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Comparative survival analysis of patients with stomach cancer after combined surgery

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ABSTRACT

Study included 1114 patients (804 men and 310 women) after combined surgery due to stomach cancer. It was investigated sex and age features and their influence of survival with Kaplan-Meier methods, including Log-rank and Breslow tests and $\chi 2$-statistics.

It was determined the prevalence of male patients over women (ratio 2.6:1), total gastrectomy (TG) over distal and proximal subtotal gastrectomy (SG) (ratio 4.6:1.5:1). Significant differences between the average life expectancy of men and women after combined TG were not found ($p>0,1$). Instead, there is a difference between life expectancy of men and women after combined TG and SG ($p<0,001$). 3- and 5-year survival rate after combined TG was respectively 16.7% and 10.1%, and after combined SG subtotal – 29.6% and 24.2%. The difference between the 3- and 5-year survival rates of patients of both sexes after completed combined SG was statistically significant ($\chi 2=4,692$, $p=0,032$).

Our results on average life expectancy, 3- and 5-year survival rates indicate the feasibility of the implementation of combined surgery as current trend to expand the possibilities of surgical radical treatment of patients with gastric cancer, and indications for their conduct.

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1. Introduction

The incidence rate of stomach cancer is gradually decreasing throughout the world (GLOBOCAN 2008). However, in Ukraine stomach cancer shows the highest incidence rates (4th-6th rank positions) and it is the second leading cause of death from malignant neoplasms for men (after lung cancer) and women (after

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breast cancer) (Cancer in Ukraine 2012).

The value of multiorgan resection in the treatment of timely and locally disseminated stomach cancer has been discussed for years. It should be emphasized that men predominated significantly among these patients, and the ratio of men to women is 2:1 (Carboni et al 2005), which is slightly higher than the ratio of the incidence rate of stomach cancer (1.5:1) in Europe (GLOBOCAN 2008). Particular attention is paid to the study of patients' survival (Dzhuraev et al 2008). Some authors have reported on some changes in the survival of patients who underwent gastrectomy with splenectomy or pancreatosplenectomy (Piso et al 2002; Radovanović et al 2004). In contrast, in some studies there was indicated possible higher mortality, increased rates of complications and long term inpatient treatment connected with an extended organ resection (Ahn et al 2011; Carboni et al 2005; Li et al 2004). Some studies have argued about the need to add an extended lymphadenectomy and resection of adjacent organs and, in particular, it has been justified that the potential benefit of extended resection is to improve the quality of resection surgery for these lesions (bring to level R0) (Carboni et al 2005).

2. Material and methods

The study group consisted of 1114 patients, including 804 men and 310 women. Various combined surgeries for stomach cancer were held in Lviv State Oncological Center from 1962 to 2012. Combined surgeries were considered such ones, in which the main type of surgery (subtotal gastrectomy (SG) or total gastrectomy(TG) was combined with en bloc resection or removal of other (related) organs (mesentery of the transverse colon, the transverse colon, the body and tail of the pancreas, spleen, diaphragm, soft tissue of the anterior abdominal wall). Depending on the location of the primary lesion and other JGCA criteria (Japanese Gastric Cancer Association 2011) subtotal distal gastrectomy (SDG), subtotal proximal gastrectomy (SPG) or TG was performed. Additional organ resections were performed for following purposes: promoting greater lymphadenectomy, obtaining greater radicalism (eradication of tumor), or because of iatrogenic damage of the organ (ex., spleen). All digital data were entered into the program for statistical analysis – SPSS, version 13.0 (statistical package for the Social Sciences, Inc Brooklyn, NY; ABD for Windows). Parameters affecting survival rates were calculated using Kaplan-Meier method, log-rank and Breslow tests, $\chi 2$-statistics. A statistically significant result was recognized at $p < 0,05$.

3. Results

Age of operated patients ranged from 21 to 87 years. Most patients were in the older age groups. Among men the majority of patients were within the age group from 50 to 74 years – 83.8% (674), most of the women were also within the age group of 50-74 years – 77.4% (240). Among all patients men predominated (male to female ratio = 2.6: 1 (72.2%: 27.8%)). TG was made 719, SDG– 240, SPG – 155. The relationship between them was following: 4.6: 1.5: 1 (Table. 1).

