



Surgical Management of Gastric Leiomyosarcoma: Evaluation of the Propriety of Laparoscopic Wedge Resection

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Abstract. Laparoscopic surgery has been applied to malignant gastric tumors. To evaluate the propriety of laparoscopic wedge resection for gastric leiomyosarcoma it is necessary to question whether lymph node dissection is necessary for the surgical management of gastric leiomyosarcoma. A retrospective study on open surgery cases of gastric leiomyosarcoma was performed to address this issue. The clinical records of 28 patients with gastric leiomyosarcoma who had had surgery were examined. The patients who underwent open surgery were divided into a systematic lymph node dissection (SLND) group ($n = 9$) and a nondissection (non-D) group ($n = 19$). No patient had lymph node metastasis at the time of operation or recurrence, and statistical analysis showed no difference between the SLND and non-D groups in terms of survival rates. These data suggest that SLND might not be necessary for the surgical management of gastric leiomyosarcoma and that laparoscopic wedge resection of the stomach can be considered a first-line treatment for gastric leiomyosarcoma.

Patients and Methods

Patients

From May 1984 to December 1994 a total of 1399 patients underwent surgery for gastric malignant tumors and 65 patients for submucosal tumor of the stomach at the Keio University Hospital; 28 patients (2.0%) who underwent open surgery for gastric leiomyosarcoma were enrolled in this study. The clinical records and histopathologic material of these patients were examined and were accepted for retrospective study only if the diagnosis of gastric leiomyosarcoma could be confirmed by review of microscopic tissue slides. The review was performed by a skillful pathologist without knowledge of the clinical course. The criteria for evaluating malignant neoplasms included cellularity, cellular atypia, and mitotic activity.

Laparoscopic surgery for early gastric cancer has been established [1–5]. It has been supported by technical advancements [1, 2, 5] and analysis of lymph node metastasis of the early gastric cancers [4]. On the other hand, laparoscopic surgery has begun to be applied to gastric leiomyosarcoma. To evaluate the propriety of laparoscopic wedge resection for gastric leiomyosarcoma it is necessary to question whether lymph node dissection is necessary for the surgical management of gastric leiomyosarcoma.

To answer the question, an analysis of open surgery cases is required. Leiomyosarcoma of the stomach represents about 1% to 3% [6–10] of primary malignant tumors and approximately 20% [11, 12] of submucosal tumors of the stomach. This low frequency prevented us from performing a randomized prospective study. Consequently, the present study was a retrospective analysis of open surgery cases for gastric leiomyosarcoma to ascertain the need for lymph node dissection during surgical management of gastric leiomyosarcoma.

Analysis

The 28 patients were divided into two groups: a systematic lymph node dissection (SLND) group ($n = 9$) and a nondissection (non-D) group ($n = 19$). In the SLND group, lymph nodes in group 1 and 2 according to the Japanese classification of gastric carcinoma [13] were dissected. Of the nine operations in the SLND group, four were total gastrectomies, one was a proximal gastrectomy, and 4 were distal gastrectomies. Of the 19 operations in the non-D group, 1 was a total gastrectomy, 2 were proximal gastrectomies, and 16 were wedge resections of the stomach via laparotomy.

The anatomic location of tumor, size of the resected specimen (in greatest dimension), metastatic sites at the time of operation, operative procedures, prognosis, and metastatic lesions at the time of recurrence were reviewed from the clinical records.

Data are presented as means \pm SD. Statistical significance of the difference between the two groups was determined by Student's *t*-test. The Kaplan-Meier method was used to estimate survival rates, and the generalized Wilcoxon test was used to determine the difference between the two groups.

Results

Sex and Age of Patients

In the SLND group, there were three men and six women. In the non-D group there were eight men and eleven women. The mean ages were 55.9 ± 13.6 years in the SLND group and 60.0 ± 10.4 years in non-D group. Neither sex nor age had any discernible influence on the survival rates of these patients or on the frequency, distribution, or size of the tumors.

