Total gastrectomy with simultaneous pancreaticosplenectomy or splenectomy in patients with advanced gastric carcinoma

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Summary A splenectomy or distal pancreaticosplenectomy is often performed simultaneously with total gastrectomy to facilitate dissection of the lymph nodes around the splenic artery and splenic hilus. However, the negative impact of splenectomy and pancreaticosplenectomy has also been reported. A retrospective analysis was performed to evaluate the outcomes of distal pancreaticosplenectomy and total gastrectomy, splenectomy and total gastrectomy, and gastrectomy alone in the patients with advanced gastric carcinoma without distant metastasis. Prognostic factors were examined. No significant differences existed in 5-year survival in the patients who underwent gastrectomy with splenectomy, gastrectomy with distal pancreaticosplenectomy, or gastrectomy alone. Neither splenectomy, nor distal pancreaticosplenectomy were prognostic factors. However, distal pancreaticosplenectomy was an independent predictor of pancreatic fistula. In conclusion, the addition of distal pancreaticosplenectomy or splenectomy to total gastrectomy for gastric cancer increases the risk of severe complications, but does not improve survival.

Keywords: gastric carcinoma; total gastrectomy; distal pancreatectomy
gastrectomy, 57 (44.6%) underwent splenectomy and total gastrectomy, and 25 (19.5%) underwent total gastrectomy alone.

**Surgical technique**

The surgical procedures were performed by several attending surgeons on the faculty, or by the surgical fellows. Patients with gastric carcinoma located in the middle or proximal stomach underwent total gastrectomy by essentially the same technique. The definitions for classification were taken from the International Union Against Cancer (UICC) (Hermanek et al, 1987).

**Clinicopathologic findings**

Information collected from the medical records included the age and sex of the patient, as well as the size and location of the primary tumour, the depth of invasion, and whether regional lymph node metastases were present. The UICC stage, presence or absence of residual tumour, the operative time, pre-operative co-morbid conditions, and blood transfusion requirements were also recorded.

Post-operative complications were reviewed. A complication was not considered infectious unless confirmed by bacteriologic cultures.

**Statistical methods**

Statistical analysis was performed using the NAP system (Version 4.0) programmed by Aoki (1989). The first objective of the statistical analysis was to examine the influence of each clinical, pathologic and therapeutic variables on survival following total gastrectomy. Information obtained from the univariate analysis (log-rank test) was applied to survival analysis with covariates.
using the Cox model of proportional hazards (Cox, 1972). To analyse the influence of splenectomy or distal pancreatectomy on survival following gastrectomy, the Kaplan–Meier method and generalized Wilcoxon test were performed.

The second objective of the statistical analysis was to assess the incidence of the complications. The incidence of the post-operative co-morbidities was compared between groups using 11 variables.

RESULTS

Clinicopathologic findings

Significant differences were noted in the operative time between the groups (Table 1).

Survival rates

The cumulative 5-year survivals of the patients who underwent total gastrectomy with distal pancreatecospinectomy, total gastrectomy with splenectomy and total gastrectomy alone were 40.7%, 55.9% and 54.2% respectively. Using the generalized Wilcoxon test, a significant difference was not observed between the groups (Figure 1).

Prognostic factors

Of the 13 clinical and pathologic variables identified by univariate analysis, six were found to be independent predictors of survival, and were selected for final proportional-hazards regression. Those variables were tumour size, depth of cancer invasion, location of the primary tumour, regional lymph node metastases, residual tumour, and the gross appearance of the tumour (Table 2).

Multivariate analysis showed that significant prognostic factors were residual tumour, depth of cancer invasion and the gross appearance of the tumour. Neither distal pancreatecospinectomy nor splenectomy were independent prognostic factors (Table 3).

Complication following total gastrectomy

Pancreatic fistulae were significantly more common following total gastrectomy with distal pancreatecospinectomy than after gastrectomy with splenectomy or total gastrectomy alone (Table 4).

DISCUSSION

The extent of lymph node dissection with gastrectomy for gastric carcinoma has been a topic of much discussion (Gall et al, 1985;
Soga et al, 1979, 1988). Lymphatic flow around the upper portion of the greater curvature of the stomach has been reported, toward the nodes around the splenic hilus and splenic artery (Takahashi et al, 1991). Yoshino et al have reported that spread of carcinoma is often to the lymph nodes around the splenic hilus and splenic artery when the primary tumour is located along the greater curvature of the upper third of the stomach (Yoshino et al, 1979). Simultaneous splenectomy and distal pancreatectosplenectomy have been advocated as standard procedures for proximal gastric cancer to facilitate removal of the lymph nodes around the splenic hilus and artery. The incidence of positive hilar node metastasis in patients with gastric carcinomas located in the upper third of the stomach has been reported to be greater than 25% (Fass and Schumpelick, 1989). In cases of curative total gastrectomy with splenectomy, the rate of cancerous involvement of the splenic hilar nodes was found to be about 10% (Sugimachi et al, 1980). In our study, the incidence of hilar nodal metastasis in patients who underwent splenectomy simultaneously with total gastrectomy for gastric carcinoma was 14% (14/103) (unpublished data).

Although splenectomy has been advocated for clearance of the splenic hilar lymph nodes, the importance of the spleen as a part of the immune system has only recently been stressed. The spleen is an important component of the reticuloendothelial system (Ellison and Fabri, 1983), and serves as a site of T- and B-lymphocyte interaction, which is important for the secondary immune response to foreign antigen challenges (Llende et al, 1986). Moreover, Griffith et al have reported that most of their patients with splenic hilar nodal metastasis had a primary tumour that had penetrated through the serosa, and had perigastric lymph node metastasis (Griffith et al, 1995). The prognosis in these patients was poor even after radical gastrectomy. Thus, whether or not to preserve the spleen has been vigorously debated.

In our previous study, the incidence of microscopic lymph node metastasis around the splenic artery in patients who underwent distal pancreatectomy simultaneously with total gastrectomy for gastric carcinoma was 15% (7/46) (unpublished data). Kanai (1967) has demonstrated, by examining sequential sections of the distal pancreas and surrounding tissues, that remnant nodes exist along the splenic artery in 74.7% of patients. This suggests that organ resection in the absence of true invasion is necessary to ensure the completeness of nodal dissection. However, Sugimachi et al (1982) have reported that many patients with nodal metastases at the splenic hilus or around the splenic artery are incurable with surgery because of factors other than the existence of these nodal metastases. Moreover, the morbidity after distal pancreatectosplenectomy and gastrectomy has been reported to be greater than that after splenectomy and gastrectomy alone (Fortner et al, 1994; Otsuji et al, 1997). In this study, the incidence of pancreatic fistulae after distal pancreatectosplenectomy and total gastrectomy was significantly higher than that after splenectomy and total gastrectomy and total gastrectomy alone.

Because only the in-hospital morbidity was analysed in this study, the long-term risk of infection following splenectomy was not considered. Therefore, in patients with gastric cancer, the addition of distal pancreatectosplenectomy or splenectomy to total gastrectomy increases the risk of severe complication, but does not improve survival.

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