33/43 or 77%) had recurrences

Table 2. Treatment and outcomes

Treatment and outcomes	Number (%) (n = 97)
Perioperative blood transfusion	
No	89 (92)
Yes	8 (8)
Surgical treatment	
Subtotal gastrectomy	42 (43)
Total gastrectomy	55 (57)
Combined resection (for T4 category)	
No	86 (89)
Yes	11 (11)
Postoperative adjuvant therapy	
No	34 (35)
Yes	63 (65)
Time to detection of recurrence (months)	
Median (range)	19 (3 to 50)
Length of follow up (months)	
Median (range)	49 (3 to 119)
Status at final follow up	
Dead from disease	28 (29)
Alive with disease	15 (15)
Alive, free from disease	54 (56)

Table 3. Postoperative complications and mortality

Postoperative complications	N=79 Number of patients (%) (n = 97)
Postoperative morbidity	16 (17)
- Subtotal gastrectomy (n = 42)	1/42 (2)
- Total gastrectomy (n = 55)	15/55 (27)
Prolonged drainage	7 (7)
Pancreatic fistula	3 (3)
Subdiaphragmatic collection	3 (3)
Blind pouch leakage	1 (1)
CVA with hemiparesis	1 (1)
Wound infection (subtotal gastrectomy)	1 (1)
Reoperation	
Blind pouch leakage	1 (1)
Hospital mortality	0

within two years after surgery. One patient had recurrent disease four years after surgery. At the last follow-up, 28/43 patients (65%) had died of recurrent disease. The median time from recurrence to death was seven months (range, 3 to 25 months). Twenty-three of 28 patients (82%) died within one year and 27/28 patients (96%) died within two years of the diagnosis of recurrence. The recurrence was peritoneal in 36/43 patients (91%), loco-regional in 16/43 patients (37%) and distant in 13/43 patients (30%). Twenty-two of 43 patients (51%) had single-pattern recurrence, 20/43 patients (47%) had two recurrence patterns and one patient (2%) had all three types of recurrence.

Prognostic variables

Prognostic variables related to overall survival and disease-free survival are presented in Tables 4 and 5, respectively. Univariable Cox regression analyses showed that, for patients undergoing curative resection, poor survival was related to scirrhous carcinoma, presence of angiolymphatic invasion, poorly differentiated tumor, serosal penetration (pT3 or pT4), nodal involvement, TNM staging, combined resection, positive peritoneal washing cytology and adjuvant therapy.

