



Surgery: Independent Prognostic Factor in Curable and Far Advanced Gastric Cancer

Giovanni Battista Doglietto, M.D.,¹ Fabio Pacelli, M.D.,¹ Paola Caprino, M.D.,¹ Antonio Sgadari, M.D.,² Francesco Crucitti, M.D.¹

¹Department of Digestive Surgery, School of Medicine, Catholic University, Largo A. Gemelli n. 8, 00168 Rome, Italy

²Institute of Internal Medicine and Geriatrics, School of Medicine, Catholic University, Largo A. Gemelli n. 8, 00168 Rome, Italy

Abstract. The hospital records of 639 patients affected by primary gastric cancer who were consecutively admitted to our unit during the period 1981–1995 were reviewed. Overall 220 underwent total gastrectomy (38 palliative), 12 had resection of the gastric stump, 195 had distal subtotal gastrectomy (55 palliative), 78 had bypass procedures, 72 had explorative laparotomy, and 62 had no operation. Univariate and multivariate analyses were used to evaluate 5-year survival with respect to the main clinical, pathologic, and treatment variables after both curative and palliative treatments. Overall the 5-year survival after curative treatment (320 patients—operative mortality excluded) was 55.5%: 91.1% for stage IA, 71.5% IB, 62.4% II, 37.5% IIIA, 31.5% IIIB. Among patients who underwent palliative treatment 5-year survival was 13.1% after gastric resection (total or distal subtotal), 4.9% after the bypass procedures, 0 after explorative laparotomy, and 0 after no operation. Univariate and multivariate survival analyses showed that variables independently associated with poor survival were advanced stage, upper location and D1 lymphadenectomy after curative treatment, tumor spread to distant sites, and nonresectional surgery after palliative treatment. Multivariate analysis showed that even though survival with gastric cancer depends on predetermined factors, the type of surgery can have a significant effect on prognosis after both curative and palliative treatment.

Although resectional surgery has generally been accepted as the treatment of choice for gastric cancer [1], many questions are still a matter of debate: (1) How extended should lymph node dissection be for patients with curable gastric cancer [2–5]? (2) Should a resection be performed whenever feasible? (3) What is the survival advantage of resectional surgery for patients with far advanced cancer [6–8]? The aim of this retrospective study was to analyze factors influencing prognosis after surgical treatment (both radical and palliative) of gastric cancer in a large series of patients consecutively admitted to our surgical unit.

Patients and Methods

The hospital records of 639 patients affected by primary gastric cancer who were consecutively admitted to our unit during the period 1981–1995 were reviewed. Demographic data, tumor location, and gross appearance according to Borrmann [9], histologic type according to Lauren [10], type of treatment, and hospital

morbidly and mortality were recorded. The disease was staged according to the TNM system.

The operative procedures were defined as palliative when done because of the presence of residual tumor, distant metastasis, or both at the end of surgery. Tumor resection was judged to be curative when no grossly visible tumor tissue (metastatic or lymph node involvement) had been left and resection margins were histologically free from disease.

Survival was calculated after both curative and palliative treatment. Patients' status was investigated by follow-up examination or telephone contact.

Statistical analysis was carried out using the SPSS for Windows version 6.01 package (BMDP statistical software, Los Angeles, CA, USA). Results are expressed as mean \pm standard deviation. The statistical significance of the difference between mean values was evaluated using Student's *t*-test. Survival was calculated according to actuarial life-table methods. Survival curves were compared using the Mantel-Cox test [11]. Operative deaths were excluded from survival analysis after radical treatment. Overall, survival was calculated in 320 and 305 patients after radical and palliative treatment, respectively.

Univariate and multivariate analyses were used to evaluate the 5-year survival with respect to the main clinical, pathologic, and treatment variables after both curative and palliative treatment. Variables shown to be prognostically significant by univariate analysis were entered into a multivariate model. Multivariate analysis was applied using the Cox regression proportional hazard model [12].

