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Long-Term Follow-Up After Curative Surgery for Early Gastric Lymphoma

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Objective

This study was designed to examine the long-term survival of a homogenous group of patients with stage IE or IIE-1 gastric lymphoma after complete surgical resection.

Summary Background Data

The management of gastric lymphoma remains controversial. Enthusiasm for multimodality approaches for gastric lymphoma has lead to the current trend of using chemotherapy as primary treatment, thus avoiding gastric resection. Surgery, however, may result in improved long-term survival rates.

Methods

The records of all patients with the diagnosis of gastric lymphoma from 1980 to 1991 were reviewed retrospectively. Of 106 patients examined, 34 underwent curative resection and regional lymphadenectomy for pathologically staged IE or IIE-1 (pN1) gastric lymphoma. Fifteen patients underwent surgery alone, whereas 19 also received postoperative adjuvant therapy.

Results

The median follow-up time was 74 months. The 10-year actuarial disease-free survival was 91% for stage IE disease (n = 23) and 82% for stage IIE-1 disease (n = 11). There were no operative deaths and a 26% morbidity rate. No difference in survival was found for those treated with adjuvant therapy.

Conclusions

The results compare favorably to those reported with the use of primary chemotherapy and radiation therapy and suggest that surgery remains the best frontline therapy for early gastric lymphoma.

Controversy remains regarding the best treatment for early gastric lymphoma and the role of surgery in this disease. Successful treatment of early gastric lymphoma with surgery,[1] chemotherapy,[2] and radiation therapy[3] have all been reported. Although there are multiple options for successful treatment of early gastric lymphoma, the goal for definitive therapy is to achieve maximal survival with minimal morbidity at the lowest cost to the patient and the health care system.

Recent studies and ongoing protocols have increasingly removed surgery from traditional multimodality therapy and displaced it to a role of salvage therapy for life-threatening complications or for treatment of resistant disease after chemotherapy, radiation therapy, or

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both have been performed.[4,5] This trend has evolved as a result of improvements in overall survival after the use of multimodality treatment for gastric lymphoma[1] and in part because of the success of nonsurgical approaches in the treatment of primary nodal non-Hodgkin's lymphomas. The studies of gastric lymphoma include predominantly patients with advanced (stage IIE and IV) disease, so that the potential effect of a curative resection for an early-stage gastric lymphoma on patient survival is difficult to assess. Because of the rarity of the disease, many investigators flaw their studies by combining multiple stages and/or multiple sites of gastrointestinal lymphomas with varied treatment protocols.[6–11] In addition, accurate pathologic staging and data on surgical margins is often lacking.[12–14] The role of adjuvant therapy in early gastric lymphoma, therefore, has not been defined.

With improvements in surgical technique and perioperative management, the mortality rate associated with a subtotal gastrectomy has decreased to less than 3% and the major morbidity rate to less than 10%.[15,16] The long-term functional results have been well studied and are quite good. The mortality rate associated with complications of chemotherapy for non-Hodgkin's lymphoma have also improved and recently were reported to be between 3% and 17%.[17–21] Surgical resection may be the safest and most successful treatment for stage IE and IIE-1 gastric lymphoma.

Our purpose in the current study was to analyze the long-term survival of a homogenous group of patients with early gastric lymphoma treated with standard surgical therapy. We also addressed the question of whether adjuvant therapy is necessary after complete resection of an early-stage gastric lymphoma.