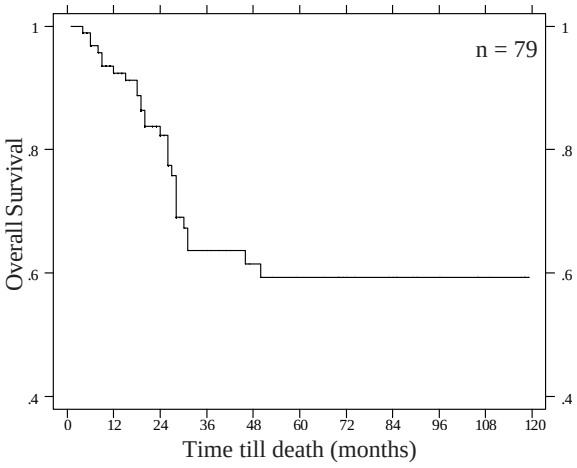

Fig. 1 Overall survival

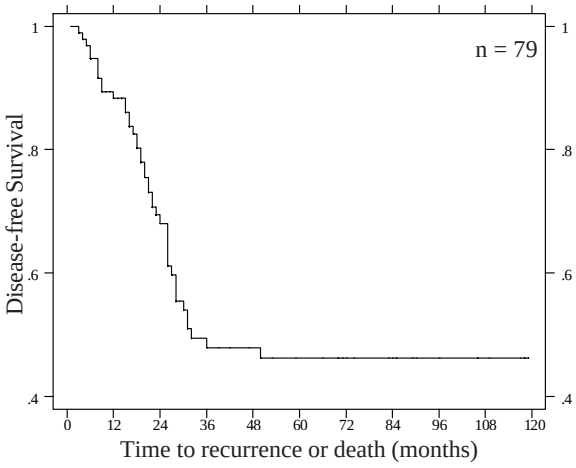

Fig. 2 Disease-free survival

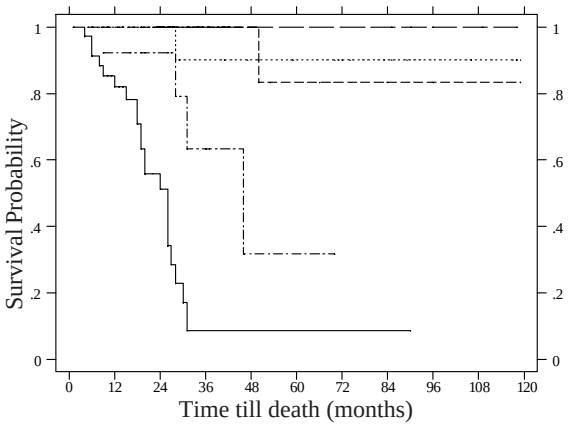

Fig. 3 Survival curves for stages IA and IB (— — —), stage II (- - -), stage IIIA (···), stage IIIB (–·–·–·) and stage IV (————)

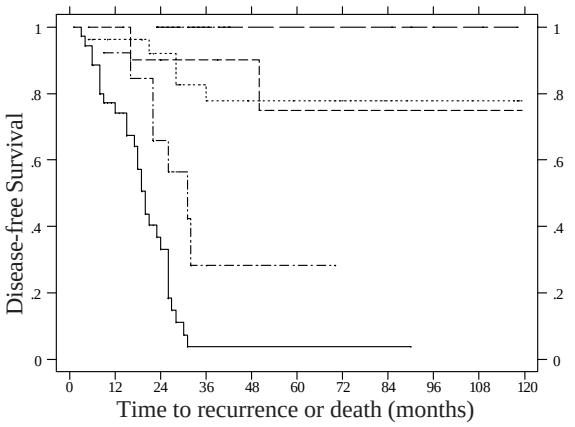

Fig. 4 Disease-free survival curves for stages IA and IB (————), stage II (- - -), stage IIIA (···), stage IIIB (–·–·–·) and stage IV (————)

Multivariable analysis identified only three independent prognostic variables (analysis not shown): TNM staging, presence of angiolymphatic invasion and positive peritoneal washing cytology. These three variables were predictors of poor prognosis for both the overall and disease-free survival. There was no evidence against the proportional hazard and linearity assumptions for all regression models.

Discussion

A large proportion of patients in the present series (43%) had distal tumors. Although the incidence of synchronous multiple gastric cancers has been reported to be 2 to 8.6%[19], none was seen in the present series. Most of the patients had advanced disease. Most had TNM stage III and IV disease (66%), most tumors had serosal penetration (85%), and nodal metastasis

Table 4. Significant prognostic variables related to overall survival, univariable Cox regression (n = 97)

Variables	Hazard Ratio	95%CI	p-value
Location of tumor			
Middle + Upper vs Lower	1.69	0.63 to 4.58	0.301
Macroscopic findings			
Scirrhous vs Non scirrhous	11.40	4.09 to 31.9	<0.001
Angiolymphatic invasion			
Presence vs Absence	17.40	5.87 to 51.8	<0.001
Histologic grade			
Poorly differentiated vs Differented	1.73	1.01 to 2.97	0.047
T-category			
Higher category vs Lower category	3.66	1.75 to 7.67	0.001
N-category			
Higher category vs Lower category	5.28	2.95 to 9.45	<0.001
TNM staging grouping			
Higher category vs Lower category	4.33	2.52 to 7.43	<0.001
Surgical treatment			
Total vs Subtotal gastrectomy	2.26	0.87 to 5.89	0.095
Combined resection vs Gastrectomy alone	6.41	2.20 to 18.6	0.001
Peritoneal washing cytology:			
Positive vs Negative	12.30	5.36 to 51.8	<0.001
Adjuvant therapy			
Yes vs No	3.54	1.33 to 9.40	0.011

