Survival after Resection of Gastric Cancer and Prognostic Relevance of Systematic Lymph Node Dissection: Twenty Years Experience in Taiwan

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Abstract. A retrospective study of 954 resectable gastric cancers in a single institute of Taiwan from 1971 to 1990 was performed to evaluate improvements in gastric cancer surgery. The patients were divided into four time periods representing an overall experience of progressive implementation of aggressive resection and increased extent of systematic lymph node dissection. The clinicopathologic data and survival rates were statistically compared and the significance of the extent of resection on survival analyzed. A significant increase in the proportion of upper one-third tumors (from 14.8% to 20.4%) and a decrease in the incidence of intestinal type (73.6% to 41.5%) was found within the overall period. The proportion of patients with early gastric cancer increased from 11.5% to 19.4%. Patients who underwent total gastrectomy and combined visceral resection increased from 13.7% to 27.4% and 19.8% to 41.1%, respectively. An increase of both total dissected lymph node number and the incidence of detected lymph node metastases in early gastric cancer were associated with more extensive lymphadenectomy. An improved 5-year survival rate following aggressive resection was found for all stages except stage IV and T4 lesions, and the surgical mortality decreased from 5.5% to 2.0%. Patients with earlier stage lesions benefited more from radical resection, especially those with stage II and T2 lesions. Systematic lymph node dissection increased the 5-year survival of patients by about 10% for stage III or T3 lesions but not for patients with stage IV or T4 lesions. Multivariate analysis confirmed the significance of the improved technique of lymphadenectomy on the prognosis of gastric cancer following resection in Taiwan. In conclusion, a changing pattern of gastric cancer epidemiology in Taiwan is documented. A decrease in surgical mortality indicates that curative resection with extensive lymph node dissection can be safely performed. Although potential for increasing survival by upstaging remains, radical gastrectomy with extended lymphadenectomy could be adopted for gastric cancer resection with possibly more adequate control of locoregional disease.

annual death rates in 1990 of 15.4 and 7.2 deaths per 100,000 for males and females, respectively [2]. Surgery remains the primary therapeutic modality for gastric cancer. Although radical gastrectomy with systematic lymph node dissection has been advocated by both Japanese surgeons [3-6] and others [7, 8] as standard procedure for gastric cancer treatment, its status has not been characterized by prospective randomized trials [9, 10]. In our hospital, an aggressive approach to lymph node dissection for gastric cancer has been used since the end of 1970. Because of an encouraging initial experience, this approach was subsequently adopted as routine gastric cancer resection. It is not only interesting but of clinical importance to evaluate the overall result of gastric cancer surgery during the past 20 years when this aggressive program has been used. In this study, we focus on the survival rate following curative resection of gastric cancer for the period since the aggressive approach toward gastric cancer resection and lymphadenectomy was progressively implemented.

Patients and Methods

From 1 January 1971 through 31 December 1990 there were 954 patients who underwent gastric resections for primary adenocarcinoma of the stomach in the Department of Surgery, National Taiwan University. Patients' medical records were reviewed to ascertain age, sex, tumor location and size, and type of gastric resection. Survival status was determined from medical records and by personal follow-up. A detail histopathologic review of the pathologic slides were performed to determine the histologic type, depth of gastric wall invasion, number of lymph nodes excised, and the extent of lymph node metastases.

The classification and operation procedure was performed according to the protocol of the Japanese Research Society for

Although gastric cancer is a major malignancy that occurs worldwide, its incidence varies geographically [1]. In Taiwan, gastric cancer remains the third leading cause of cancer death with

Table 1. Clinicopathologic characteristics at different periods.

