

• GASTRIC CANCER •

Clinicopathologic characteristics of gastric carcinoma in elderly patients: A comparison with young patients

Dong-Yi Kim, Jae-Kyoon Joo, Seong-Yeob Ryu, Young-Kyu Park, Young-Jin Kim, Shin-Kon Kim

Dong-Yi Kim, Jae-Kyoon Joo, Seong-Yeob Ryu, Young-Kyu Park, Young-Jin Kim, Shin-Kon Kim, Division of Gastroenterologic Surgery, Department of Surgery, Chonnam National University Medical School, Gwangju, Korea

Correspondence to: Dr. Dong-Yi Kim, Division of Gastroenterologic Surgery, Department of Surgery, Chonnam National University Medical School, Gwangju 501-757, Korea. dockim@chonnam.ac.kr
Telephone: +82-62-2206450 **Fax:** +82-62-2271635

Received: 2004-03-31 **Accepted:** 2004-05-13

Abstract

AIM: To examine the clinicopathologic features of elderly patients with gastric carcinoma and to investigate the relationship between prognosis and age.

METHODS: We reviewed the hospital records of 2 014 patients with gastric carcinoma retrospectively to compare the clinicopathologic findings in elderly (age >70 years) and young (age <36 years) patients during the period from 1986 to 2000 in a tertiary referral center in Gwangju, Korea. Overall survival was the main outcome measure.

RESULTS: Of the 2 014 patients, 194 (9.6%) were in the elderly group and 137 (6.8%) were in the young group. The elderly and young patients had similar distributions with respect to depth of invasion, nodal involvement, hepatic metastasis, peritoneal dissemination, tumor stage at the initial diagnosis, and type of surgery. Synchronous multiple carcinomas were found in 14/194 (7.2%) of the elderly group and 4/137 (2.9%) of the young group ($P<0.05$). Using the Borrmann classification, type IV was more frequent in the young patients than in the elderly patients ($P<0.05$). Significantly more elderly patients had a well or moderately differentiated histology, and more young patients had a poorly differentiated histology and signet ring cell carcinoma ($P<0.001$). The 5-year survival rates of elderly and young patients did not differ statistically (52.8% vs 46.5%, $P=0.5290$). Multivariate analysis showed that the histologic type, nodal involvement and operative curability were significant prognostic factors, and age itself was not an independent prognostic factor of survival for elderly gastric carcinoma patients.

CONCLUSION: Elderly patients with gastric carcinoma do not have a worse prognosis than young patients. The important prognostic factor is whether the patients undergo a curative resection.

© 2005 The WJG Press and Elsevier Inc. All rights reserved.

Key words: Gastric carcinomas; Prognosis; Age; Surgery

Kim DY, Joo JK, Ryu SY, Park YK, Kim YJ, Kim SK. Clinicopathologic characteristics of gastric carcinoma in elderly patients: A

comparison with young patients. *World J Gastroenterol* 2005; 11(1): 22-26

<http://www.wjgnet.com/1007-9327/11/22.asp>

INTRODUCTION

Although the incidence of gastric carcinoma is declining in the general population^[1,2], its incidence in the elderly is increasing^[3-5]. In conjunction with recent increases in life expectancy, more of these patients are undergoing surgery for gastric carcinoma than in the past.

Some investigators have reported on the feasibility of gastric surgery in patients over 70 years of age, with advances in peri- and postoperative care, anesthesia, and operative techniques^[6,7].

Since the incidence of gastric carcinoma in the elderly is also increasing in Korea, we are interested in the clinicopathologic features and prognostic factors that affect the survival rate of elderly patients with gastric carcinoma. This study analyzed the clinicopathologic features of gastric carcinoma in patients older than 70 years and compared them with young patients with gastric carcinoma.