Results

Patient characteristics and operative procedures are shown in Table 1. Overall 220 patients underwent total gastrectomy (TG) (38 palliative), 12 had resection of the gastric stump (RGS), 195 had distal subtotal gastrectomy (DSG) (55 palliative), 78 had a bypass procedure (BPP), 72 had an explorative laparotomy (EL), and 62 underwent no operation (NO). In 54 patients (12.6%) the gastric resection was extended to other organs (Table 2).

Among patients undergoing curative resection the type of nodal dissection was limited (D1) in 128 and extended (D2/D3) in 206.

Table 1. Patient characteristics.

Characteristics	Curative resection	Palliative treatment	Overall
Patients (no.)	334	305	639
Age, mean ± SD	60.4 ± 11.3	63.7 ± 11.6	62.6 ± 10.1
Sex (M/F)	217/117	216/89	433/206
Tumor location			
Lower third	148 (44.3%)	107 (35.1%)	255 (40.0%)
Middle third	113 (33.8%)	124 (40.6%)	237 (37.0%)
Upper third	73 (21.9%)	59 (19.3%)	146 (22.7%)
Whole stomach	—	15 (5.0%)	15 (2.3%)
Borrmann classification			
Type I	60 (18.0%)	57 (18.7%)	117 (18.3%)
Type II	152 (45.5%)	62 (20.3%)	214 (33.5%)
Type III	121 (36.3%)	166 (54.4%)	287 (45.0%)
Type IV	1 (0.2%)	20 (6.6%)	21 (3.2%)
Lauren classification			
Diffuse	143 (42.8%)	98 (32.1%)	241 (37.7%)
Intestinal	165 (49.4%)	186 (61.0%)	351 (54.9%)
Undetermined	26 (7.8%)	21 (6.9%)	47 (7.4%)
Tumor stage			
IA	59 (17.7%)	—	59 (9.2%)
IB	32 (9.5%)	—	32 (5.0%)
II	90 (27.0%)	—	90 (14.1%)
IIIA	94 (28.1%)	—	94 (14.8%)
IIIB	59 (17.7%)	—	59 (9.2%)
IV	—	305 (100%)	305 (47.7%)
Type of operation			
TG	182 (54.5%)	38 (12.5%)	220 (34.4%)
DSTG	140 (41.9%)	55	195 (30.5%)
RGS	12 (3.6%)	—	12 (1.9%)
BPP	—	78 (25.6%)	78 (12.2%)
EL	—	72 (23.6%)	72 (11.3%)
NO	—	62 (20.3%)	62 (9.7%)

TG: total gastrectomy; DSTG: distal subtotal gastrectomy; RGS: resection gastric stump; BPP: bypass procedure; EL: explorative laparotomy; NO: no operation.

Table 2. Extended resection: adjacent organs removed.

Involved organ	Curative resection (334 patients)	Palliative resection (305 patients)	Overall (639 patients)
Esophagus	21 (6.3%)	4 (1.3%)	25 (3.9%)
Left pancreas	13 (3.9%)	4 (1.3%)	17 (2.6%)
Liver	3 (0.9%)	8 (2.6%)	11 (1.7%)
Colon	1 (0.2%)	3 (0.9%)	4 (0.6%)
Patients ^a	36 (10.7%)	18 (5.9%)	54 (8.4%)

^aThe total number of patients shown for extended resection is less than the sum of patients having individual organ resection because some patients had more than one organ involved.

The extent of nodal dissection was based on the surgeons' preference.

Hospital mortality was 5.9% (13/220) after TG, 5.6% (11/195) after DSG, 8.3% (1/12) after RGS, 10.2% after BPP (8/78), 8.3% after EL (6/72), and 6.4% after NO (4/62). Among patients undergoing radical resection, hospital mortality was 4.3% (8/182) and 3.5% (5/140) after TG and DSG, respectively ($p = \text{NS}$). Among those undergoing palliative resection, hospital mortality was 13.1% (5/38) and 10.9% (6/55) after TG and DSG, respectively ($p = \text{NS}$).