MATERIALS AND METHODS

The data represent a retrospective review of all patients treated at the Memorial Sloan-Kettering Cancer Center from 1980 to 1991 who underwent curative surgical therapy for primary gastric lymphoma. One hundred six patients were seen during this time period with the diagnosis of gastric lymphoma. Twenty-eight patients did not undergo resection because of the extent of disease or high surgical risk, 13 patients were operated on elsewhere and were referred for adjuvant treatment, 11 patients underwent palliative resection that left residual disease, and 20 patients were found to have metastatic disease to N2 lymph nodes (*i.e.*, lymph nodes located more than 3 cm from the primary tumor), liver, spleen, or bone marrow. The study group was limited to those patients who on pathologic examination were found to have disease limited to the stomach and N1 lymph node metastasis (stage IE and stage IIE-1 disease). Thirty-four patients with pathologically staged IE or IIE-1 (pN1) gastric lymphoma were treated with curative resection and regional lymphadenectomy. Of these 34 patients, 15 underwent surgery alone, 8 underwent curative surgery plus adjuvant chemotherapy, 6 received adjuvant radiation therapy, and 5 received both adjuvant chemotherapy and radiation therapy.

We retrospectively reviewed the medical records of these 34 patients and we focused on the onset and type of clinical symptoms, means for diagnosis, preoperative staging, pathologic staging, and survival data. We paid special attention to surgical morbidity and mortality rates and length of hospital stay. Disease was staged according to the gastric carcinoma TNM staging system[22,23] and the Ann Arbor gastric lymphoma staging scheme with Musshoff's modification.[24] Attention was paid to the size of the primary lesion, the depth of invasion, and extent of lymph node involvement. All cases were reviewed by the same pathologist and graded according to the Working Formulation system as low, intermediate, or high grade.

The decision regarding adjuvant therapy was made in collaboration with the consulting oncologist and often reflected that physician's personal preference. Table 1 summarizes the type of adjuvant therapy given and the reason for giving it for all 19 patients treated with adjuvant chemotherapy and/or radiation therapy. Many of the patients received adjuvant therapy outside of our institution, so accurate data on complications of adjuvant therapy could not be obtained.

The follow-up time ranged from 22 to 150 months, with a median follow-up of 74 months. No patients were excluded because of being lost to follow-up. The 10-year survival rate was calculated with use of the Kaplan–Meier method. A multivariate analysis of factors influencing survival was determined by the Cox regression analysis, and a multivariate analysis of factors influencing complication rate was determined by multiple linear regression.

RESULTS

The clinical characteristics of early gastric lymphoma are summarized by treatment group in Table 2. The overall mean age of study subjects was 61, and 69% were female. The average weight loss was 6.8 lb. The lactic dehydrogenase and albumin levels were abnormal for 19% and 36% of patients, respectively. Vague epigastric pain, which was experienced by 34 patients (71%), was the most common presenting symptom, followed by gastrointestinal bleeding for 6 (17%) of the patients.

Delay in diagnosis and treatment continues to be a

Table 1. RADIATION THERAPY DOSES AND CHEMOTHERAPEUTIC REGIMENS AND THE REASONS FOR THEIR USE AFTER CURATIVE SURGERY IN EARLY GASTRIC LYMPHOMA

Patient	Radiotherapy	Chemotherapy	Reason
1	None	CHOP	T-4 disease
2	4980 rads	None	Protocol†
3	None	Leukeran	Unknown
4	dose unknown	None	Perinodal involvement
5	4100 rads	CHOP	Protocol†
6	Dose unknown	m-BACOD	T-4 disease
7	None	CHOP	Physician preference
8	None	Cytoxan	Physician preference
9	4700 rads	None	Protocol†
10	Dose unknown	None	Physician preference
11	None	CHOP	Protocol†
12	3000 rads	None	Protocol†
13	None	m-BACOD	Protocol†
14	Dose unknown	m-BACOD	Physician preference
15	None	CHOP	Physician preference
16	4500 rads	None	Close margin
17	None	CopBLAM I	Physician preference
18	Dose unknown	CHOP	Physician preference
19	3600 rads	None	Physician preference

CHOP = cyclophosphamide, doxorubicin, vincristine, prednisone; M-BACOD = methotrexate, leucovorin, bleomycin, doxorubicin, cyclophosphamide, vincristine, and dexamethasone; CopBLAM I = cyclophosphamide, doxorubicin, vincristine, procarbazine, prednisone, and bleomycin.
* Total dose of radiation treatments is unknown for some patients receiving adjuvant treatment at other institutions.
† Patient was treated based on a lymphoma protocol and therapy was based on randomization.