Characteristic	1971–1975 (n = 182)	1976–1980 (n = 249)	1981–1985 (n = 224)	1986–1990 (n = 299)	p
Age (mean $\pm$ SD)	59.4 $\pm$ 11.9	57.3 $\pm$ 12.0	58.8 $\pm$ 12.0	59.1 $\pm$ 12.1	NS
Male/female ratio	2.6	2.3	1.8	2.0	NS
Location					
Upper third	27 (14.8)	36 (14.5)	46 (20.5)	61 (20.4)	0.021
Middle third	29 (15.9)	53 (21.3)	58 (25.6)	84 (28.0)	
Lower third	126 (69.2)	160 (64.2)	120 (53.6)	155 (51.6)	
Histology					< 0.001
Intestinal	134 (73.6)	180 (72.3)	114 (51.1)	124 (41.5)	
Diffuse	48 (26.4)	69 (27.7)	109 (48.9)	175 (58.5)	
Invasion depth					
T1	21 (11.5)	39 (15.7)	32 (14.3)	58 (19.4)	< 0.01
T2	41 (22.5)	69 (27.7)	66 (29.5)	53 (17.7)	
T3	101 (55.5)	128 (51.4)	116 (51.8)	160 (53.5)	
T4	19 (10.4)	13 (5.2)	10 (4.5)	28 (9.4)	

SD: standard deviation; NS: no significance; numbers in parentheses are percents.

Gastric Cancer (JRS GC) [11]. Nodal involvement is classified into n(-), n1(+), n2(+), n3(+), and n4(+) according to the Japanese enumeration. The first three designations are similar to the pN0, pN1, and pN2 of the TNM system [12]. Both n3(+) and n4(+) are defined as metastasis, or pM1 in the TNM system. The extent of lymphadenectomy is classified as R1, R2, R3, and R4 according to the "n" level for which lymph node dissection was performed. For cancer in the upper part, total gastrectomy with splenectomy and distal hemipancrcreatectomy was routinely performed as an R2 resection for clearance of associated lymph nodes. The histologic pattern was classified into intestinal and diffuse types on the basis of Lauren's classification [13].

The patients were grouped according to four periods: Period I (1971–1975) represented 182 patients on whom R1 resection was routinely performed. Period II (1976–1980) contained 249 patients on whom R1 or R2 resection was routinely performed. Period III (1981–1985) comprised 221 patients in whom R2 resection was routinely performed. Period IV (1986–1990) comprised 299 patients on whom R2 to R3 resection was the principal form of surgery. The depth of cancer invasion was defined according to the TNM system: pT1, the cancer has invaded the mucosa and submucosa; pT2, the tumor invaded the muscularis or the subserosa; pT3, the cancer invaded over the serosa; pT4, the cancer had invaded adjacent structures. The site of the cancer was classified into upper third (C), middle third (M), and lower third (A) of the stomach. The 5-year survival curves for the periods were compared and the results assessed with regard to differences in TNM stage, tumor location, and invasion depth of the cancer.

Survival curves were generated using the method of Kaplan and Meier. Statistical differences between survival curves were evaluated using the log-rank test. Differences between patient populations were assessed using the chi-square test, Kruskal-Wallis test, or ANOVA, as appropriate. Multivariate analysis with Cox's regression model was performed only for the most recent three periods because the data of the first period were not sufficiently detailed. Statistical analysis was done using the SAS package.

Results

Clinicopathologic Background

Clinicopathologic data were compared for patients of different time periods (Table 1). There were no differences in age distribution or sex ratio. Significant correlation was found between the location of tumors, distribution of invasion depth, and histologic type. A shift of gastric cancer from the distal third to upper third was observed during this period. Tumors of the upper third increased from 14.8% to 20.4%, whereas the distal third localization decreased from 69.2% to 51.6%. A shift in the intestinal type of gastric cancer was also observed to decrease from 73.6% to 41.5%. Early gastric cancer increased from 11.5% to 19.4%.