MATERIALS AND METHODS

Patients and specimens

From 1986 to 2000, a total of 2 014 patients with gastric carcinoma were admitted to the Division of Gastroenterologic Surgery in the Department of Surgery at Chonnam National University Medical School, Gwangju, Korea. Of these, 194 (9.6%) were in the elderly group (defined as older than 70 years). There were 131 males and 63 females. In elderly patients with gastric carcinoma, the pTNM classification showed 37, 39, 96, and 22 patients with pT1, pT2, pT3, and pT4 tumors, respectively. According to the grade of anaplasia, 38 tumors were well differentiated, 62 moderately differentiated, 74 poorly differentiated, 10 mucinous, and 6 had signet ring cell carcinomas.

The clinicopathologic features of these elderly patients with gastric carcinoma were reviewed retrospectively, including information on each patient's age, sex, tumor size, number of lesions, tumor location, Borrmann type, depth of invasion, histologic type, nodal involvement, hepatic metastasis, peritoneal dissemination, stage at the initial diagnosis, and type of surgery. The survival rate was obtained from the hospital records. A histological evaluation was performed according to the Japanese General Rules for Gastric Cancer Study in Surgery and Pathology^[8]. Curative resection was defined as all gross lesions removed as judged by the surgeon at operation.

Statistical analysis

The survival rates of the patients were calculated using the Kaplan-Meier method and the relative prognostic importance of the parameters was investigated using the Cox proportional hazards model. The χ^2 was used to evaluate the statistical significance of differences, and P values less than 0.05 were considered statistically significant.

RESULTS

Table 1 summarizes the clinicopathologic findings of gastric carcinoma in elderly patients. Of the 2 014 patients, 194 (9.6%) aged more than 70 years were classified as elderly patients. There were 131 males and 63 females, the gender ratio was 2.1:1. The age of the patients at the time of the initial diagnosis ranged from 70 to 83 years, with a mean age of 73.3 years. Of the 2 014 patients, 137 (6.8%) aged less than 36 years were classified as young patients. There were 63 males and 74 females, the gender ratio was 0.85:1.

The mean tumor size was smaller in elderly patients (5.16 vs 5.07 cm) with gastric carcinoma, but the difference was not statistically significant ($P>0.05$). Synchronous multiple carcinomas were found in 14/194 (7.2%) of the elderly group and 4/137 (2.9%) of the young group. The incidence of multiplicity was significantly higher in the elderly patients than in the young patients ($P<0.05$). The lower third of the stomach was the most common site of gastric carcinoma in both groups, and the upper third was more frequently involved in the young patients than in the elderly patients (16.8% vs 8.3%, $P<0.05$). In elderly patients with gastric carcinoma, the pTNM classification showed 37, 39, 96, and 22 patients with pT1, pT2, pT3, and pT4 tumors, respectively. According to the grade of anaplasia, 38 tumors were well differentiated, 62 were moderately differentiated, 74 were poorly differentiated, 10 were mucinous, and 6 had signet ring cell carcinomas. Significantly more old patients had a well- or moderately differentiated histology and more young patients had a poorly differentiated histology and signet ring cell carcinoma ($P<0.001$).