problem in the treatment of gastric lymphoma. The average time from onset of symptoms to treatment was 6.5 months. Twenty-four of 34 patients underwent an upper gastrointestinal series on initial screening, and 100% of the patients underwent esophagogastroduodenoscopy at some point as part of the workup. The initial esophagogastroduodenoscopy was nondiagnostic for 53% of patients. The mean number of esophagogastroduodenoscopies done for diagnosis per patient was 1.8 ± 1.1 (range, 1–5). In addition, preoperative staging in gastric lymphoma was often inaccurate. The preoperative stage was correct for 42% patients, understaged for 8%, overstaged for 19%, and indeterminate for 31%. Most of these patients had their disease stages with the use of an upper gastrointestinal series, endoscopy, and computed tomography scan. Most of these cases preceded the routine use of endoscopic ultrasound, which was used for only 4 patients in this study.

Tumor characteristics are summarized by treatment group and stage in Table 3. The average greatest dimension of tumor was 8.2 cm. A larger proportion of proximal tumors were included in the group receiving surgery alone, which may lead to a worse prognosis. Most of the tumors were graded as intermediate, per the Working

Table 2. CLINICAL CHARACTERISTICS BY TREATMENT GROUPS

Treatment	N	Age (yrs)	Weight Loss (lbs)	Albumin (mg/dL)	Lactic Dehydrogenase (mU/mL)	Hemoglobin (g/dL)
Surgery alone	15	63 ± 16	9.1 ± 9.7	4.0 ± 0.4	179 ± 31	12.9 ± 1.3
Surgery + radiation therapy	6	55 ± 16	3.3 ± 4.7	4.4 ± 0.4	167 ± 7.6	13.5 ± 0.6
Surgery + chemotherapy	8	63 ± 14	6.8 ± 7.4	4.0 ± 0.5	162 ± 37	12.5 ± 1.6
Surgery + both	5	61 ± 18	3.0 ± 4.0	3.4 ± 0.9	264 ± 125	13.1 ± 1.1
Total	34	61 ± 15	6.6 ± 8.2	4.0 ± 0.5	183 ± 56	12.9 ± 1.2

Values represent mean ± standard deviation

Table 3. TUMOR CHARACTERISTICS BY TREATMENT GROUP AND STAGE

Treatment	Stage*	N	Tumor Diameter (cm)†	Proximal Location (%)	Grade			T-Level‡			
					L	I	H	1	2	3	4
Surgery alone	IE	11	6.7 ± 1.7	36	1	10	—	2	5	4	—
	IIE-1	4	9.5 ± 5.1	50	1	3	—	—	2	2	—
Surgery + radiation therapy	IE	5	8.1 ± 4.0	0	1	3	1	2	3	—	—
	IIE-1	1	9.0 ± 0	0	—	1	—	—	—	1	—
Surgery + chemotherapy	IE	4	4.9 ± 1.7	25	1	3	—	2	1	1	—
	IIE-1	4	12.5 ± 6.8	25	1	2	1	—	—	3	1
Surgery + both	IE	3	4.0 ± 1.4	0	—	3	—	—	2	1	—
	IIE-1	2	11.8 ± 0.4	0	—	2	—	—	1	—	1
Total	IE	23	6.8 ± 2.6	22	3	19	1	6	11	6	—
	IIE-1	11	11.0 ± 4.9	27	2	8	1	—	3	6	2
Overall	—	34	8.2 ± 3.3	24	5	27	2	6	14	12	2

L = low; I = intermediate; H = high.
* Stage is by Musshoff's modification of the Ann Arbor staging system.
† Values for tumor diameter represent mean ± standard deviation.
‡ T-level corresponds to that of gastric adenocarcinoma.