Surgery

There was a tendency to use the more extensive operation for resection of gastric cancer as time progressed (Table 2). More total gastrectomies and combined visceral resections were performed during the most recent period (1986–1990). Within this period, 27.4% of the patients underwent total gastrectomy and 41.1% underwent combined resection of other viscera. The average number of total dissected lymph nodes per patient increased throughout the study as well. During the first period (1971–1975) the average number of lymph nodes removed was 6.2 ± 7.4 compared to 32.3 ± 16.7 during the most recent period. This difference reflects the more aggressive approach taken with regard to lymphadenectomy during the latter portion of the study. Although more radical operations were performed within the most recent period, operative mortality decreased from 5.5% to 2.0%. There was no increased incidence in the detection of lymph node metastases or in the number of metastases per patient over the various time periods. However, increased detection of nodal metastases was found for early cancer (T1) when stratified by the factor of invasion depth.

Table 2. Pathologic characteristics at different periods.

Characteristic	1971–1975 (n = 182)	1976–1980 (n = 249)	1981–1985 (n = 224)	1986–1990 (n = 299)	p
Curative resection	131 (72.0)	221 (88.8)	192 (86.8)	239 (79.9)	NS
Extent of surgery					
Total gastrectomy	25 (13.7)	32 (12.8)	46 (20.5)	82 (27.4)	< 0.001
Total LN no. (mean $\pm$ SD)	6.2 $\pm$ 7.4	11.5 $\pm$ 10.2	22.9 $\pm$ 12.3	32.3 $\pm$ 16.7	< 0.001
Combined resection	36 (19.8)	68 (27.3)	81 (36.2)	123 (41.1)	< 0.01
Surgical mortality	10 (5.5)	11 (5.4)	7 (3.1)	6 (2.0)	
LN metastases					
All	119 (65.4)	140 (56.2)	139 (62.0)	182 (60.8)	NS
Positive number	3.4 $\pm$ 6.2	3.6 $\pm$ 5.8	4.8 $\pm$ 7.8	3.7 $\pm$ 5.3	NS
Related to depth					NS
T1	2 (4.7)	3 (7.7)	4 (12.5)	9 (15.5)	
T2	20 (48.8)	25 (36.2)	33 (50.0)	25 (47.2)	
T3	80 (79.2)	102 (79.7)	94 (81.0)	121 (75.6)	
T4	17 (89.5)	10 (76.9)	8 (80.0)	27 (96.4)	

LN: lymph node; SD: standard deviation; NS: no significance; numbers in parentheses are percents.

Fig. 1. Overall 5-year survival rate for various time periods: 24.7% in patients during 1971–1975; 30.7% for patients during 1976–1980; 36.8% for patients during 1981–1985; and 47.5% for patients during 1986–1990.

Survival

Overall. Figure 1 shows the overall survival curves for the four time periods. A substantial increase in survival was observed within the overall span of 20 years. The cumulative 5-year survival rate of all resectable gastric cancer patients increased from 24.7% in period 1 to 47.5% in period 4.

TNM Stage. The improved survival rates were observed for all stages except stage IV (Table 3). The 5-year survival rate increased from 72.2% to 93.3% in stage I and from 23.8% to 60.9% in stage II. However, the improvement in 5-year survival rate was rather limited in stage III patients (from 16.0% in period 1 to 24.8% in period 4). No increase of survival rate was achieved in the patients with stage IV disease throughout the study. During

the most recent period (1986–1990), the overall 5-year survival rate was 93.3% for stage I, 60.9% for stage II, 24.8% for stage III, and 4.8% for stage IV (Fig. 2). The 5-year survival rate in the subgroups was 100% for stage IA, 85.7% for stage IB, 48.1% for stage IIIA, 12.8% for stage IIIB, 12.5% for stage IV curative resection, and 0% 3-year survival for stage IV noncurative resection patients.

Invasiveness (T). For tumors of different invasion depth, significant improvement in 5-year survival was found for all T stages except T4. The improvement in 5-year survival was most significant for T2 tumors (31.7% to 85.4%) but was limited for T3 tumors (12.9% to 21.4%). For T1 tumors the 5-year survival increased from 86.7% during period 1 to 98.3% during period 4.

Table 3. Cumulative 5-year survival rate for various time periods.