Anatomic Location of Tumor

Seventeen tumors (60.7%) (five in the SLND group and twelve in the non-D group) presented in the upper third of the stomach; eight tumors (28.6%) (three in the SLND group and five in the non-D group) presented in the middle third of the stomach; and three tumors (10.7%) (one in the SLND group and two in the non-D group) presented in the lower third of the stomach (Fig. 1A). The tumors arose in the anterior wall in 11 patients (39.3%) (three in the SLND group and eight in the non-D group), in the lesser curvature in eight patients (28.6%) (one in the SLND group and seven in the non-D group), in the posterior wall in eight patients (28.6%) (four in the SLND group and four in the non-D group) and in one patient (3.6%) in the greater curvature (SLND group) (Fig. 1B).

Tumor Size

Tumor size ranged from 1.5 to 15.0 cm (median 6.1 cm) in the SLND group and from 2.2 to 19.0 cm (median 4.0 cm) in the non-D group. Statistical analysis showed no differences between the SLND and non-D groups ($p = 0.32$) (Fig. 2).

Metastasis

Histopathologic examination revealed no lymph node metastasis in the SLND group. In the non-D group there was no finding of lymph node metastasis at the time of operation, and lymph node sampling (nine cases) revealed no lymph node metastasis.

There was only one case of pancreatic invasion (SLND group) and one case of lung metastasis (non-D group) at the time of the primary operation. No metastatic lesions were found in the remaining 26 cases.

Prognosis

The follow-up duration was 1 to 116 months (mean 37.9 months). One patient (SLND group) died of an unrelated disease, and four patients (two in the SLND group and two in the non-D group) died of recurrent sarcoma. Liver metastasis developed in two patients (one in the SLND group and another in the non-D group); and there was one case of local recurrence (pancreatic infiltration in the SLND group) and one case (non-D group) of peritoneal dissemination. No lymph node metastasis was found at the time of recurrence.

The probability of survival stratified by tumor size is shown in Figure 3. These data indicate that tumor size was a factor that affected prognosis. Comparison of the survival rates between the SLND and non-D groups is shown in Figure 4. There was no