Table 5. Significant prognostic variables related to disease-free survival, univariable Cox regression (n = 97)

Variables	Hazard Ratio	95%CI	p-value
Location of tumor			
Middle + Upper vs Lower	1.57	0.77 to 3.23	0.212
Macroscopic findings			
Scirrhous vs Non scirrhous	4.72	2.06 to 10.85	<0.001
Angiolymphatic invasion			
Presence vs Absence	11.90	5.38 to 26.2	<0.001
Histologic grade			
Poorly differentiated vs Differented	1.73	1.01 to 2.97	0.047
T-category			
Higher category vs Lower category	3.51	1.95 to 6.33	<0.001
N-category			
Higher category vs Lower category	3.62	2.44 to 5.39	<0.001
TNM staging grouping			
Higher category vs Lower category	3.15	2.17 to 4.58	<0.001
Surgical treatment			
Total vs Subtotal gastrectomy	1.70	0.83 to 3.46	0.144
Combined resection vs Gastrectomy alone	3.89	1.67 to 9.05	0.002
Peritoneal washing cytology			
Positive vs Negative	9.31	4.84 to 17.9	<0.001
Adjuvant therapy			
Yes vs No	3.29	1.51 to 7.14	0.003

was seen in 86% of patients. Three patients had distant metastasis. Potentially curative resection was performed for all patients, however.

The majority of patients (65%) received postoperative adjuvant chemotherapy, although there was no consistent regimen. There is controversy as to the effectiveness of adjuvant therapy after curative gastric resection (R0 resection). There is no established guideline for adjuvant therapy for gastric cancer in Thailand. In the present trial, most patients with serosal penetration, positive nodal status, and positive peritoneal washing cytology received adjuvant therapy.

In the present series, the average number of lymph nodes examined was 38 (range, 22 to 82) in the subtotal gastrectomy group and 48 (range, 24 to126) in the total gastrectomy group. These data are important because the number of dissected nodes is considered a marker of quality for a D2 gastrectomy. At least 25 lymph nodes should be removed, according to some studies[3,5,19,20]. In the TNM classification, at least 15 lymph nodes are necessary to properly stage gastric cancer[17]. The Italian Gastrointestinal Tumor Study Group suggested in 2002 that a lymphadenectomy including at least 25 lymph nodes is associated with the best long term results[21].

The overall morbidity rate in this series was 17%. Total gastrectomy had a higher morbidity rate than subtotal gastrectomy (27% versus 2%, respectively). Re-operation was necessary in only one patient. The authors found no pancreatic necrosis as a complication in all 56 pancreas-preserving total gastrectomy patients. There was no mortality in the present series. The present study is a striking contrast to the Dutch[11] and British[9] trials in which D2 gastrectomy was associated with a hospital morbidity rate of 43% and 46%, respectively, and postoperative mortality rate of 10% and 13%, respectively. There is wide variation in mortality and morbidity rates following gastric cancer surgery among countries and institutions. The mortality for D2 gastrectomy ranged between 0 and 13% and the morbidity ranged between 10.7 and 53.5%[5,7,8,19,22-24]. The Japanese nationwide registry reported an operative mortality for D2 gastrectomy of less than 2%, and in specialized institutions, less than 1%[25-28].

The low morbidity and mortality achieved in the present series can be attributed to several factors. First, only one surgeon performed the operations. Second, pancreas-preserving technique was performed routinely in patients undergoing total gastrectomy. Third, this university institution had an efficient and effective perioperative and postoperative care team. Fourth, the body mass index in Thai patients is significantly lower than most Western patients. Thai patients, like the Japanese, seldom exhibit obesity and have a

relatively low incidence of comorbid diseases compared with those in the West.

Both the overall survival and disease-free survival for the present series tended to decline sharply during the first five years after the primary operation (Fig. 1, 2). After five years, both survivals remained comparatively constant (at 59% and 46%, respectively). One possible interpretation is that the disease is less likely to recur or affect survival if a patient has managed to live past five years after the primary operation.