Formulation system. Fifteen percent of the tumors were low grade and 6% were high grade. No high-grade lesions were found in the surgery-alone group. This finding represents a selection bias, because in all cases the high-grade tumors were treated with adjuvant therapy, presumably because of increased risk of recurrence. Low-grade lymphomas were evenly distributed throughout all treatment groups. Although the designation of mucosa-associated lymphoid tissue lymphomas has recently been popular in the literature, we prefer to consider these lymphomas in the spectrum of standard nomenclature for lymphomas, that is, corresponding to low-grade, T1 lesions. There were only three of these lymphomas in the current series, and each received a different treatment.

Survival analysis is summarized in Figures 1 and 2. Only four patients in the current study had lymphoma recurrence after treatment, and all four died of their disease (Table 4). Five patients died of other causes, as follows: (1) meningitis at 83 months, (2) acquired immunodeficiency syndrome at 79 months, (3) heart disease at 59 months, (4) heart disease at 28 months, and (5) sudden death of unknown cause at 57 months in a patient who was disease free. The actuarial 10-year survival rate was 88% overall. The 10-year survival rate was 91% for stage IE disease and 82% for stage IIE-1 disease. Table 5 summarizes the characteristics of the patients who died of their disease. The mean size of tumors in this subgroup was 9.6 ± 4.5 cm (50% of patients had tumors >10 cm), compared with 7.7 ± 3.9 cm for the group as a whole (17% had tumors >10 cm). There was an increased incidence of stage IIE-1 disease (50%) in this subgroup compared with the overall incidence of stage IIE-1 disease (29%). No other characteristics stood out as being different from the group as a whole. These factors were not statistically significant according to univariate and multivariate analyses.

No deaths related to treatment were found in the current study. The overall complication rate was 26% (8 of 34 patients) (Table 6). Twelve percent of these patients had early, perioperative complications, and 15% had late complications secondary to strictures and nutritional difficulties. There was a 50% incidence of complications in the proximal and total gastrectomies combined, compared with a 19% incidence in the distal gastrectomies. This difference was statistically significant in a multivariate analysis ($p = 0.02$). Eighty percent of the late complications resulted from proximal and total gastrectomies. The median length of hospital stay was 10 days (range, 6–27 days).

DISCUSSION

The current literature on the treatment of gastric lymphoma is confusing and contradictory and has led to much controversy regarding the best form of therapy. The rarity of the disease lends itself to retrospective reviews, which often combine different types of gastrointestinal lymphomas, different stages, and different forms of therapy. The result is a treatment approach that varies among institutions and specialties, with no evidence of the superiority of one approach over another. Nevertheless, the general goal of surgery has gradually changed over the years from one of curative intent to one of staging and palliation, that is, debulking the disease and pre-