Eighty-eight elderly patients with gastric carcinoma were pN0 and 106 had lymph node metastasis. By disease stage, 60, 41, 55, and 38 patients were stages I, II, III, and IV, respectively. The most common type of advanced gastric carcinoma in the elderly patients was the ulcerating infiltrative type (128/194, 66.0%). Thirteen lesions were diffusely infiltrative (Borrmann type IV). Borrmann type IV lesions were more common in the young patients than in the elderly patients (17.3% vs 6.6%, $P<0.05$). The elderly and young patients had similar distributions with respect to depth of invasion, nodal involvement, hepatic metastasis, peritoneal dissemination, tumor stage at the initial diagnosis, and operative type. Of the elderly patients, 93 (48.0%) were classified as either stage III or stage IV at initial diagnosis. The types of operative procedure are shown in Table 1. Subtotal gastrectomy was the procedure most frequently performed (62.9% of cases) in elderly patients. The curative resection rate was 80.9% (157/194) in the elderly group and 73.7% (101/137) in the young group ($P>0.05$). Univariate analysis showed that invasive depth, histologic type, operative type, and extent of lymph nodal involvement were the significant prognostic factors for elderly patients with gastric carcinoma (Table 2). Multivariate analysis showed that nodal involvement and operative curability were the significant prognostic factors of survival for the elderly gastric carcinoma patients. The P value was <0.001 and the relative risk was 3.077 when the observed value was curative resection or non-curative resection. Multivariate analysis also showed that age itself was not an independent prognostic factor of survival for the elderly gastric carcinoma patients (Table 3). The 5-year survival rates of the young and elderly patients did not differ statistically (52.8% vs 46.5%, $P=0.5290$) (Figure 1A). The 5-year survival rates of young and elderly patients with curative resection did not differ statistically (67.0% vs 60.0%, $P=0.3100$) (Figure 1B). The elderly patients with curatively resected gastric carcinoma had a better survival rate than the elderly patients with non-curatively resected gastric carcinoma (60.0% vs 6.5%, $P<0.001$) (Figure 2).

Table 1 Clinicopathologic features of gastric carcinoma in the elderly and young patients

Variables	Age > 70 yr (n = 194) (%)	Age < 36 yr (n = 137) (%)	P value
Age (yr)	73.3±3.1	30.6±5.1	<0.001
Gender			<0.001
Male	131 (67.5)	63 (46.0)	
Female	63 (32.5)	74 (54.0)	
Tumor size (cm)	5.16±3.45	5.07±3.23	NS
Number of lesions			
Multiple	14 (7.2)	4 (2.9)	<0.05
Single	180 (92.8)	133 (97.1)	
Borrmann type			
I	10 (5.2)	5 (3.6)	
II	43 (22.2)	13 (9.5)	
III	128 (66.0)	93 (67.9)	
IV	13 (6.6)	26 (19.0)	0.011
Location			
Upper	16 (8.3)	23 (16.8)	
Middle	41 (21.1)	50 (36.5)	
Lower	130 (67.0)	56 (40.9)	<0.05
Whole	7 (3.6)	8 (5.8)	
Depth of invasion			NS
T1	37 (19.1)	27 (19.7)	
T2	39 (20.1)	21 (15.3)	
T3	96 (49.5)	73 (53.3)	
T4	22 (11.3)	16 (11.7)	
Histologic type			
Well-differentiated	38 (19.5)	4 (2.9)	
Moderately differentiated	62 (32.0)	15 (10.9)	
Poorly differentiated	74 (38.1)	84 (61.3)	<0.001
Mucinous	10 (5.2)	4 (2.9)	
Signet ring cell	6 (3.1)	25 (18.3)	
Others	4 (2.1)	5 (3.7)	
Nodal involvement			NS
N (-)	88 (45.4)	67 (48.9)	
N (+)	106 (54.6)	70 (51.1)	
Hepatic metastasis			NS
H (-)	188 (96.9)	132 (96.4)	
H (+)	6 (3.1)	5 (3.6)	
Peritoneal dissemination			NS
P (-)	176 (90.7)	116 (84.7)	
P (+)	18 (9.3)	21 (15.3)	
Stage			NS
1	60 (30.9)	41 (29.9)	
2	41 (21.1)	21 (15.3)	
3	55 (28.4)	36 (26.3)	
4	38 (19.6)	39 (28.5)	
Operative type			
Total gastrectomy	52 (26.8)	47 (34.4)	0.004
Subtotal gastrectomy	122 (62.9)	78 (56.9)	
Others	20 (8.6)	12 (8.7)	
Resectability			NS
Curative	157 (80.9)	101 (73.7)	