The 5-year overall survival rate after curative resection in the present series (59%) is higher than many of those from the West, which ranged between 14 and 37%[29-30]. These rates are similar to those from specialized centers in the West, which ranged from 49 to 61.3%[3,5,24]. However, they are below the 63.6 to 70.8% reported from Japan[16,25].

In an American College of Surgeons Survey in 1993, the 5-year overall survival rate for patients with completely resected gastric cancer was 14%, but only 4.7% of these were treated with D2 gastrectomy[31]. In contrast, a series of patients undergoing potentially curative resection at the Memorial Sloan Kettering Cancer Center in New York in 2000, in which 81% of patients were treated with D2 or D3 gastrectomy, had an overall 5-year survival rate of 49%[32].

As in the German Gastric Cancer study group trials[7] and the Austrian trials[22] where the benefit of a more radical lymph node dissection was demonstrated for stages II and IIIA disease, the present series showed 5-year disease-free survival rates of 75% and 78% for stages II and IIIA disease, respectively.

Patients with more advanced disease (stages IIIB and IV) have a very high rate of disease recurrence and low survival. A distinct survival difference between stages IIIA and IIIB can be seen in the present series. The 5-year disease-free survival was 78% for stage IIIA but only 28% for stage IIIB. For stage IV disease, D2 gastrectomy did not improve patient survival. Similar results were found from the German Gastric Cancer study group[7] and the Austrian series[22]. Surgery for stage IV tumors will almost always be palliative.

The evaluation of long-term survival in patients with N2 lymph node metastasis is an indirect method to assess the potential benefit of D2 gastrectomy[8], because N2 nodes are not removed in surgery with a limited lymph node dissection (D0-D1). In the present trial, a curative D2 gastrectomy was done on 43 patients with positive N2 nodes, and 33% of these patients were alive five or more years after surgery. These findings suggest that D2 gastrectomy may increase the cure rate in patients with N2 lymph node metastasis. Patients with positive N2 nodes would receive only palliative surgery if D0 or D1 gastrectomy were performed. In the authors' opinion, not only does D2 gastrectomy permit staging that are more accurate, it also increases the possibility of complete tumor resection. If patients with positive N2 nodes who have undergone a D2 resection can survive five or more years, one must conclude that some benefit has occurred to these patients.

Recurrent disease occurred in 44% of patients in the present study, most commonly peritoneal recurrence (91%). This finding is similar to other reports[30,34-36]. The reported types of recurrence were peritoneal dissemination in 29 to 70%, loco-regional recurrence in 10 to 54% and distant metastasis in 20 to 51%[18,30,37,38]. Most of the tumor recurrences occurred within two years of surgical resection and death ensued rapidly thereafter. Tumor recurrence was rare after four years. These findings are also similar to other reports[3,34,37].

An identical set of prognostic variables was significantly related to overall survival and disease-free survival on multivariable analysis: TNM staging, presence of angiolymphatic invasion and positive peritoneal washing cytology. Treatment factors were not significantly related to overall or disease-free survival once pathological factors were taken into account. That the same set of prognostic variables was identified for both outcomes was probably because the majority of patients died within a relatively short time after recurrence.

In the present series, presence of intraperitoneal free cancer cells was found in 22/97 patients (23%). Invasion of the gastric serosa was observed in all cytology-positive patients: 14 patients had pT3 tumors and 8 had pT4 tumors. All cytology-positive patients developed recurrence (peritoneal dissemination). None of the cytology-positive patients survived longer than three years after surgery.

In the literature, the reported rate of detection of intraperitoneal free cancer cells ranges from 4.4% to 47%[39,40]. Several authors have found that the presence of positive peritoneal washing cytology is a very specific predictor of peritoneal recurrence[34,41], although it is not very sensitive, owing to a considerable false-negative rate[41]. The present finding confirmed the validity of the Japanese classification, second edition (1998)[14], which include peritoneal cytology in the staging system. Any patient with positive peritoneal cytology should be classified as having stage IV disease.