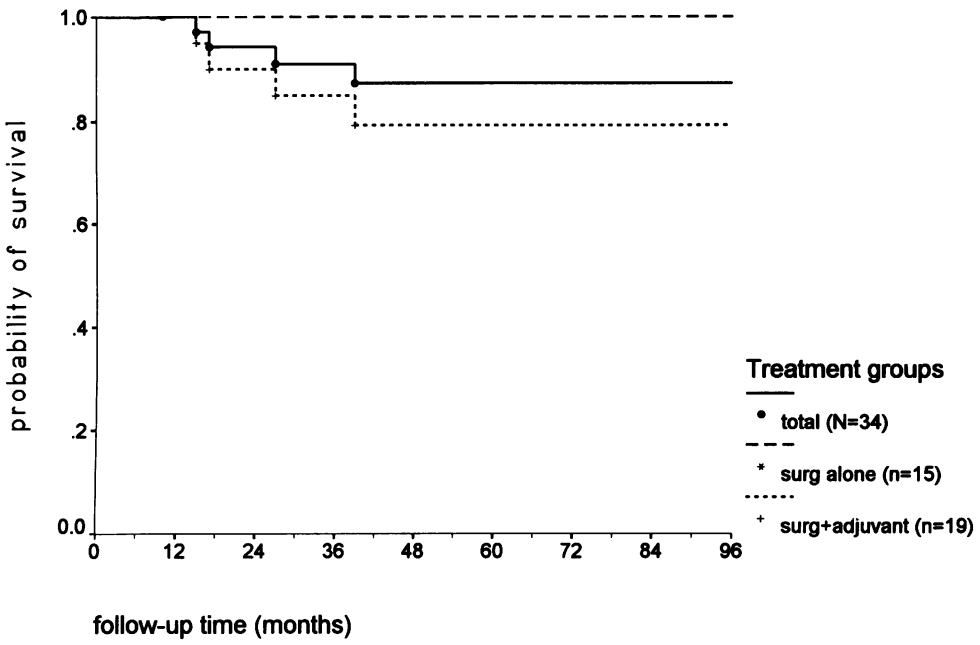

Figure 1. Kaplan–Meier survival curves by treatment for all patients. No statistically significant differences were found.

venting complications, with less concern for surgical margins.[25] Likewise, the treatment of gastric lymphoma has evolved from surgical resection alone to the recent use of primary chemotherapy and radiation therapy with no surgical intervention. Although primary chemotherapy and radiation therapy may be allowable in terms of morbidity and mortality rates, there is concern that the efficacy of treatment may have suffered for the subset of patients with stage IE or IIE-1 disease.

The current series demonstrates a 10-year actuarial survival of 88% for patients with early gastric lymphoma with a median follow-up of 73 months. Fifteen patients treated with surgery alone had no relapses, with a median follow-up time of 88 months (100% 5-year survival). Twenty-three patients with stage IE disease had a 91% 10-year disease-free survival. Eleven patients with stage IIE-1 disease demonstrated a 82% 10-year disease-free survival. Two reviews of gastric lymphoma from this in-

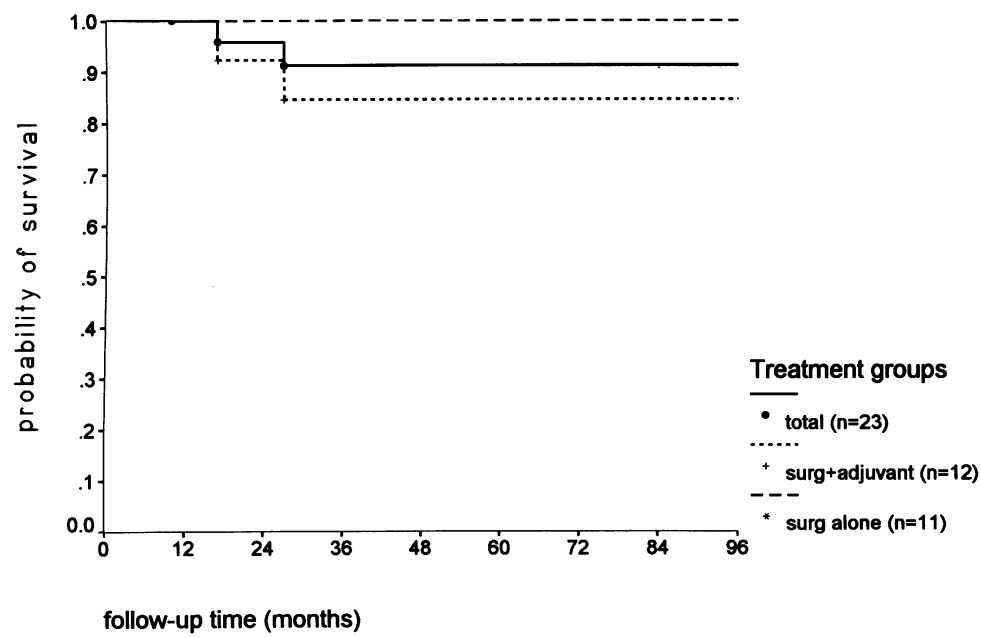

Figure 2. Kaplan–Meier survival curves by treatment for 23 patients with stage IE disease only. No statistically significant differences were found.