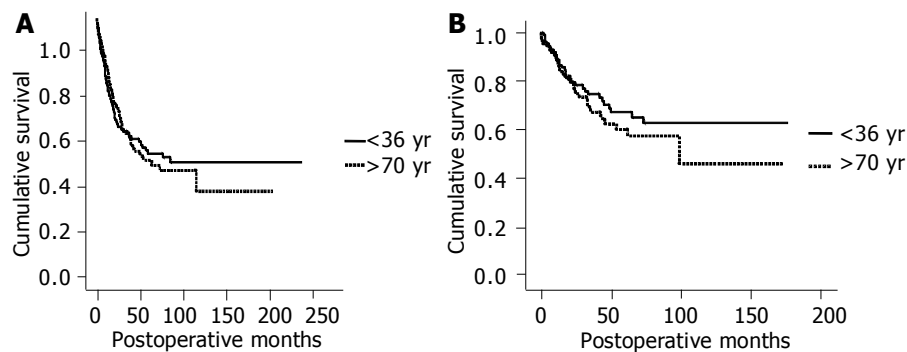


Figure 1 Survival curves of young and elderly patients without and with curative resection. A: Survival curves of young and elderly patients without curative resection. The 5-year survival rates of young and elderly patients did not differ statistically (52.8% *vs* 46.5%, $P = 0.5290$); B: Survival curves of the young and elderly groups with curative resection. The 5-year survival rates of young and elderly patients with curative resection did not differ statistically (67.0% *vs* 60.0%, $P = 0.3100$).

Table 2 Correlation between prognostic factors and survival rates of elderly patients with gastric carcinoma

Variables	No. of patients (<i>n</i> = 194)	5-yr survival rate (%)	<i>P</i> value
Gender			0.3147
Male	131	43.3	
Female	63	52.8	
Tumor size (cm)			<0.001
<5	102	66.8	
>5	92	26.0	
Depth of invasion			<0.001
T1 and 2	76	84.9	
T3 and 4	118	20.6	
Histologic type			0.0097
Differentiated	100	55.1	
Undifferentiated	94	39.8	
Tumor location			0.1969
Upper third	16	31.6	
Middle/distal third	178	50.8	
Operative type			<0.001
Total	52	27.9	
Subtotal	142	55.5	
LN invasion			<0.001
N0	88	77.9	
N1	48	36.6	
>N2	58	12.9	

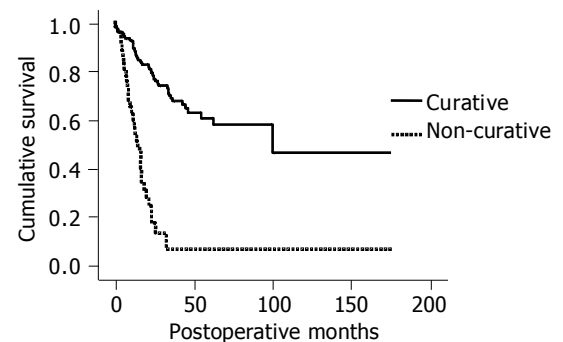


Figure 2 Survival curves of elderly patients according to resectability. The patients with curative resection had a better 5-year survival rate than those with non-curative resection in elderly group (60.0% *vs* 6.5%; $P < 0.001$).

DISCUSSION

In Korea, gastric carcinoma is the leading cause of death. Gastric carcinoma is usually a disease of the aged, and patients have a mean age of approximately 50 to 60 years^[9,10]. Furthermore, the incidence of gastric carcinoma is increasing in patients more than 70 years old^[3-5]. Whether gastric carcinoma in elderly patients differs from that in young patients is controversial. Some authors have reported an inverse relationship between age and prognosis in gastric carcinoma. We reviewed the patients with gastric carcinoma retrospectively to compare the clinicopathologic features between elderly and young patients.