The hospital morbidity and mortality rates relative to the type of operation after radical and palliative treatments are outlined in

Table 3. Hospital morbidity and mortality after curative resection according to type of operation.

Parameter	No. of patients by type of resection			
	TG	DSTG	RGS	Overall
Total patients ^a	60 (32.9%)	17 (12.0%)	4 (33.3%)	81 (24.4%)
Hospital deaths	8 (4.3%)	5 (3.5%)	1 (8.3%)	14 (4.2%)
Complication ^b				
Anastomotic leak	15 (6)	3 (1)	3 (1)	21 (8)
Intraabdominal abscess	8 (1)	2 (1)	—	10 (2)
Abdominal wound dehiscence	1	—	—	1
Wound infection	6	3	—	9
Duodenal stump dehiscence	2 (1)	—	—	2 (1)
Pneumonia	8	3	—	11
Pulmonary embolism	—	2 (1)	—	2 (1)
Hemorrhage	3	—	—	3
Pancreatic fistula	1	—	2	3
Intestinal obstruction	1	—	—	1
Melena	—	1 (1)	—	1 (1)
Urinary infection	—	1	—	1
Other	12	2 (1)	1	15 (1)

See Table 1 for abbreviations.

^aThe total number of patients shown for complications is less than the sum of the patients having individual complications because many patients had more than one complication.

^bNumbers in parentheses are the number of hospital deaths.

Tables 3 and 4, respectively. Overall the 5-year survival after curative treatment (320 patients—operative mortality excluded) was 55.5%: 91.1% for stage IA, 71.5% IB, 62.4% II, 37.5% IIIA, 31.5% IIIB (Fig. 1, Table 5). Among patients who underwent palliative resection 5-year survival was 18.4% after gastric resection (total or distal subtotal), 2.4% after bypass procedures, 0 after explorative laparotomy, and 0 after no operation (Fig. 2, Table 6). Univariate survival analyses after radical and palliative treatments are shown in Tables 7 and 8, respectively. Multivariate analysis showed that variables independently associated with poor survival were advanced stage, upper location and D1 lymphadenectomy after curative treatment (Table 9), and tumor spread to distant sites and nonresectional surgery after palliative treatment (Table 10).

Discussion

The demographics of this study were similar to those of previously published Western reports [13–15]. As far as early results are concerned, hospital mortality did not occur more often among patients undergoing total gastrectomy than among those who had more limited resections after both radical and palliative surgery. These figures are in accordance with those published by others [16–18] and by our group [19], suggesting that total gastrectomy is a relatively safe procedure when performed as a radical or a palliative procedure. Therefore we do not argue against palliative total gastrectomy for proximal or extensive incurable tumors and radical total gastrectomy for curable antral cancer.

As far as long-term results after curative resection are concerned, multivariate analysis using the Cox model showed the

Table 4. Hospital morbidity and mortality after palliative treatment according to type of treatment.

Parameter	No. of patients by type of treatment				
	NO	GR	BPP	EL	Overall
Total patients ^a	5 (8.0%)	26 (28.0%)	20 (25.6%)	12 (16.6%)	63 (20.6%)
Hospital deaths	4 (6.4%)	11 (11.8%)	8 (10.2%)	6 (8.3%)	29 (9.5%)
Complication					
Anastomotic leak	—	5 (2) ^b	3 (2) ^b	—	8 (4) ^b
Intraabdominal abscess	—	4	1	—	5
Abdominal wound dehiscence	—	2	2 (1)	2	6 (1)
Wound infection	—	3	3	2	8
Pneumonia	—	4 (3)	5 (2)	2	11 (5)
Pulmonary embolism	—	1	1	—	2
Hemorrhage	1 (1) ^b	1 (1)	2 (2)	3 (3) ^b	14 (7)
Pancreatitis	1 (1)	1	1	—	3 (1)
Myocardial infarction	3 (1)	3 (3)	1 (1)	4 (2)	11 (7)
Intestinal obstruction	—	2	1	1	4
Other	1 (1)	5 (2)	5	2 (1)	13 (4)

GR: gastric resection. See Table 1 for other abbreviations.