Parameter	1971-1975 (n = 182)	1976-1980 (n = 249)	1981-1985 (n = 224)	1986-1990 (n = 299)	p
All patients	24.7	30.7	36.8	47.5	< 0.001
Curative resection	29.0	34.8	41.5	59.4	< 0.001
TNM stage					
I	72.2	68.3	79.5	93.3	< 0.01
II	23.8	30.6	36.7	60.9	< 0.05
III	16.0	10.1	14.3	24.8	< 0.01
IV	8.0	5.7	10.1	4.8	NS
Invasion depth					
T1	86.7	86.8	90.6	98.3	< 0.05
T2	30.6	31.1	49.6	85.4	< 0.001
T3	12.9	15.6	22.1	21.4	< 0.01
T4	12.0	7.7	10.0	10.0	NS
LN metastases					
0	52.4	58.7	72.9	75.0	< 0.05
1-3	11.6	12.5	21.8	46.2	< 0.001
>4	9.2	6.6	8.8	16.7	< 0.05
Tumor location					
Upper	13.3	5.7	19.5	20.6	< 0.001
Middle	23.1	36.7	45.4	46.8	NS
Lower	27.8	34.6	39.4	53.4	< 0.05

LN: lymph node.
All values are percents.

Fig. 2. Overall 5-year survival rate according to pathologic stage for patients during 1986-1990. It was 93.3% for stage I, 60.9% for stage II, 24.8% for stage III, and 4.8% for stage IV. The 5-year survival rate in the subgroups was 100% for stage IA, 85.7% for stage IB, 48.1% for stage IIIA, 12.8% for stage IIIB, and 12.5% for stage IV curative resection. There were no 3-year survivals for stage IV noncurative resection patients.

Only one patient, with early gastric cancer of the cardia and lymph node metastases, died of the disease during the most recent period.

Lymph Node Number. An improvement in 5-year survival was found among patients with different numbers of lymph node metastases. Patients with limited node involvement (one to three nodes) were the most benefited group. The prognostic differences between patients with involvement of one to three and more than four nodes was significant during the most recent period but not during the earlier periods.

Tumor Site. For tumors of different locations, both distally and proximally located tumors showed significant increases in 5-year survival, but the prognosis is poorer for the proximally located tumor (20.6%) compared to that for other areas. Although the 5-year survival of patients with middle third tumors has increased, it is statistically insignificant.

Multivariate Analysis. Multivariate analysis using Cox's regression model with adjustment for various factors (including tumor location, histologic type, and type of gastrectomy) has confirmed that the progressive lymphadenectomy attitude had a significant

Table 4. Hazard ratios of various periods according to the invasion depth of tumor.

Parameter	Hazard ratios with 95% confidence intervals		
	1976–1980 (R1/2) ^a	1981–1985 (R2) ^a	1986–1990 (R2/3) ^a
Before adjustment, all patients	1.00	0.78 (0.62–0.97)	0.69 (0.55–0.86)
After adjustment ^b			
All patients	1.00	0.71 (0.56–0.90)	0.58 (0.45–0.73)
T1 and T2	1.00	0.68 (0.44–1.05)	0.19 (0.10–0.38)
T3 and T4	1.00	0.74 (0.56–0.98)	0.66 (0.51–0.87)

^aExtent of lymphadenectomy [11].^bMultivariate analysis using Cox's regression with the adjustment of tumor location, histologic type, and type of gastrectomy.

impact on the improved survival rate of gastric cancer patients following resection. In addition, the reduction of the hazard ratio is more significant for T1/T2 than T3/T4 tumors (Table 4).