The proportion of elderly patients treated in our department was 9.6% (194/2014) among those admitted in our department. The incidence of gastric carcinoma in elderly patients increased

Table 3 Multivariate analysis of factors associated with elderly patients with gastric carcinoma

Variables	Odds ratio	95% CI	<i>P</i> value
Gender (male <i>vs</i> female)	0.768	0.434-1.360	NS
Tumor location (upper <i>vs</i> distal)	0.467	0.231-0.944	NS
Tumor size (cm) (<5 <i>vs</i> >5)	1.618	0.942-2.778	NS
Depth of invasion (mucosa <i>vs</i> submucosa)	1.061	0.924-1.217	NS
Histologic type (differentiated <i>vs</i> undifferentiated)	2.041	1.244-3.350	0.005
Resectability (curative <i>vs</i> non-curative)	3.077	1.681-5.635	<0.001
Lymph node metastasis (negative <i>vs</i> positive)	3.626	1.985-6.622	<0.001
Age (yr) (>70 <i>vs</i> <70)	1.308	0.845-1.107	NS

CI: confidence interval, NS: not significant.

2.3% in the previous decade, according to a nationwide mass screening for gastric carcinoma in the elderly. Kubota *et al.*^[5] and Mitsudomi *et al.*^[11] have also reported a steady increase in the incidence of gastric carcinoma in the elderly in Japan.

In our series, there was a significant difference in the sex ratio between the young and elderly patients. In the elderly patients, there was a higher proportion of male patients (2.1:1 in this study). Several studies have obtained the same results^[1,12]. The causes of this sexual imbalance are not yet clear. Male patients might have a more frequent and prolonged exposure to environmental carcinogens than females, which might explain the male predominance among elderly patients^[13]. On the contrary, for younger patients the sex ratio has consistently been reported to be around 1:1. We found that the sex ratio (females: males) was about 1.1:1 in the young patients (74 vs 63), and this result is compatible with other reports^[9,14].

We found synchronous multiple carcinomas of the stomach in 7.2% (14/191) of the elderly patients and this rate was significantly higher than that in the young patients (2.9%, $P < 0.05$). It is thought that improved diagnostic techniques have allowed the detection of very small secondary and primary lesions. Kitamura *et al.*^[3] reported that 7.69% of multiple gastric carcinomas were found in elderly patients with gastric carcinoma. They explained that gastric carcinoma in the elderly was usually intestinal type, which was sometimes followed by multifocal carcinogenesis in stomachs with underlying atrophic gastritis.

Concerning the anatomic location of primary lesions, the incidence in the lower third of the stomach is higher in elderly patients than in young patients. Fujimoto *et al.*^[9] reported the same results. By histologic type, we found that significantly more elderly patients had a well or moderately differentiated histology, and more young patients had a poorly differentiated histology and signet ring cell carcinoma ($P < 0.001$). Other studies have reported similar results^[1,3,9,12]. Nakamura *et al.*^[15] analyzed the histologic types of early gastric carcinoma in elderly patients, and found 45.5% of early gastric carcinomas were well-differentiated adenocarcinomas. In contrast to elderly patients, the higher incidence of poorly differentiated adenocarcinoma in young patients found in this study is consistent with the literature.

There were no significant differences in either lymph node invasion or peritoneal dissemination between the two groups. This finding is in agreement with a prior report^[1]. In our study, 80.9% of the elderly patients had advanced carcinomas, but the percentage of early gastric carcinomas was not significantly different between the two groups (19.1% vs 19.7%).

Gastrectomy in combination with lymphadenectomy is the only potentially curative modality for localized gastric carcinomas. In accordance with most literature reports^[3,9-11,16-20], curative resection offers the only chance of long-term survival. Nevertheless, Katai *et al.*^[21] concluded that the extent of surgery should be considered, especially as total gastrectomy and extended node dissection were associated with higher operative mortalities. Many investigators have reported a low curative resection rate in elderly patients with gastric carcinoma^[12,22,23]. In our series, however, the curative resection rate (80.9%) in the elderly group is much higher than previously reported in Western countries. Otani *et al.*^[4] reported that surgery should not be avoided based solely on the age of patients. On the contrary, Iguchi *et al.*^[24] recommended the less extensive gastric surgery for the very old patients with gastric carcinoma to improve their quality of life. We performed gastrectomy with D2 lymph node dissection in elderly patients with advanced gastric carcinoma who had no other medical illnesses, such as cardiovascular or respiratory problems.