^aThe total number of patients shown for complications is less than the sum of patients having individual complications because many patients had more than one complication.

^bNumbers in parentheses are the number of hospital deaths.

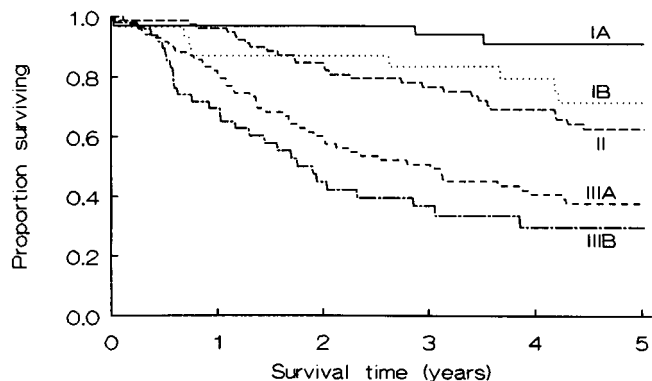


Fig. 1. Survival curves, according to stage, of 320 patients undergoing curative resection excluding operative deaths.

Table 5. Survival of 320 patients undergoing resection.

Stage	No. of survivors					
	0 Year	1 Year	2 Years	3 Years	4 Years	5 Years
Total	320	282	238	213	190	178
Ia	58	58	58	55	53	53
Ib	31	27	27	26	25	22
II	85	82	72	65	58	53
IIIa	90	74	54	46	36	34
IIIb	56	40	26	22	18	18

extent of lymphadenectomy as an independent predictor of survival. Despite the unfavorable results of the Dutch multicenter trial [2], which compared extensive node dissection with limited lymph node dissection, the present data are in agreement not only with those of Japanese authors but also with reports of D2 lymphadenectomy recently performed outside Japan [4, 5]. Moreover, they support the survival advantage of extended lymph node dissection for surgical treatment of gastric carcinoma.

Concerning long-term results of palliative surgery, as in most other studies [6, 7, 20] we found a more favorable outcome for

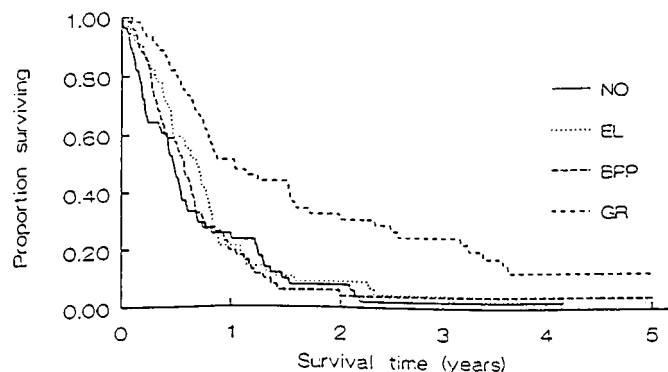


Fig. 2. Survival curves, according to type of treatment, of 256 patients with far-advanced carcinoma undergoing palliative treatment, excluding operative deaths and patients with tertiary lymph node involvement as the only reason for palliation. NO: no operation; EL: explorative laparotomy; BPP: bypass procedure; GR: gastric resection.

Table 6. Survival of 256 patients with far advanced carcinoma undergoing palliative treatment.

Treatment	No. of survivors						Median survival (months)
	0 Year	1 Year	2 Years	3 Years	4 Years	5 Years	
GR	93	29	16	11	5	5	16.3
BPP	78	12	2	1	1	1	7.1
EL	72	12	4	2	1	0	4.4
NO	62	13	4	1	1	0	3.1

See Tables 1 and 4 for abbreviations.

This patient group excluded those with tertiary lymph nodes as the only reason for palliation and operative deaths.

patients having a resection than for those who did not: Resectional surgery was found to be an independent prognostic factor by multivariate survival analysis.