Table 4. TREATMENT RESULTS

Treatment	Stage	N	Recurrence	DOD	Recurrence Site	Median Follow-Up Time (mos)	10-Yr Disease-Free Survival (%)
Surgery alone	IE	11	0	0	—	75	100
	IIE-1	4	0	0		70	100
Surgery + radiation therapy	IE	5	0	0	—	67	100
	IIE-1	1	0	0		54	100
Surgery + chemotherapy	IE	4	1	1	Neck	80	75
	IIE-1	4	1	1	Chest	55	75
Surgery + both	IE	3	1	1	Local + neck	100	66
	IIE-1	2	1	1	Unknown	62	50
Total	IE	23	2	2		77	91
	IIE-1	11	2	2	—	63	82
Overall		34	4	4	—	72	88

DOD = died of disease.
Ten-year survival represents actuarial results based on Kaplan-Meier curve.

stitution have been published previously. Shiu et al. reviewed the institutional experience from 1949 to 1970.[26] The patients with stage I disease in their study had a 62% 5-year disease-free survival. The second review done by Shiu et al., from 1971 to 1982, included 23 patients with stage IE or stage IIE-1 disease who underwent surgical resection, and only 1 patient died of his disease (5-year disease-free survival rate, 96%).[1] There were no operative deaths, and only 8% perioperative and 25% late complications in that series. Fifty-two patients (5 patients overlapped between studies) have been treated at our institution since 1971 with complete surgical resection with or without adjuvant therapy for stage I or IIE-1 disease, with only 5 patients dying of lymphoma (90% 10-year survival).

The current review reiterates the early difficulties in the diagnosis and preoperative staging of gastric lymphoma, which has been reported previously.[27] The more recent, routine use of endoscopic ultrasound and the practice of performing multiple, deep biopsies throughout the stomach has improved this problem. We have combined stage I and stage IIE-1 as early disease. There appears to be a distinct break in prognosis between those patients with distant lymph node metastasis and those with perigastric lymph node involvement alone.[1,6,8,28] We included only those patients with complete resections to negative microscopic margins.

Many authors have found the adequacy of surgical resection to be a significant prognostic indicator for gastric lymphoma.[6–8,29–36] This is probably a reflection of the stage of disease as well as the effectiveness of surgical resection. Weingrad et al. reviewed 104 cases of primary gastrointestinal lymphomas and reported that involvement of resection margins was not a statistically significant prognosticator of survival. Their assumption was that routine adjuvant radiation therapy or chemother-

Table 5. CHARACTERISTICS OF PATIENTS WHO DIED OF THEIR DISEASE

Patient	Age (yrs)	Weight Loss (lbs)	Lactic Dehydrogenase (mU/mL)	Tumor Location	Tumor Diameter (cm)	Tumor Grade	T Stage	N Stage
1	62	5	285	Distal	11.5	Intermediate	T-2	N-1
2	75	10	212	Distal	15	Intermediate	T-1	N-1
3	62	20	113	Distal	7	Intermediate	T-3	N-0
4	80	0	180	Distal	5	Intermediate	T-3	N-0
Total	70 ± 9.2	8.8 ± 8.5	198 ± 7.1	100% Distal	9.6 ± 4.5	100% intermediate	50% T-3, T-4	50% N-1
Average of others*	60 ± 16	6.3 ± 8.6	179 ± 55	73% Distal	7.7 ± 3.9	79% intermediate	32% T-3, T-4	29% N-1

* Mean ± standard deviation of the other 30 patients who were without evidence of disease.