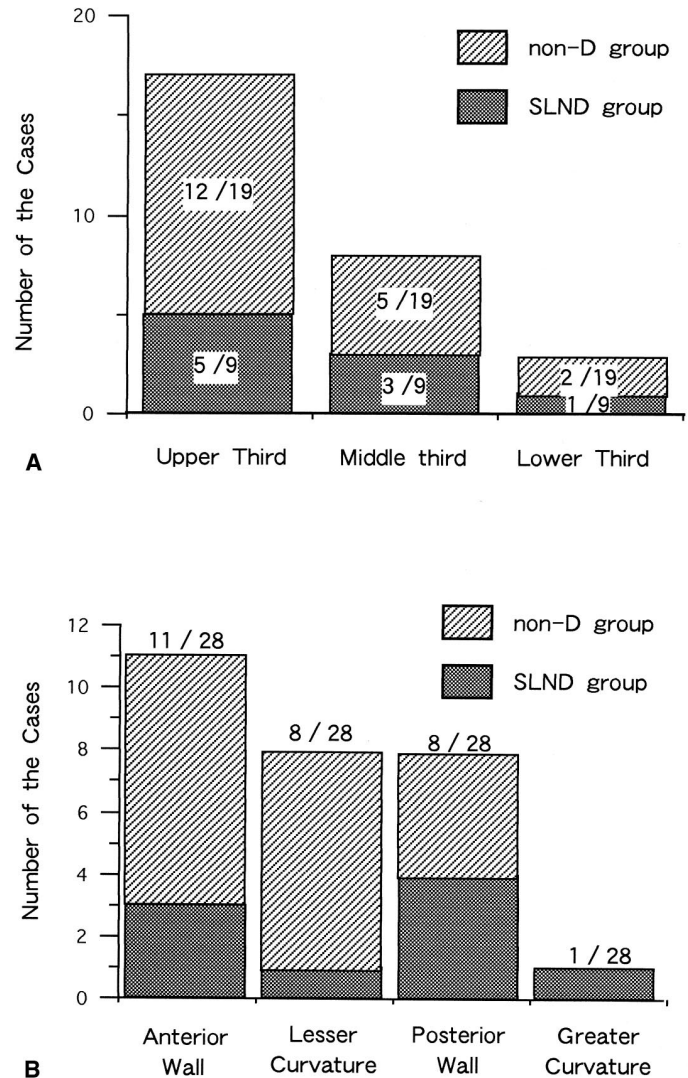


Fig. 1. Anatomic location of tumor. **A.** Seventeen tumors (60.7%) presented in the upper third, eight (28.6%) in the middle third, and three (10.7%) in the lower third of the stomach. **B.** Cross-sectional circumference of the stomach. Tumors arose in the anterior wall in eleven patients (39.3%), in the lesser curvature in eight patients (28.6%), in the posterior wall in eight patients (28.6%), and in the greater curvature in one patient (3.6%).

significant difference in survival rates between the SLND and non-D groups.

Discussion

Is lymph node dissection necessary for surgical management of gastric leiomyosarcoma? This clinical issue is crucial. If SLND is necessary, many cases of gastric leiomyosarcoma require total gastrectomy because in the present study 60.7% of leiomyosarcomas presented in the upper third of the stomach; Shiu et al. [11] reported similar results. On the other hand, if SLND is not necessary, laparoscopic wedge resection of the stomach may be appropriate for gastric leiomyosarcoma. This study was an attempt to evaluate the appropriateness of laparoscopic wedge resection for gastric leiomyosarcoma to begin to clarify this issue.

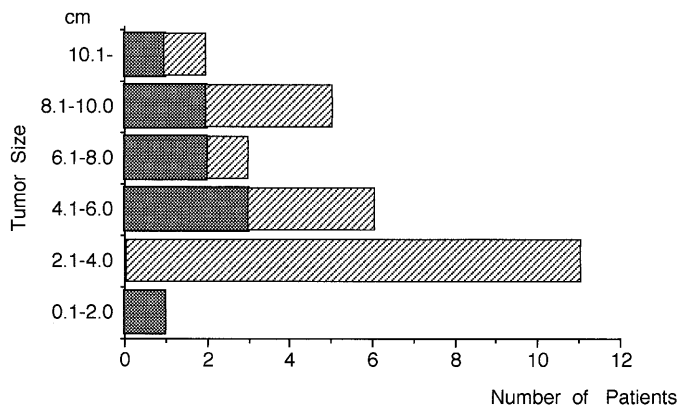


Fig. 2. Tumor size. No statistically significant differences were observed between the SLND (shaded bars) and non-D (hatched bars) groups ($p = 0.32$) for tumor size.

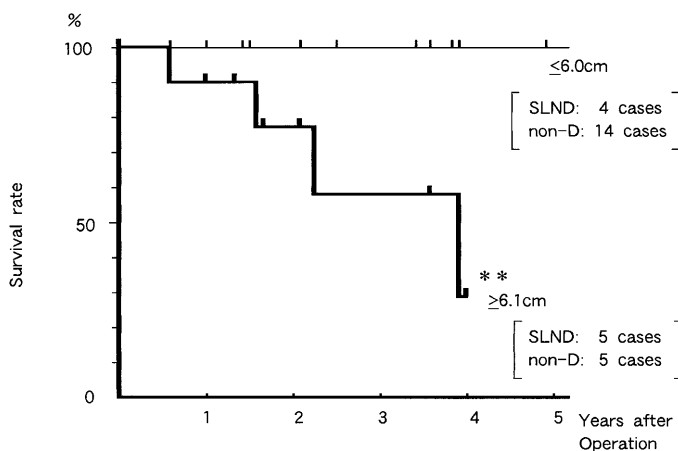


Fig. 3. Probability of survival stratified by tumor size. This parameter was significantly different between large (≥ 6.1 cm) and small (≤ 6.0 cm) tumors. $**p < 0.01$.

