

Original Research Article

Does the surgical technique and the academic level of the hospital have impact on survival in gastric cancer? a retrospective study

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ABSTRACT

Background: Cure may only be achieved through surgical resection in gastric cancer. In this paper, we retrospectively analyzed the effects of D1 and D2 dissection and type of the performed operation as well as type of the hospital on survival.

Methods: Total of 125 patients, who had been operated for gastric cancer in two separate hospitals between January 2003 and June 2007 were retrospectively studied. The patients who met the criteria of the study were divided into four groups according to the operation type. Difference between the survival rates, median survival of the patients with respect to the type of the operation and hospitals were analyzed.

Results: Of the patients, 66 had total gastrectomy + D1 lymph node dissection, 39 had distal subtotal gastrectomy + D1 lymph node dissection, 7 had total gastrectomy + D2 lymph node dissection, and 13 had distal subtotal gastrectomy + D2 lymph node dissection. Analysis of 3-year survival of the patients demonstrated no statistically significant difference between the groups with respect to the survival rates, median survival of the patients and the hospitals ($p < 0.05$).

Conclusions: This study indicated that there was no significant difference between survivals with regard to the institution where the operation had been performed, the operation type and the extent of the dissection.

Keywords: Gastric cancer, Gastrectomy, Lymph node dissection

INTRODUCTION

Gastric adenocarcinoma is common worldwide. Cure can only be achieved with surgical resection in gastric cancer. In patients who are free from peritoneal and distant organ metastases curative resection is possible through total removal of gastric tumor tissue with clean borders together with the pathological lymph nodes.¹

According to the data from the Cancer Institute of Ministry of Health of Turkey, gastric cancer is the fifth leading cancer among gastrointestinal cancers, adenocarcinoma being the most common type (95%).^{2,3}

Japanese have obtained great success with early diagnosis and treatment modalities in the surgical treatment of gastric cancers.

The five-year survival rate reaches 70% through active use of screening programs and effective radical lymph node sampling.⁴ While the Japanese surgeons routinely recommend D2 lymph node dissection (LND), many Western surgeons still perform D1 LND.^{5,6}

In our country, an active fight against gastric cancer is hard to put forth since this disease is only diagnosed in advanced stages. D2 LND operations requires more

experience therefore this kind of operations performed by mostly in tertiary referral centers such as university hospitals.

In this study, we aimed to investigate both the impact of different operation types performed in gastric cancer as well as the influence of academical level of the surgical institutions on survival following surgery.

METHODS

Records of 125 patients operated for gastric cancer between January 2003 and June 2007 in two separate hospitals of different academic levels were retrospectively investigated with regard to the influence of the operation technique and LND on survival.

Data were collected from the operation notes of a research and training hospital (RTH) (n=62) and a university hospital (UH) (n=63), as well as phone calls to patients. The patients who were either irresectable or at stage 4 in the preoperative and the intraoperative period were excluded from the study. Patients who had died due to comorbidities in the postoperative period were also excluded. The perioperative period was limited to the postoperative one month. Thirty-three patients survived the operations.

Of the surviving patients, 17 had been operated in the RTH and 16 at the UH. Cancer staging was determined through retrospective analysis of the pathology reports and was done according to the TNM criteria. The stages were taken as only 1-2-3 as the subgroups of stage 1 and 3 tumors could not be discriminated because of the fact that the specimens were obtained as end bloc resection and lymph node marking was not performed in the pathology reports.

The surgical techniques were determined by evaluating the operation notes. Telephone numbers were accessed from the patient files. Patients who had received successful chemotherapy and radiotherapy were recorded.

The time of death and thereby survival of the patients were determined. D1 and D2 resections were performed according to the systematic of JRSSG (Japan Research Society for the Study of Gastric Cancer).⁷ The stomach has 16 lymph node stations according to this systematic. Peri gastric lymph node stations along the lesser curvature (station 1, 3, 5) and the greater curvature (station 2, 4, 6) of the stomach were defined as the N1 group.