In this study, the 5-year survival rates of the elderly and

young patients did not differ statistically (46.5% vs 52.8%). The elderly patients with curatively resected gastric carcinoma had a better survival rate than those with non-curatively resected gastric carcinoma (68.1% vs 6.5%). On the contrary, others^[5,21,24,25] reported that the survival rates of the elderly were worse than those of the younger patients. The 5-year survival rate of 37 elderly patients with early gastric carcinoma was 94% in this study. These findings suggest that elderly patients with early gastric carcinoma can tolerate radical treatment well. In previous reports, the prognosis of elderly patients was poor and the survival rate was low, particularly in patients with advanced gastric carcinoma^[5,21]. Delay in diagnosis and a more advanced stage of gastric carcinoma in elderly patients have been suggested as possible causes of a poor prognosis and a low survival rate. In a few reports, however, the prognosis of elderly patients who underwent curative resection was the same as that of young patients. Many investigators^[12,23,26-29] also reported similar survival rates in the two age groups when the same tumor stages were compared.

In conclusion, elderly patients with gastric carcinoma do not have a worse prognosis than young patients. The important prognostic factor is whether the patients undergo a curative resection.

REFERENCES

- 1 Wang JY, Hsieh JS, Huang CJ, Huang YS, Huang TJ. Clinicopathologic study of advanced gastric cancer without serosal invasion in young and old patients. *J Surg Oncol* 1996; **63**: 36-40
- 2 Roder DM. The epidemiology of gastric cancer. *Gastric Cancer* 2002; **5**: 5-11
- 3 Kitamura K, Yamaguchi T, Taniguchi H, Hagiwara A, Yamane T, Sawai K, Takahashi T. Clinicopathological characteristics of gastric cancer in the elderly. *Br J Cancer* 1996; **73**: 798-802
- 4 Otani Y, Kubota T, Kumai K, Ohgami M, Hayashi N, Ishikawa Y, Wada N, Kitajima M. Gastric carcinoma in elderly patients. *J Gasrtrol Hepatol* 2000; **15**: 507-511
- 5 Kubota H, Kotoh T, Dhar DK, Masunaga R, Tachibana M, Tabara H, Kohno H, Nagasue N. Gastric resection in the aged (≥ 80 years) with gastric carcinoma: a multivariate analysis of prognostic factors. *Aust N Z J Surg* 2000; **70**: 254-257
- 6 Morel P, Egeli RA, Wachtl S, Rohner A. Results of operative treatment of gastrointestinal tract tumors in patients over 80 years of age. *Arch Surg* 1989; **124**: 662-664
- 7 Schoon IM, Arvidsson S. Surgery in patients aged 80 years and over. *Eur J Surg* 1994; **157**: 251-255
- 8 Japanese Gastric Cancer Association. Japanese Classification of Gastric Carcinoma - 2nd English Edition. *Gastric Cancer* 1998; **1**: 10-24
- 9 Fujimoto S, Takahashi M, Ohkubo H, Mutou T, Kure M, Masaoka H, Kobayashi K. Comparative clinicopathologic features of early gastric cancer in young and older patients. *Surgery* 1994; **115**: 516-520
- 10 Maehara Y, Emi Y, Tomisaki S, Oshiro T, Kakeji Y, Ichiyoshi Y, Sugimachi K. Age-related characteristics of gastric carcinoma in young and elderly patients. *Cancer* 1996; **77**: 1774-1780
- 11 Mitsudomi T, Matsusaka T, Wakasugi K, Takenaka M, Kume K, Fujinaga Y, Teraoka H, Iwashita A. Clinicopathological study of gastric cancer with special reference to age of patients: An analysis of 1630 cases. *World J Surg* 1989; **13**: 225-231
- 12 Medina-Franco H, Heslin MJ, Cortes-Gonzalez R. Clinicopathological characteristics of gastric carcinoma in young and elderly patients: A comparative study. *Ann Surg Oncol* 2000; **7**: 515-519
- 13 Ershler WB, Longo DL. The biology of aging. *Cancer* 1997; **80**: 1284-1293
- 14 Grabiec J, Owen DA. Carcinoma of the stomach in young persons. *Cancer* 1985; **115**: 516-520
- 15 Nakamura T, Yao T, Niho Y, Tsuneyoshi M. A clinicopatho-