Angiolymphatic invasion was present in 43% of patients in the present series. The 5-year overall survival rates of patients with and without angio lymphatic invasion were 16% and 88%, respectively. The 5-year disease-free survival rates of patients with and without angiolymphatic invasion were 6% and 80%, respectively. The incidence of angiolymphatic invasion in gastric cancer varies from 5.4% to 86%, with the lowest incidence reported in patients with node-negative tumors[42,43]. By multivariable analysis, angio lymphatic invasion was one of the most important predictors of survival[42-46]. Dicken et al in 2006 reported that lymphatic invasion was associated with a 5-year survival of 13.9% versus 55.9% in patients in whom it was absent[42].

Conclusion

Curative D2 gastrectomy can be considered a safe and effective treatment for gastric adenocarcinoma in Thai patients, at least in experienced centers. The survival benefit of D2 gastrectomy was seen in patients with stage I to IIIA disease. Recurrence generally occurred within the first two years after surgery, and death usually followed rapidly.

The present results suggest that D2 gastrectomy should be the procedure of choice in the curative treatment of gastric adenocarcinoma. To improve results of treatment and facilitate research, centralization of gastric cancer treatment is advocated.

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ผลการรักษามะเร็งกระเพาะอาหารด้วยการผ่าตัดแบบ D2 Gastrectomy: ประสบการณ์ 10 ปี ในการรักษาผู้ป่วยไทย

จักรพันธ์ เอื้อนรเศรษฐ์, ภาณุวัฒน์ เลิศสิทธิชัย

***ภูมิหลัง**: ประโยชน์ของการผ่าตัดแบบ D2 Gastrectomy เพื่อการรักษาแบบหายขาดสำหรับมะเร็งกระเพาะอาหาร ยังมีความคิดเห็นไม่ตรงกันนอกประเทศญี่ปุ่น*

***วัสดุและวิธีการ**: ศึกษาเวชระเบียนของผู้ป่วยมะเร็งกระเพาะอาหาร 97 ราย ที่ได้รับการผ่าตัดแบบ Curative D2 Gastrectomy ระหว่างเดือนตุลาคม พ.ศ. 2538 ถึง เดือนกันยายน พ.ศ. 2548*

***ผลการศึกษา**: ทำ Subtotal Gastrectomy จำนวนร้อยละ 43 (42/97 ราย) และ Total Gastrectomy ร้อยละ 57 (55/97 ราย) มีจำนวนต่อมน้ำเหลืองเฉลี่ย 38 ต่อม (22-82) และ 48 ต่อม (24-126) ตามลำดับ พบภาวะแทรกซ้อนจากการผ่าตัด ร้อยละ 17 (16/97 ราย) และไม่มีผู้ป่วยเสียชีวิต อัตราการอยู่รอดทั้งหมด และอัตราการอยู่รอดโดยไม่มีการเกิดซ้ำของโรค ณ เวลา 5 ปี หลังการรักษา คือ ร้อยละ 59 และ 64 ตามลำดับ อัตราการอยู่รอดโดยไม่มีการเกิดซ้ำของโรค ณ เวลา 5 ปี หลังการรักษา สำหรับแต่ละระยะของการเป็นมะเร็ง ตามระบบ TNM คือร้อยละ 100 สำหรับระยะ IA และ IB, ร้อยละ 75 สำหรับระยะ II, ร้อยละ 78 สำหรับระยะ III A ร้อยละ 28 สำหรับระยะ III B และร้อยละ 4 สำหรับระยะ IV พบว่าร้อยละ 44 (47/97ราย) ของผู้ป่วยมีการแพร่กระจายของมะเร็งไปถึงต่อมน้ำเหลืองระดับที่ 2 (N2) ผู้ป่วยกลุ่มนี้มีร้อยละ 33 (14/43 ราย) ที่ยังมีชีวิตนานกว่า 5 ปีหลังการรักษา*

***สรุป**: การผ่าตัด D2 Gastrectomy สามารถทำได้โดยมีภาวะแทรกซ้อนต่ำและไม่มีอัตราตาย และอาจเพิ่มอัตราการอยู่รอดและหายขาดจากโรคในผู้ป่วยไทยที่เป็นมะเร็งกระเพาะอาหาร อย่างน้อยในสถาบันที่มีประสบการณ์ในการรักษาแบบนี้*