Table 6. COMPLICATIONS BY TREATMENT GROUP AND TUMOR LOCATION

Treatment	Location	N	Perioperative Complication*	Late Complication*	Total %
Surgery alone	Distal	9	1 suphrenic abscess 1 duodenal stump leak	0	22
	Proximal	6	0	3 strictures 1 nutritional difficulty	67
Surgery + adjuvant	Distal	17	1 wound dehiscence 1 subphrenic abscess	1 stricture	18
	Proximal	2	0	0	0
Total	Distal	26	4	1	19
	Proximal	8	0	4	50
Overall	—	34	4	5	26

* Does not include complications related to XRT or chemotherapy.

apy treats the residual disease.[28] Their regression analysis, however, included all stages and all sites of gastrointestinal lymphomas, including 36 patients with advanced lymph node or distant metastasis, for whom surgical margins would not be expected to make a difference. Perhaps better attention to surgical margins in early lymphomas will prevent the need for adjuvant chemotherapy or radiation therapy in disease limited to the stomach.

The survival results that we reported with curative surgery compare favorably to Maor's report of patients with stage IE disease only, in which the 5-year actuarial disease-free survival after Chop-Bleo plus radiation therapy without surgical resection was 68% (13 of 19 patients).[4] Likewise, Burgers et al., in their study of seven patients with stage I disease treated with radiation therapy alone, reported only one death due to lymphoma, with a minimum follow-up of 32 months. In an addendum, they studied 17 additional patients with stage I disease treated with radiation therapy alone. Three patients (18%) had recurrent or resistant disease in the follow-up period of 14 to 55 months. One explanation for the poor results in these studies is that the lack of pathologic staging results in understaging. Our results on preoperative staging, however, indicate a 19% incidence of overstaging. Nevertheless, the goal of stomach preservation probably does not warrant this decrease in treatment efficacy, especially in consideration of the comparable morbidity and mortality rates.

Attempts at primary radiation therapy or chemotherapy in the 1980s were associated with numerous reports of life-threatening complications related to gastric perforation and bleeding.[16,20,37,38] More recent reports, however, have not confirmed a high incidence of perforation and after following primary radiation therapy and chemotherapy.[2,39] Many researchers currently believe that complications and long-term adverse effects associated with the surgical resection of part or all of the stomach will be greater than that for cases in which the stomach is conserved.

Our institution has not had a single perioperative death after gastric resection for lymphoma since 1969. The overall complication rate from the current review was 26%, with a 12% rate of perioperative complications. The recent report by Maor et al. regarding primary chemotherapy and radiation therapy revealed 2 of 34 (6%) fatal complications related to chemotherapy and 5 major complications, for an overall 21% complication rate.[3] Burger et al. recently reported that 1 of 17 patients in their study died secondary to hemorrhage after receiving primary radiation therapy.[2] Salles reported a 10% mortality rate for induction chemotherapy in aggressive gastrointestinal lymphomas.[40] Although earlier reports have emphasized a high rate of complications for gastric surgery,[3,11,41,42] current operative and perioperative techniques have dramatically improved the associated morbidity and mortality rates.[1,38] In a series from Japan of 5952 patients treated for gastric cancer from 1980 to 1984, Takagi et al. reported a 0.1% operative mortality rate for distal subtotal gastrectomy and a 0.7% operative mortality rate for total gastrectomy.[43] A prospective French study compared total *versus* subtotal gastrectomy for adenocarcinoma of the stomach and reported a 1.3% operative mortality for total gastrectomy and a 3.2% operative mortality rate for subtotal gastrectomy.[44] In a prospective study from Germany, Jaehne et al. reported a 2.5% mortality,[45] and a recent report from our institution demonstrated an operative mortality of rate of 1.1% in 185 patients.[46]

Considering the results of our study and others' studies, it appears that surgery as the principle form of therapy for the treatment of early gastric lymphoma is the