Discussion

The age-adjusted mortality rate associated with gastric cancer decreased in Taiwan between 1970 and 1990 by 42% in men and 39% in women [2]. This finding corroborates the notable decline worldwide in gastric cancer mortality and incidence [14]. There has also been a recent trend toward a change in the site of origin of gastric carcinoma, with proximally located tumors becoming more prevalent [15–18]. For example, Cady et al. [17] reported that 34% of patients had proximal lesions in their 1989 series, compared to 20% in their 1945 series. Although the number of patients with resectable gastric cancer did not decrease in our series, our study indicates similar changes in the location and histologic type of gastric carcinoma. The rate of occurrence in proximally located tumors increased from 14.8% to 20.4% with a corresponding decrease in the rate of distally located tumors. The rate of intestinal-type gastric carcinomas decreased from 73.6% to 41.5%, and a corresponding increase was found in the diffuse type. The rising relative incidence of proximally sited carcinoma highlights the rapid disappearance of distally located gastric cancers. Distally located cancers are “epidemic” in nature and are related to dietary variations, whereas the proximally located lesions are “endemic,” diffuse-type in histology, and less related to dietary factors [19]. Other environmental factors, such as urbanization [2] and a decrease in *Helicobacter pylori* infection [20] may also contribute to this transition, as documented in Taiwan patients.

In the past, the surgical treatment of gastric cancer has varied mainly regarding the extent of resection. A frequent debate centers on whether radical lymph node dissection can improve the basically poor results of treatment with better survival. Recent studies from Japan suggested an improved survival of gastric cancer patients with an overall 5-year survival rate ranging between 40% and 50% following resection [3–6]. In contrast, however, the survival rate has not appreciably changed in Western countries, where the overall 5-year survival rate varies between 21% and 25% subsequent to resection [15–18, 21, 22]. Such differences have been attributed to the higher incidence of early cancer detection and the more aggressive surgical approach advocated by Japanese oncologists. To date, however, the suggested therapeutic effect of extended lymph node dissection has not been demonstrated in randomized trials [9, 10].

In this study, a substantial, significantly improved 5-year survival rate of resectable gastric cancer patients was documented in a single institute in Taiwan after a more aggressive approach toward gastric cancer resection and systematic lymphadenectomy was progressively implemented. Almost all TNM stages except stage IV were benefited from the extended lymph node dissection. However, the survival benefit is less than 10% in stage III patients. Because the evaluation of lymph node metastases and postoperative prognosis may be influenced by the extent of lymphadenectomy, which is known as “stage migration” or “Will Rogers phenomenon” [23], the comparison of the survival rates in different periods were conducted and stratified by T stage as well as the conventional TNM staging. Significant improvements in prognosis were found for T1–T3 cancers but not for T4 cancers. Patients with a T2 lesion have the most dramatically increased 5-year survival: from 31% to 85%. This group of patients was most benefited from radical lymphadenectomy, a fact confirmed by multivariate analysis. For those with a good prognosis and early gastric cancer (T1), radical lymph node dissection may detect more metastatic involvement and thus increase the completeness of surgical eradication of node metastases. Radical lymph node dissection revealed a 15.5% rate of lymph node metastases in early gastric cancer and almost 100% control of the disease in our study and others [24]. However, the benefit of lymphadenectomy for local control of gastric cancer was limited in their early stage. Once the cancer had invaded over the serosa (T3), the 5-year survival was 21.4% after radical lymphadenectomy, less than 10% increase compared with the 12.9% during the simple gastrectomy period. This phenomenon may be explained by the high incidence of N3 or N4 lymph node metastases [25], which were regarded as distant metastases and not curable by local treatment. Another explanation is the risk of intraperitoneal dissemination of the cancers that had invaded over the serosa [26]. For these patients, another treatment modality, such as neoadjuvant chemotherapy [27] or continuous hyperthermic peritoneal perfusion [28], should be used to improve the therapeutic advantage. In addition, the depressed cellular immunity found in advanced gastric cancer patients may play a significant role when electing treatment [29].

When the survival rate was compared in patients with different numbers of node metastases, those with limited involvement (fewer than four nodes involved), were most benefited by radical lymph node dissection. This effect may be due to the detection of noninvasive micrometastases of gastric cancer by radical lymph node dissection—the effect of “stage migration” [30]. The fact that the survival of those with one to three involved nodes and those with more than three nodes involved was similar during the simple gastrectomy period but different during the radical lymphadenectomy period implies that the prognostic relevance of node number may be true only with radical lymph dissection, when more accurate staging is attained.