As most published studies dealing palliative surgery for gastric cancer have been criticized mainly for methodologic problems

Table 7. Univariate survival analysis of clinical and pathologic variables after curative treatment of gastric carcinoma.

Parameter	No.	5-Year survival (%)	<i>p</i>
Sex			
Male	210	55.3	0.94
Female	110	55.8	
Age (years)			
≤ 60	129	57.6	0.08
> 60	191	54.0	
Tumor location			
Upper third	71	37.1	< 0.00025
Middle third	112	64.4	
Lower third	137	57.5	
Lauren classification			
Intestinal	158	59.6	0.19
Diffuse	139	51.6	
Undetermined	23	53.9	
Borrmann classification			
Type I	60	51.5	< 0.007
Type II	145	65.5	
Type III	115	43.6	
Stage			
IA	58	91	< 0.0001
IB	31	71	
II	85	67	
IIIA	90	37	
IIIB	56	31	
Type of operation			
TG ^a	185	57.5	0.96
DSTG	135	53.0	
Extent of nodal dissection			
D1	121	41.5	< 0.0001
D2–D3	199	66.3	

D1, D2, D3: nodal dissections. See Table 1 for other abbreviations.
^aTG includes RGS: 11 cases.

related to analysis of data, and because they did not take into account differences in the stage of the disease at the time of treatment [7], in the present study we performed a survival analysis based on a multivariate model that considered the main clinical and pathologic variables as well as treatment variables. The analysis shows that the survival advantage for resectional surgery, compared to bypass procedures or laparotomy, can be demonstrated not only in patients with local spread of the disease but also in those with disseminated distant disease.

In conclusion, multivariate analysis using the Cox model showed that even though predetermined factors govern the survival of patients with either curable or far advanced stomach cancer, the surgeon's choice and manner of execution of the surgery have a significant effect on prognosis.

The study indicates that at least a D2 nodal dissection should be associated with resection in patients with curable forms of gastric cancer. Moreover, resectional surgery, including total gastrectomy, should be undertaken whenever possible in patients with noncurable gastric cancer.

Résumé

Nous avons examiné les dossiers hospitaliers de 639 patients consécutif admis pour cancer gastrique primitif dans notre unité entre 1981–1995. Globalement, 220 patients ont eu une gastrectomie totale (GT), dont 38 palliative, 12 ont eu une

Table 8. Univariate survival analysis of clinical and pathologic variables after palliative treatment of gastric carcinoma.

Parameter	No.	5-Year survival (%)	Median (months)	<i>p</i>
Sex				
Male	216	7.2	5.9	0.55
Female	89	6.8	5.8	
Age (years)				
≤ 65	127	5.7	5.9	0.18
> 65	129	6.5	5.6	
Tumor location				
Upper third	85	3.9	5.0	0.32
Middle third	98	7.3	6.9	
Lower third	107	10.2	5.5	
Whole stomach	15	0	5.8	
Lauren classification				
Intestinal	186	6.9	5.5	0.72
Diffuse	98	8.1	6.3	
Undetermined	21	4.7	6.3	
Borrmann classification				
Type I	57	4.4	4.5	0.19
Type II	62	8.1	5.3	
Type III	166	8.7	6.3	
Type IV	20	0	5.8	
Tumor spread				
Local	107	16.9	8.9	0.008
Distant	103	1.2	4.5	
Local + distant	95	3.8	5.0	
Type of operation				
GR	93	18.4	16.3	< 0.0001
BPP	78	2.4	7.1	
EL	72	0.0	4.4	
NO	62	0.0	3.1	

See Tables 1 and 4 for abbreviations.

Table 9. Independent prognostic variables identified by a Cox proportional hazard model using the covariates in Table 7 (radical surgery).

Prognostic variable	Relative risk	Hazard ratio	<i>p</i>
Tumor location (upper vs. middle + lower third)	1.72	1.72–2.53	0.006
Borrmann classification (type III vs. type I–II)	1.37	0.96–1.96	0.085
Stage (III vs. I–II)	1.54	1.31–1.82	< 0.0001
Extent of nodal dissection (D1 vs. D2–3)	2.32	1.63–3.29	< 0.0001

See Table 7 for abbreviations.