The lymph nodes along the left gastric (station 7), the common hepatic (station 8), celiac (station 9) and splenic (stations 10-11) arteries were defined as the N2 group. D1 dissection was performed as total or subtotal resection, so as to include major and minor momentum. D2 dissection was performed as total resection of the

vascular pedicle of the stomach, so as to include the anterior leaflet of the omental bursa and transverse mesocolon.

Resection of the spleen and/or the caudal part of the pancreas was performed for only complete removal of stations 10 and 11 in proximal and median tumors only.

Patients were allocated into 2 groups according to the hospitals and 4 groups according to the operation type:

- Group 1: Patients who had been operated in the UH (n:63)
- Group 2: Patients who had been operated in the RTH (n:62)
- Group I: Total gastrectomy (TG) + D1 LND (n:66)
- Group II: Distal subtotal gastrectomy (DSG) + D1 LND (n:39)
- Group III: TG + D2 LND (n:7)
- Group IV: DSG + D2 LND (n:13)

Statistical analysis

Statistical analysis was performed using the NCSS 2007 package program.

The One-Way Variance Analysis was used for the inter-group comparisons, the Tukey multi-comparison test was used for the subgroup analysis, and the qui-square and the Fischer exact tests were used for comparison of the qualitative data beside descriptive methods (mean, standard deviation). The median survival of the groups and the percentage of survival were calculated with the Kaplan Meier method, and the Log Rank test was used for the comparisons. Results were evaluated at a p of <0.05 significance level and 95% confidence interval.

RESULTS

Total of 125 patients who had been operated due to gastric cancer between January 2003 and June 2007 were included in the study. Demographic characteristics of the patients are presented in Table 1. No difference was found between the groups with regard to age, gender, stage, adjuvant therapy (p>0.05).

Additionally, there was no difference between two group hospitals' mean survival (t: -0.13. p= 0.895). There was no statistically significant difference between the distribution of the operation types performed in the UH and the RTH. Total gastrectomy + D2 LND (n:5, 7.9%) and DSG + D2 LND (n:11, 17.5%) were performed more frequently in the UH compared to the RTH (n:2, 3.2%), (n:2, 3.2%).

Distal subtotal gastrectomy + D1 LND (n:26, 41.9%) was performed at a significantly higher rate in the RTH than in the UH (n:13, 20.6%).

Table 1: Comparison of demographic and clinical parameters.

		UH (n:63)		RTH (n:62)			p
Age		60.78±11.95		61.84±12.09		T=0.49	0.623
Gender	Female	19	30.2%	17	27.4%	χ^2 :0.11	0.735
	Male	44	69.8%	45	72.6%		
Stage	Stage 1	10	15.9%	8	12.9%	χ^2 :0.30	0.857
	Stage 2	11	17.5%	10	16.1%		
	Stage 3	42	66.60%	44	71.00%		
Operation type	TG+D1	34	54.0%	32	51.6%	χ^2 :11.9	0.008
	DSG+D1	13	20.6%	26	41.9%		
	TG+D2	5	7.9%	2	3.2%		
	DSG+D2	11	17.5%	2	3.2%		
Adjuvant Therapy	No	15	23.8%	12	19.4%	χ^2 :0.36	0.545
	Yes	48	76.2%	50	80.6%		
Survival (month)		17.12±14.74		17.44±11.78		T=0.13	0.895

The qui-square and the Fischer exact tests were used, $p < 0.05$

UH: University Hospital; RTH: Research and Training hospital; TG+D1: Total gastrectomy + D1 lymph node dissection; DSG+D1: Distal subtotal gastrectomy + D1 lymph node dissection; TG+D2: Total gastrectomy + D2 lymph node dissection; DSG+D2: Distal subtotal gastrectomy + D2 lymph node dissection

Table 2: Comparison of survival between hospitals.