The effect of extended lymphadenectomy on the 5-year survival of gastric carcinoma patients was also analyzed in relation to the primary site of the lesion. The prognosis was found to be poor with carcinoma of the upper third of the stomach, which is consistent with other reports [15–18]. Although improved 5-year survival was observed in all three locations subsequent to the institution of more radical operations, significant improvement was found for those in whom the location was limited to the upper and lower one-thirds of the stomach. The 5-year survivals of

Table 5. Comparison of gastric cancer resection results recorded in the United States [22], Japan [5], and NTUH.

Parameter	Incidence (%)			Patients with resection: survival (%)		
	Japan	US	NTUH	Japan	US	NTUH
No. of patients	12,535	10,237	299			
Stage I	33.7	17.1	29.0	95.6	50.0	93.3
Stage II	14.5	16.9	16.7	70.1	29.0	60.9
Stage III	28.7	35.5	32.0	36.3	13.0	24.8
Stage IV	23.1	30.5	22.3	23.1	3.0	4.8
Overall survival				56.3	19.0	47.5

patients in the most recent period were 20.6%, 46.8% and 53.4% for the upper, middle, and lower one-third, respectively.

Comparison with other large databases, such as those collected from Japanese and American hospitals, show some interesting trends (Table 5). The data from Japan have a high frequency of stage I gastric cancer (34%) compared to the United States (17%) and Taiwan (29%), with fewer stage III and stage IV patients. The overall survival of patients with resection in the Japanese series was 56.3%, similar to ours (49.5%) but higher than the 19% in the United States. Not only is the stage more advanced in the U.S. series, but the 5-year survival is also considerably less according to stage. The 5-year survival rate in the United States was similar to our earliest period, when simple gastrectomy was routinely performed. Although comparisons between these retrospectively collected databases are not without problems, the large patient numbers do allow some inferences. Although complete resection of the primary tumor, dissection of lymph nodes, and more pathologic staging were performed in Japanese hospitals and ours, special education of the surgeon as a requisite for adequate gastrectomy may also factor into the increase in survival of patients with gastric cancer who undergo surgery. Our experience confirms recent reports that suggest curative resection with extensive lymphadenectomy can be safely performed without increasing, and perhaps even decreasing, surgical mortality [3–8]. The surgical mortality rates documented in the present study decreased from 5.5% during the 1970s to 2.0% during the 1990s.

Although our experience confirmed the Japanese experience that radical resection could improve local control of gastric cancer and the survival rate [31], further improvement of the gastric cancer treatment results rely on the development of multimodality treatment. Radical resection provided almost 100% control of stage I disease, and no adjuvant therapy was needed. Stage II and IIIA patients had a relatively good prognosis following curative radical resection in our series, similar to the results of others [32]. Postoperative immunochemotherapy might further improve the survival rate as suggested in a recent report [33]. For stage IIIB and IV patients, surgery alone had no significant effect on improving long-term survival. Investigation of the application of neoadjuvant chemotherapy is warranted [27].

In summary, the present findings and our review of the literature suggests that extended lymph node dissection is valuable in the curative surgical treatment of stomach cancer. Radical gastrectomy with extensive lymphadenectomy can be safely performed without increasing surgical mortality, and it improves the prospect of cure for patients with this malignant disease.