Table 10. Independent prognostic variables identified by a Cox proportional hazard model using the covariates in Table 8 (palliative surgery).

Prognostic variable	Relative risk	Hazard ratio	<i>p</i>
Type of operation			
EL vs. GR	1.96	1.31–2.92	0.001
BPP vs. GR	2.34	1.57–3.48	< 0.0001
NO vs. GR	2.28	1.50–3.48	< 0.0001
Extent of spread			
Distant vs. local	1.45	1.02–2.06	0.039
Local + distant vs. local	1.35	0.96–1.92	0.088

See Tables 1 and 4 for abbreviations.

resección de moignon gástrica (RMG), 195 ont eu une gastrectomie distale subtotale (GDS), dont 55 de façon palliative, 78 ont eu une dérivation (D), 72 une laparotomie exploratrice (LE), alors que 62 n'ont pas eu d'opération (NO). On a évalué la survie à 5 ans après traitement à visée curative et palliative par une analyse uni- et multifactorielle en ce qui concerne les paramètres principaux cliniques, histopathologiques et thérapeutiques. La survie globale à 5 ans après traitement à visée curative (n = 320 patients, mortalité opératoire exclue) a été de 55.5%, 91.1% pour le stade IA, 71.5% pour le stade IB, 62.4% pour le stade II, 37.5% pour le stade IIIA et 31.5% pour le stade IIIB. Parmi les patients qui ont eu un traitement palliatif, la survie à 5 ans a été de 13.1% après résection gástrique (totale ou distale subtotale), de 4.9% après les dérivations, de 0% après LE et de 0% après NO. L'analyse de la survie en uni- et multi-factorielle a montré que les paramètres associés indépendamment avec une mauvaise survie étaient un stade avancé de maladie, une localisation proximale du cancer et une résection avec curage D1 après traitement à visée curative, des métastases à distance et un traitement chirurgical palliatif ne comportant pas de résection. L'analyse multifactorielle a montré que, bien que la survie de cancer gástrique dépende de facteurs prédéterminés, le type de chirurgie peut influencer le pronostic de façon significative que le traitement soit à visée curative ou palliative.

Resumen

Se revisaron las historias clínicas de 639 pacientes con cáncer gástrico primario hospitalizados en forma consecutiva en nuestro servicio en el periodo 1981–1995. Doscientos veinte (220) fueron sometidos a gastrectomía total (GT) (paliativa no. 38), 12 a resección del muñón gástrico (RMG), 195 a gastrectomía subtotal distal (GSD) (paliativa no. 55), 78 a procedimientos derivativos (PD), 72 a laparotomía exploratoria (LE) y 62 no fueron operados (NO). Se utilizó análisis uni y multivariado para evaluar la supervivencia a 5 años con respecto a las principales variables clínicas, patológicas y de terapia luego de tratamiento curativo y paliativo. La supervivencia global a 5 años luego de tratamiento curativo (no. 320 pacientes, excluida la mortalidad operatoria) fue 55.9%, 91.1% para el estado IA, 71.5% para el IB, 62.4% para el II, 37.5% para el IIIA, 31.5% para el IIIB. En los pacientes sometidos a tratamiento paliativo, la supervivencia a 5 años fue 13.1% luego de resección gástrica (total o subtotal distal), 4.9% luego de procedimientos derivativos o luego de laparotomía exploratoria, o en los no operados. El análisis uni y multivariado de supervivencia mostró variables independientemente asociadas con pobre supervivencia: estadio avanzado, ubicación superior del tumor y linfadenectomía D-1 luego de tratamiento curativo; extensión tumoral a distancia y cirugía no reseccional luego de tratamiento paliativo. El análisis multivariado mostró que a pesar de que la supervivencia en el cáncer gástrico depende de factores predeterminados, el tipo de cirugía puede tener un efecto significativo sobre el pronóstico luego de tratamiento quirúrgico.