This study found no evident difference between the background factors of the SLND and non-D groups. Tumor size was found to be the most important background factor of the patients in the present study, for which the probability of survival stratified by tumor size was significantly different between large (≥ 6.1 cm) and small (≤ 6.0 cm) tumors. This finding was comparable to those of previous studies, which had reported similar results [11, 14–16]. Statistical analysis showed no difference between the SLND and non-D groups ($p = 0.32$) in terms of tumor size. Other background factors, including sex, age, and operative findings, were not found to be different between the comparison groups.

Systematic lymph node dissection is not thought to be necessary for surgical management of gastric leiomyosarcoma. First, lymph node involvement is rare in patients with gastric leiomyosarcoma; and in our study the operative findings and histopathologic examination revealed no patients with lymph node metastasis. Lindsay et al. [17] reported that none of 50 patients had lymph node metastasis and concluded that lymph node dissection was not necessary. Although Grant et al. [16] found lymph node metastasis in 8% of 53 patients, all of these cases were advanced, with multicentric tumors, liver metastasis, or widely invasive

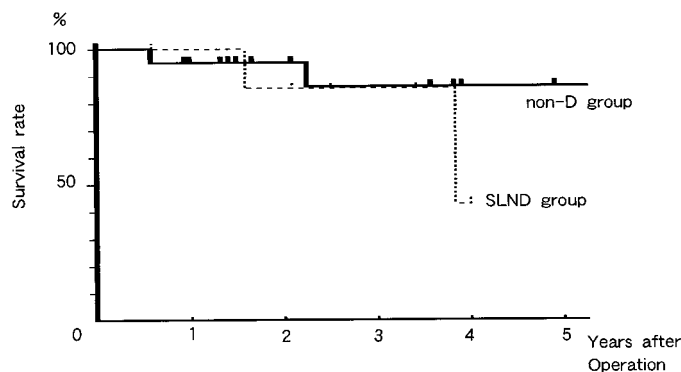


Fig. 4. Comparison of survival rates for the SLND and non-D groups. There was no statistically significant difference in survival rates between the SLND and non-D groups.

tumors. Lymph node dissection did not improve the outcome of gastric leiomyosarcoma in these advanced cases. Second, lymph node metastasis is also rare at the time of recurrence. No patient in the present study exhibited lymph node metastasis at the time of recurrence. Although Shiu et al. [11] described lymph node metastasis with 3 of 23 recurrent gastric leiomyosarcomas, few articles have described the presence of lymph node metastasis at the time of recurrence [14, 16–18]. Third, the operative method is not thought to influence the prognosis of gastric leiomyosarcomas, as in the present study, where no statistically significant difference was present between the SLND and non-D groups in terms of survival rate. Grant et al. [16] reported the same results, and Estes et al. [18] described that no differences were noted whether wedge resection, subtotal gastrectomy, or total gastrectomy was performed, so long as the tumor was resected with a tumor-free margin.

To resect the stomach with a tumor-free margin, laparoscopic wedge resection is technically feasible. Ohgami et al. [2, 5] reported that laparoscopic wedge resection of the stomach for early gastric cancer successfully resected the stomach with a tumor-free margin. Based on this background, we have started to apply laparoscopic wedge resection of the stomach for gastric leiomyosarcoma (unpublished data). In all of our first six patients, histopathologic examination revealed complete resection with a tumor-free margin. The posterior wall of the stomach has been easily exposed using laparoscopic coagulating shears [5]. Although laparoscopic wedge resection is not indicated for tumors at inappropriate locations, such as the cardia or pylorus, or large tumors resulting in postoperative stenosis, this procedure is appropriate for tumors located in other parts of the posterior and anterior wall of the stomach.

Laparoscopic wedge resection of the stomach is thought to be minimally invasive. In an analysis of laparoscopic wedge resection cases for early gastric cancer, Ohgami and Kitajima [5] reported that operative blood loss was negligible, initiation of diet was at 1 to 2 days postoperatively, and the postoperative courses were uneventful. In our six patients who underwent laparoscopic wedge resection for gastric leiomyosarcoma, operative blood loss and postoperative courses were the same as for the patients with gastric cancer.