Résumé

On a analysé rétrospectivement 954 patients ayant un cancer gastrique provenant d'un seul Hôpital de Taiwan entre 1971 et 1990 dans le but d'évaluer l'évolution du traitement. Les patients ont été étudiés selon quatre périodes correspondant à la pratique d'une résection de plus en plus agressive et d'un curage lymphatique de plus en plus étendu. Les données clinicopathologiques et les taux de survie ont été analysés en fonction de l'étendue de la résection. On a constaté une augmentation de la proportion de tumeurs du tiers proximal (de 14.8% à 20.4%) et une baisse des tumeurs du type intestinal (73.6% à 41.5%). La proportion de patients ayant un cancer au début a augmenté de 11.5% à 19.4%. Les patients ayant eu une gastrectomie totale seule ou combinée à une résection d'organe de voisinage a augmenté de 13.7% à 27.4% et de 19.8% à 41%, respectivement. On a également constaté une augmentation du nombre total d'adénopathies enlevées et de l'incidence de métastases ganglionnaires détectées dans les cancers au début au fur et à mesure que l'étendue de la lymphadénectomie s'est développée. Une amélioration de la survie à 5 ans a été observée pour tous les stades de cancer exceptés ceux ayant une lésion T4 ou stade IV alors que la mortalité a diminué de 5.5% à 2.0% pendant ce même délai. Les patients qui ont tiré le plus de bénéfice du traitement radical étaient ceux qui avaient un cancer du stade II ou T2. La lymphadénectomie systématique augmente la survie d'environ 10% chez les patients du stade III ou T3, mais pas chez les patients du stade IV ou ayant une lésion T4. L'analyse multifactorielle a confirmé l'importance de la technique de dissection sur le pronostic du cancer gastrique dans cette population. En conclusion, on a documenté un changement épidémiologique du cancer gastrique à Taiwan. La baisse de mortalité indique que l'on peut effectuer une chirurgie radicale avec sécurité. Bien qu'il semble possible d'améliorer d'avantage la survie par 'upstaging' le stade, la gastrectomie radicale avec lymphadénectomie étendue pourrait être adaptée pour donner un contrôle satisfaisant de la maladie régionale.

Resumen

Se realizó un estudio retrospectivo de 954 pacientes con cáncer resecable del estómago en una única institución de Taiwan entre 1971 y 1990, con el fin de determinar la mejoría en los resultados de la cirugía por cáncer gástrico. Los pacientes fueron divididos en 4 períodos que representaban la experiencia en la implementación progresiva de la técnica de resección radical y linfadenectomía sistemática extensa. Se hizo un análisis estadístico compara-

tivo de los datos clínico-patológicos y del efecto de la radicalidad de la resección sobre la tasa de supervivencia. En el período de estudio se encontró un incremento significativo en la proporción de los tumores del tercio superior (de 14.8% a 20.4%), disminución en la incidencia del carcinoma de tipo intestinal (73.6% a 41.5%) y ascenso del cáncer gástrico temprano (precoz) de 11.5% a 19.4%. La proporción de pacientes sometidos a gastrectomía total y resección visceral combinada ascendió de 13.7% a 27.4% y de 19.8% a 41.1%, respectivamente. Tanto el aumento en el número total de ganglios linfáticos diseccionados como en la incidencia de metástasis ganglionares detectadas en los pacientes con cáncer gástrico temprano apareció asociado con una linfadenectomía más extensa. Se halló mejoría en la tasa de supervivencia a cinco años luego de resección agresiva en todos los estadios, excepto el estadio IV y lesión T4, en tanto que la mortalidad quirúrgica descendió de 5.5% a 3.0%. Los pacientes en estadios tempranos se beneficiaron más de la resección radical, especialmente aquellos en estadio II y lesiones T2. La disección ganglionar sistemática podría incrementar la tasa de supervivencia a cinco años en los pacientes en estadio III o con lesiones T3 en cerca de 10%, pero no así en los pacientes en estadio IV o con lesiones T4. El análisis multivariable confirmó la significancia de las mejores técnicas de linfadenectomía sobre el pronóstico del cáncer gástrico luego de resección, en Taiwan. En conclusión, se ha demostrado un patrón cambiante de la epidemiología del cáncer de estómago en Taiwan; la disminución en la mortalidad quirúrgica indica que la resección curativa con disección ganglionar extensa puede ser realizada con buen margen de seguridad, aunque se acepta la posibilidad de la "upstaging". La gastrectomía radical con linfadenectomía extensa puede ser adoptada en la resección del cáncer del estómago para lograr un posible mejor control de la enfermedad local-regional.

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