		RTH (n:62)	UH (n:63)	Mean of all patients (n:125)
Survival (%)	1 st year	86.9	90.8	88.7
	2 nd year	68.3	69.7	69.4
	3 rd year	44.2	50.8	41.9
Media (month)		31±3	35±4	36±2
95% CI*		23-35	28-43	32-42
Log Rank:1.41 p=0.234				

Kaplan Meier method, and the Log Rank test was used *(confidence interval)

The 1st year, 2nd year and 3rd year survivals were 86.9%, 68.3%, 44.2% for RTH and 90.8%, %69.7, %50.8

for UH, respectively. The median survivals were 31±3 months for RTH and 35±4 months for UH, respectively. No statistically significant difference was observed between the survival rates and the median survival of the patients who had been operated in the RTH and in the UH (Log Rank:1.41 p = 0.234).

The data is shown in Table 2. The 1st year, 2nd year and 3rd year survivals were 0.974, 0.612, 0.537 for TG+D1, 0.971, 0.749, 0.749 for DSG+D1, 0.857, 0.685, 0.685 for TG+D2, 0.923, 0.647, 0.647 for DSG+D2, respectively.

The median survivals were 33±7 months for TG+D1, 37±12 months for DSG+D1, 36±7 months for TG+D2 and 38±9 months for DSG+D2, respectively.

Table 3: Comparison of survival according to the dissection type.

		TG+D1 n:66	DSG+D1 n:39	TG+D2 n:7	DSG+D2 n:13	Total n:125
Survival	1	0.974	0.971	0.857	0.923	0.959
	2	0.612	0.749	0.685	0.647	0.662
	3	0.537	0.749	0.685	0.647	0.584
Median (month)		33±7	37±12	36±7	38±9	36±2
95% GA*		20-46	25-54	22-50	26-48	32-42
Log rank:0.78 p = 0.854						

Kaplan Meier method, and the Log Rank test was used *(Confidence interval) TG+D1: Total gastrectomy+D1 lymph node dissection; DSG+D1: Distal subtotal gastrectomy+D1 lymph node dissection; TG+D2: Total gastrectomy+D2 lymph node dissection; DSG+D2: Distal subtotal gastrectomy+D2 lymph node dissection

There was no significant difference observed between the survival of all patients who had been operated with TG+D1 LND, DSG+D1 LND, TG+D2 LND, and DSG+D2 LND (Log Rank:0.78 p=0.854) (Table 3).

DISCUSSION

Gastric adenocarcinoma is widely seen in the world. Gastric cancer is the leading fifth cause of gastrointestinal

cancers according to the 2009 data of Cancer Institute of the Ministry of Health. Aden cancer is the most common type of gastric cancer (95%).^{2,3}

The role of Japanese physicians cannot be neglected in the surgical treatment of gastric cancers and significant success has been obtained through early diagnosis and treatment. The vast majority of gastric cancers are detected in the early period through active use of screening programs in Japan, and the 5-year survival rate reaches 90% with a good radical lymph node sampling. Radical lymphadenectomy has been determined to significantly decrease the mortality in studies conducted in Japan; however, this is not the case shown in Western studies.^{4,8}

In our country, gastric cancer can only be detected in advanced stages and an active fight against the disorder cannot be put forth in these stages. In this study, it was determined that 71% of the patients who had been admitted to the RTH and 66,6% of the patients who had been admitted to the UH were found to be at stage 3. The most important prognostic factor in gastric cancer is R0 resection.⁸ The pT, pN, and pM status are also very important for the prognosis.^{9,10} In this study, we aimed to investigate the effect of Aden cancer operation techniques performed by 46 surgeons who work in two hospitals (one belonging to the Ministry of Health and the other belonging to the İstanbul University) and centers, on the survival rates of the patients.

The effectiveness of D2 dissection on survival is still controversial. D2 dissection has been determined to provide a longer survival compared to conventional gastrectomies in multi-center studies. Again, D2 dissection has been determined to be an independent risk factor in stage 2 and 3A cancers. According to Cuschieri et al., even in experienced hands D1 and D2 dissections are not effective on survival.¹¹ Lymphadenectomy took its place in the literature after the study of Kodama et al. in 1981. While the 5-year survival was 39% in patients undergoing D2-D3 dissection, it was 18% in patients undergoing D1 dissection.