Table 7. LITERATURE REVIEW OF SURGERY ALONE FOR GASTRIC LYMPHOMA

Reference	Years	N	5-Yr Survival (%)	Comments
Brooks and Enterline[13]	1939–1976	33	65	Includes N-2 disease No mention of extent of resection or margins
Mittal et al.[41]	1952–1978	8	62	Includes only N-0 disease No mention of extent of resection or margins
Weingrad et al.[28]	1949–1978	22	73	Includes N-1 disease
Rosen et al.[33]	1970–1979	12	66	Includes N-2 disease
Maor et al.[3]	1953–1980	9	67	Includes only N-0 disease No mention of extent of resection or margins
Paulson et al.[32]	1974–1980	7	100	Includes only N-0 disease No mention of extent of resection or margins
Shiu et al.[1]	1971–1982	5	100	Includes N-1 disease
Secco et al.[14]	1973–1985	7	56	Includes only N-0 disease No mention of extent of resection or margins
Shimodaira et al.[23]	1971–1992	40	95	Includes N-2 disease Standard R-2 gastrectomy
Present series (Bartlett et al.)	1980–1992	15	100	Includes N-1 disease Standard R-2 gastrectomy

best means of treatment available. We must question, however, the role of adjuvant chemotherapy and radiation therapy after complete resection to negative microscopic margins for the treatment of early gastric lymphoma. Table 7 presents a review of the recent literature for surgery alone for the treatment of early gastric lymphoma. It is clear that in a subset of patients, surgery alone is adequate therapy and that the additional morbidity and cost of 6 to 12 months of adjuvant chemotherapy and/or radiation therapy is unwarranted. A more cost-effective approach to therapy may be to concentrate on effective salvage therapy for those few patients who do experience disease relapse. Another technique is to isolate prognostic factors that demonstrate a propensity for local or systemic relapse and to individualize therapy as indicated. The most common poor prognostic factors described include high histologic grade, N2 lymph node involvement, completeness of resection, large size of the primary, and serosal or adjacent organ invasion.[6,8,31,32] In the current series, the characteristics of the patients who died of their disease indicated only the size of the lesion (>10 cm) and the presence of N1 lymph node disease as indicative of worse prognosis.

Recent reports in the literature suggest that the low-grade T1 lesions (designated mucosa associated lymphoid tissue lymphomas) can be treated by eradication of *Helicobacter pylori*.[47] These results require further investigation, including long-term follow-up, before this therapy should be used outside of a clinical trial. These tumors can have an indolent course without any treatment, and we have seen advanced lymphoma representing treatment failure after *H. pylori* eradication.

In conclusion, our data suggest that for low- and intermediate-grade tumors that are less than 10 cm in greatest dimension and that are N0, surgery alone appears adequate. The extent of surgical resection in all cases should be a standard radical subtotal gastrectomy with R-2 dissection. This is mandatory from both a therapeutic and diagnostic standpoint. The presence of microscopic disease in N1 and N2 lymph nodes should be considered in the decision for adjuvant therapy and is an important consideration in the analysis of treatment results. The extended *en bloc* lymph node dissection should not add significantly to the morbidity rate associated with the procedure.[46]

For those patients with high-grade tumors or perigastric lymph node involvement, treatment should consist of surgical resection and some form of adjuvant therapy. The treatment of proximal gastric lesions with proximal or total gastrectomy is associated with higher morbidity rate than is treatment with distal gastrectomy and must be considered. Decisions should be individualized by patient in consideration of the risk–benefit ratio of a total resection. For example, patients with lesions larger than 10 cm requiring a total gastrectomy may be good candidates for gastric preservation protocols.

In summary, we presented a series of patients with gastric lymphoma to update two previous reviews from this institution, which began in 1949. This review involved a homogenous group of patients with stage I or IIE-1 disease and a median follow-up of 72 months. We have had no deaths secondary to lymphoma after surgery alone for the 15 patients with early gastric lymphoma treated since 1980. For 34 patients treated with surgery with or with-

out adjuvant therapy, there has been a 88% 5-year survival rate. There have been no perioperative deaths from any surgical resection for gastric lymphoma since 1969, and in the current review we documented a 26% incidence of complications. These results suggest that surgery should be used as frontline therapy for the treatment of early gastric lymphoma, and adjuvant therapy is unnecessary for small (<10 cm), localized (N0) low- and intermediate-grade tumors that have been excised completely. The challenge for those proposing nonsurgical treatment algorithms is to approach the long-term results reported with surgical resection.

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