- logical study in young patients with gastric carcinoma. *J Surg Oncol* 1999; **71**: 214-219
- 16 **Eguchi T**, Takahashi Y, Yamagata M, Kasahara M, Fujii M. Gastric cancer in young patients. *J Am Coll Surg* 1999; **188**: 22-26
- 17 **Ikeguchi M**, Oka S, Gomyo Y, Tsujitani S, Maeta M, Kaibara N. Prognostic benefit of extended radical lymphadenectomy for patients with gastric cancer. *Anticancer Res* 2000; **20**: 1285-1289
- 18 **Eguchi T**, Takahashi Y, Ikarashi M, Kasahara M, Fujii M. Is extended lymph node dissection necessary for gastric cancer in elderly patients? *Eur J Surg* 2000; **166**: 949-953
- 19 **Niu WX**, Qin XY, Liu H, Wang CP. Clinicopathological analysis of patients with gastric cancer in 1200 cases. *World J Gastroenterol* 2001; **7**: 281-284
- 20 **Donati D**, Nano M. The role of lymphadenectomy in gastric cancer in elderly patients. *Minerva Chir* 2003; **58**: 281-289
- 21 **Katai H**, Sasako M, Sano T, Maruyama K. The outcome of surgical treatment of gastric carcinoma in the elderly. *Jpn J Clin Oncol* 1998; **28**: 112-115
- 22 **Damhuis RA**, Tilanus HW. The influence of age on resection rates and postoperative mortality in 2773 patients with gastric cancer. *Eur J Cancer* 1995; **31**: 928-931
- 23 **Winslet MC**, Mohsen YM, Powell J, Allum WH, Fielding JW. The influence of age on the surgical management of carcinoma of the stomach. *Eur J Surg Oncol* 1996; **22**: 220-224
- 24 **Eguchi T**, Fujii M, Takayama T. Mortality for gastric cancer in elderly patients. *J Surg Oncol* 2003; **84**: 132-136
- 25 **Wu CW**, Lo SS, Shen KH, Hsieh MC, Lui WY, P'eng FK. Surgical mortality, survival, and quality of life after resection for gastric cancer in the elderly. *World J Surg* 2000; **24**: 465-472
- 26 **Kokkola A**, Sipponen P. Gastric carcinoma in young adults. *Hepatogastroenterology* 2001; **48**: 1552-1555
- 27 **Piso P**, Bektas H, Werner U, Becker T, Aselmann H, Schlitt HJ, Klempnauer J. Comparison between treatment results for gastric cancer in younger and elderly patients. *Zentralbl Chir* 2002; **127**: 270-274
- 28 **Kim DY**, Ryu SY, Kim YJ, Kim SK. Clinicopathological characteristics of gastric carcinoma in young patients. *Langenbecks Arch Surg* 2003; **388**: 245-249
- 29 **Koea JB**, Karpeh MS, Brennan MF. Gastric cancer in young patients: demographic, clinicopathological, and prognostic factors in 92 patients. *Ann Surg Oncol* 2000; **7**: 346-351

Edited by Wang XL and Zhu LH