References

1. Siewart, J.R., Roder, J.D., editors: Progress in Gastric Cancer Research 1997; Proceedings of the 2nd International Gastric Cancer Congress, Munich, Germany, April 27–30, 1997, Vol. 2. Bologna, Monduzzi Editore, 1997, pp. 867–870.
2. Bonenkamp, J.J., Songun, I., Hermans, J., Sasako, M., Welvaart, K., Plukker, J.T.M., van Elk, P., Obertop, H., Gouma, D.J., Taat, C.W., van Lauschoot, J., Meyer, S., de Graaf, P.W., von Meyenfeldt, M.F., Tilanus, H., van de Velde, C.J.H.: Randomised comparison of morbidity after D1 and D2 dissection for gastric cancer in 996 Dutch patients. *Lancet* 345:745, 1995
3. Noguchi, Y., Miyazaki, I.: Prognostic significance and surgical management of lymph node metastasis in gastric cancer. *Br. J. Surg.* 83:156, 1996
4. Pacelli, F., Doglietto, G.B., Bellantone, R., Alfieri, S., Sgadari, A., Crucitti, F.: Extensive versus limited lymph node dissection for gastric cancer: a comparative study of 320 patients. *Br. J. Surg.* 80:1153, 1993
5. Siewert, J.R., Böttcher, K., Roder, J.D., Busch, R., Hermanek, P., Meyer, H.J.: Prognostic relevance of systematic lymph node dissection in gastric carcinoma. *Br. J. Surg.* 80:1015, 1993
6. Remine, W.H.: Palliative operations for incurable gastric cancer. *World J. Surg.* 3:721, 1979
7. Bozzetti, F., Bonfanti, G., Audisio, R.A., Doci, R., Dossena, G., Gennari, L., Andreola, S.: Prognosis of patients after palliative surgical procedures for carcinoma of the stomach. *Surg. Gynecol. Obstet.* 164:151, 1987
8. Hallissey, M.T., Allum, W.H., Roginski, C., Fielding, J.W.L.: Palliative surgery for gastric cancer. *Cancer* 62:440, 1988
9. Borrmann, R.: Geshwulste des magens und duodenums. In: *Handbuch der speziellen pathologischen Anatomie und Histologie*, Vol. IV, Part 1, Henke, F., Lubarsch, O., editors. Berlin, J. Springer, 1926, pp. 812–1054
10. Lauren, P.: The two histological main types of gastric carcinoma: diffuse and so-called intestinal-type carcinoma. *Acta Pathol. Microbiol. Scand.* 64:31, 1965
11. Mantel, N.: Evaluation of survival data and two new rank order statistics arising in its consideration. *Cancer Chemother. Rep.* 50:163, 1966
12. Cox, D.R.: Regression models and life-tables. *J. R. Stat. Soc. B.* 34:187, 1972
13. Allum, W.H., Powell, D.J., McConkey, C.C., Fielding, J.W.L.: Gastric cancer: a 25-year review. *Br. J. Surg.* 76:535, 1988
14. Wanebo, H.J., Kennedy, B.J., Chmiel, J., Steele, G., Jr., Winchester, D., Osteen, R.: Cancer of the stomach: a patient care study by the American College of Surgeons. *Ann. Surg.* 218:583, 1993
15. Breaux, J.R., Bringaze, W., Chappuis, C., Cohn, I.: Adenocarcinoma of the stomach: a review of 35 years and 1710 cases. *World J. Surg.* 14:580, 1990
16. Bozzetti, F., Marubini, E., Bonfanti, G., Miceli, R., Piano, C., Crose, N., Gennari, L.: Total versus subtotal gastrectomy: surgical morbidity and mortality in a multicenter Italian randomized trial. *Ann. Surg.* 226:613, 1997
17. Monson, J.R.T., Donohue, J.H., McIlrath, D.C., Farnell, M.B., Ilstrup, D.M.: Total gastrectomy for advanced cancer: a worthwhile palliative procedure. *Cancer* 68:1864, 1991
18. Gouzi, J.L., Huguier, M., Fagniez, P.L., Launois, B., Flamant, Y., Lacaine, F., Paquet, J.C., Hay, J.M.: Total versus subtotal gastrectomy for adenocarcinoma of the gastric antrum: a French prospective controlled study. *Ann. Surg.* 209:162, 1989
19. Pacelli, F., Bellantone, Doglietto, G.B., Tommasini, O., Genovese, V., Crucitti, F.: Risk factors contributing to postoperative morbidity and mortality after total gastrectomy in aged patients. *Am. Surg.* 57:341, 1991
20. Haugstvedt, T., Viste, A., Eide, G.E., Soreide, O.: The surgical benefit of resection in patients with advanced stomach cancer: the Norwegian multicenter experience. *World J. Surg.* 13:617, 1989