Although many separate Japanese studies have reported similar findings, western researchers have not been able to obtain the same results. This situation may be due to various reasons. The most important reason is more frequent detection of early stage gastric cancers through screening programs in Japan.

Another reason is common application of lymph node dissection in Japan. Wanebo et al analyzed 18346 gastric cancer patients in USA in 1996 and did not find a difference with regard to 5-year survival for D1 and D2 dissections. The 5-year survival rate was determined as 26.3% for D2 dissection and 30% for D1 dissection.¹²

In South Africa, Dent et al. studied 43 patients who had undergone D1 and D2 dissection. No significant

difference was determined between the 5-year survival rates and the rate was determined as 67% in D2 dissection and 69% in D1 dissection.¹³ Bonenkamp et al compared D1 and D2 dissection in 711 patients in 2004. While the 5-year survival was 45% in D1 dissection, it was shown to be 47% for D2 dissection.¹⁴ Cuschieri et al compared D1 and D2 dissection in 400 patients in 1999 in England. The 5-year survival rate was found as 35% for D1 and 33% for D2.¹⁵ The study of Sasako et al provided a clear answer to the optimal width of surgery in gastric cancer.

This multi-center prospective randomized study indicated that an enlarged dissection did not increase the morbidity and mortality when applied in appropriate centers; on the other hand, it did not contribute to the survival expectation and it was recommended that the standard therapy should be D2 dissection in gastric cancer patients.⁴

No significant difference could be determined between the survival rates of the 4 groups according to the dissection type. The dissection types performed in the UH and the RTH were found not to be effective on survival. While the most preferred dissection type by the four groups was D1 dissection, the influence of D2 dissection on survival could only be elucidated with regard to hospitals as numerically significant groups could not be created in this study.

Our work revealed that the most preferred dissection type was D1, and the most preferred operation type was DSG. D2 dissection may support the philosophy that cancer surgery is a lymph pathway surgery rather than an organ surgery. As known, perioperative morbidity and complications increase as the dissection enlarges, and also the operation time prolongs. Although present study did not show a statistically significant difference and most of our cases were at stage 2-3, we are aware of the fact that D2 dissection is the most rational approach, and this could lead to cure.

The results of present study indicate that our surgeons should be well educated and encouraged for gastric surgery operations. D1 dissection has been more frequently accepted by scientific environments, referring the patients to specialty centers could provide additional advantages for gastric cancer patients. The similarity of the results obtained from the RTH and the UH suggests that these operations may also be performed in training hospitals. Complete resection of the tumor does not seem possible at stage IIIB and IV tumors. Usually, macroscopic and microscopic residual tissue remains. The surgery is palliative and is not effective on the prognosis.¹⁶ In this study, resection was applied to stage 3 tumors at rates of 71% and 66% in the RTH and the UH, respectively.

Today, less than 15% of gastric cancers in USA and approximately 50% of gastric cancers in Japan are

detected in the early period. In this study, 14.4% of our patients were detected in the early period. 2% of the cases in the RTH and 14% of the cases in the UH had been operated in the early period. In this study, the survival rate of the patients was determined to shorten within the years in the 4 groups, consistent with the literature. No significant difference was found between the RTH and the UH with respect to survival. Statistically significant difference is observed between the survival rates according to stages. The survival is observed to shorten as the stage of the disease advances. The effectiveness of adjuvant chemotherapy is not clear in tumors undergoing R0 resection.¹⁷ Total of 2096 patients from 11 centers were studied and no effect of adjuvant chemotherapy was observed on survival.¹⁸

While adjuvant chemotherapy is standard in Japan, this was not used in Europe and USA.¹⁹ In this study, adjuvant therapy was performed mostly in stage 2-3 and no statistically significant difference was observed between the mortality rates with regard to adjuvant chemotherapy. We admit that present study has limitations such as insufficient data for detailed staging of pathology specimens.

CONCLUSION

It was determined that the difference of hospitals did not cause any significant difference with regard to survival in gastric adenocancer patients, and the operation technique did not significantly affect the survival rates in the patients.

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