The diagnosis and treatment of gastric leiomyosarcoma can be enhanced by the introduction of laparoscopic surgery. Small

asymptomatic submucosal tumors of the stomach have been detected more frequently in Japan because of mass screening for gastric cancer [12]. Although the myogenic origin of the tumor is diagnosed by endoscopic ultrasonography in a relatively easy manner, the preoperative differential diagnosis between benign and malignant tumors is sometimes difficult [19]. Small myogenic tumors of the stomach are often followed conservatively to avoid laparotomy for benign tumors, but a rapidly growing gastric leiomyosarcoma suggests a potential risk in the conservative management of small myogenic tumors [20]. Choen and Rauff [21] opined that all submucosal gastric tumors should be resected regardless of size. Laparoscopic resection makes the diagnosis and treatment of leiomyosarcoma possible without invasive surgery. Small leiomyosarcomas can often be resected by laparoscopic surgery, and the prognosis may be good for these small tumors.

In conclusion, SLND is not thought necessary for surgical management of gastric leiomyosarcoma. No patients in this study had lymph node metastasis at the time of operation or recurrence, and no statistically significant differences were observed between the SLND and non-D groups in terms of survival rate. Laparoscopic wedge resection is technically feasible to resect the stomach with a tumor-free margin. Laparoscopic wedge resection of the stomach is thought to be minimally invasive, and the present study suggests that this procedure can be considered as a first-line treatment for leiomyosarcoma of the stomach.

Résumé

Récemment, on a proposé la résection de certaines tumeurs malignes gastriques par laparoscopie. Afin d'apprécier si une résection à minima sous laparoscopie est suffisante pour le léiomyosarcome gastrique, il faut d'abord savoir s'il est nécessaire de faire un curage lymphatique dans cette situation. On a essayé d'y répondre par une étude rétrospective des cas opérés par chirurgie traditionnelle à partir de 28 dossiers de patients opérés d'un léiomyosarcome gastrique. Les patients qui ont eu une chirurgie traditionnelle ont été divisés en deux groupes selon qu'ils ont eu un curage lymphatique systématique (CLS) (n = 9) ou non (non-CLS) (n = 19). Aucun patient n'avait de métastase lymphatique au moment de l'intervention ou de la récurrence et l'analyse statistique n'a montré aucune différence statistiquement significative en ce concerne la survie des deux groupes. Ces résultats suggèrent que le CLS pourrait ne pas être indispensable dans le traitement du léiomyosarcome gastrique et que la résection à minima de l'estomac sous laparoscopie peut être considérée comme un traitement suffisant.

Resumen

La cirugía laparoscópica ha venido a ser recientemente aplicada en casos de tumores gástricos malignos. Con el propósito de evaluar la bondad de la resección laparoscópica en cuña en el tratamiento del leiomyosarcoma gástrico, es pertinente cuestionar si la disección ganglionar es necesaria. Se realizó un estudio retrospectivo de los casos de cirugía abierta por leiomyosarcoma gástrico, para lo cual se revisaron las historias clínicas de 28 pacientes sometidos a cirugía por leiomyosarcoma gástrico. Los pacientes que recibieron cirugía abierta fueron divididos en un grupo en que se practicó disección ganglionar sistemática (n = 9)

y otro en el cual no se practicó disección (n = 19). Ninguno de los pacientes exhibía metástasis ganglionares en el momento de la operación o de la recurrencia, y el análisis estadístico no demostró diferencia entre los dos grupos en cuanto a tasas de supervivencia. Estos datos sugieren que la disección ganglionar sistemática puede ser innecesaria en el manejo quirúrgico del leiomyosarcoma gástrico y que la resección laparoscópica en cuña puede ser considerada como la primera línea de tratamiento en el leiomyosarcoma gástrico.

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