Invited Commentary

Jin-Pok Kim, M.D.

Korea Gastric Cancer Center, Inje University, Seoul Paik Hospital, Seoul, Korea

Despite some controversy over the value of extended lymph node dissection for treatment of gastric cancer, I believe that extended lymphadenectomy (D2+) markedly contributes to improved survival when it is performed by experienced surgeons. In this study, among patients undergoing curative resection the type of nodal dissection was limited (D1) in 128 and extended (D2/D3) in 206. The extent of nodal dissection was based on the surgeon's preference. The 5-year survival rate was 41.5% after D1 dissection and 66.3% after D2/D3 dissection; the difference was statistically significant. Multivariate analysis showed the extent of lymphadenectomy as an independent predictor of survival. I entirely agree with these results, which clearly indicate that at least D2 nodal dissection should be done in association with gastric resection.

There are many debates about the survival advantage of palliative resectional surgery for patients with far-advanced cancer. Some authors show a more favorable outcome for patients having a resection than for those who do not, as resectional surgery has been shown to be an independent prognostic factor during multivariate survival analyses. I personally agree with these results, but careful patient selection (considering the general status of the patient, the extent of distant metastasis, and local spread) is needed when one decides to perform a gastric resection.

In our study, the clinicopathologic profile of 9262 consecutive

patients with gastric carcinoma treated surgically at the Department of Surgery, Seoul National University Hospital from 1981 to 1996 were reviewed retrospectively. Prognostic factors influencing survival were analyzed. Curative resection, depth of invasion, and lymph node metastasis were the most significant prognostic factors in our study. The 5-year survival rate (5-YSR) for all patients was 55.9%, and that of patients who underwent curative resection it was 64.8%. The 5-YSRs according to TNM stage were 92.9% for Ia, 84.2% for Ib, 69.3% for II, 45.8% for IIIa, 29.6% for IIIb, and 9.2% for IV. In the study reported by Doglietto et al., the 5-YSR after curative treatment was 55.5%: 91.1% for Ia, 71.5% for Ib, 62.4% for II, 37.5% for IIIa, and 31.5% for IIIb. Our results show better survival rates, which can be partially explained by the fact that we usually perform D2+ lymph node dissection, whereas in the study reported here D1 lymph node dissection was performed in more than one-third of the patients. This result strengthens the need for more radical lymph node dissection.

In conclusion, the authors indicate that the surgeon's choice and manner of execution of surgery can have a significant effect on prognosis in addition to the predetermined factors that govern survival. This is an important point and why we surgeons must obtain a consensus for therapeutic strategies.

References

1. Kim, J.P., Kwon, O.J., Oh, S.T., Yang, H.K.: Result of surgery on 6589 gastric cancer patients and immunochemosurgery as the best treatment of advanced gastric cancer. *Ann. Surg.* 216:269, 1992
2. Kim, J.P., Lee, J.H., Kim, S.J., Yu, H.J., Yang, H.K.: Clinicopathologic characteristics and prognostic factors in 10,783 patients with gastric cancer. *Gastric Cancer* 1:125, 1998