Table 1.
Distribution of patients due to localization of tumor, sex and type of surgical operation

Localization of tumor	All operations, n (%) Men/ Women, n (%)	TG[1], n (%) Men/ Women, n (%)	SDG[2], n (%) Men/ Women, n (%)	SPG[3] n (%) Men/ Women, n (%)	Significance level, p
Proximal part of stomach[4]	521 (46,8) 411/110 (78,9/21,1)	367 (70,4) 286/81 (77,9/22,1)	-	154 (29,6) 125/29 (81,2/18,8)	p^{1-3} <0,0001
Body of stomach[5]	251 (22,5) 170/81 (67,7/32,3)	251 (22,5) 170/81 (67,7/32,3)	-	-	p^{4-5} <0,025
Distal part of stomach [6]	238 (21,4) 147/91 (61,8/38,2)	-	238 (21,4) 147/91 (61,8/38,2)	-	p^{4-6} <0,0001 p^{5-6} >0,1
Distal part of stomach with extension to body (subtotal involment)[7]	24 (2,6) 18/6 (75,0/25,0)	24 (2,6) 18/6 (75,0/25,0)	-	-	p^{4-7} <0,0001 p^{5-7} <0,001 p^{6-7} <0,001
Fundus of stomach[8]	11 (0,9) 11/0 (100,0/0)	8 (72,7) 8/0 (100,0/0)	-	3 (27,3) 3/0 (100,0/0)	p^{4-8} <0,0001 p^{5-8} <0,0001 p^{6-8} <0,0001 p^{7-8} <0,05
Total involment[9]	60 (5,4) 40/20 (66,7/33,3)	60 (5,4) 40/20 (66,7/33,3)	-	-	p^{4-9} <0,0001 p^{5-9} <0,001 p^{6-9} <0,001 p^{7-9} <0,01 p^{8-9} <0,01
Other localizations	9 (0,8) 7/2 (77,8/22,2) 5 (0,4) 4/1 (80,0/20,0)	9 (0,8) 7/2 (77,8/22,2) 5 (0,4) 4/1 (80,0/20,0)	-	-	-
Total operations Men/Women	1114 804/310 (72,2/27,8)	719 (64,5) 529/190 (73,6/26,4)	238 (21,4) 147/91 (61,8/38,2)	157 (14,1) 128/29 81,5/18,5)	p^{1-2} <0,001 P^{1-3} <0,001 P^{2-3} <0,01

Distribution of patients of both sexes after combined surgeries is presented in table 2 by age groups.

Table 2.
Distribution of patients of both sexes after completed combined surgery by sex and age groups

№	Age group (years)	Men		Women		All patients	
		n	% from sick men	n	% from sick women	n	% from all patients
1	20-24	-	-	1	0,3	1	0,1
2	25-29	2	0,25	-	-	2	0,2
3	30-34	3	0,4	5	1,6	8	0,7
4	35-39	13	1,6	9	2,9	22	2,0
5	40-44	35	4,4	18	5,8	53	4,7
6	45-49	45	5,6	29	9,4	74	6,6
7	50-54	104	12,9	37	11,9	141	12,6
8	55-59	144	17,9	39	12,6	183	16,4
9	60-64	165	20,5	62	20,0	227	20,4
10	65-69	173	21,5	70	22,6	243	21,8
11	70-74	88	10,9	32	10,3	120	10,8
12	75-79	28	3,5	6	1,9	34	3,1
13	80-84	4	0,5	2	0,65	6	0,5
	Total	804	100	310	100	1114	100

During the analysis of age structure of all patients it was established that the median (Me) was 61 year, the arithmetic mean (M) = 59.95 years, standard errors of means (m) = ±0.28, minimum (min) = 22 years, maximum (max) = 84 years. Among men: Me = 61.4 years, M = 60.37 years, m = ±0.32, min = 25 years, max = 83 years, and female patients: Me = 60.8 years, M = 58.87 years, m = ±0.59, min = 22 years, max = 84 years.

A clinical observation on life expectancy of 767 patients of both sexes was carried out after performed combined surgery of malignant tumors of the stomach. Analyzing the life expectancy of patients depending on the type of surgical operation the following features were detected. Among 540 patients of both sexes, who had a combined TG, M = 22.9 months, m = ±1.67 months, ($p < 0.0001$); Me = 9.3 months.

Also separately studied survival of 397 male patients who had combined TG: M = 23.25 months, m = ±2,05 months, ($p < 0.0001$); Me = 8.9 months. Also separately studied life expectancy of 143 female patients who had the combined TG: M was 22.28 months, m = ±2.75 months, ($p<0.0001$); Me = 11.5 months. (Fig. 1).

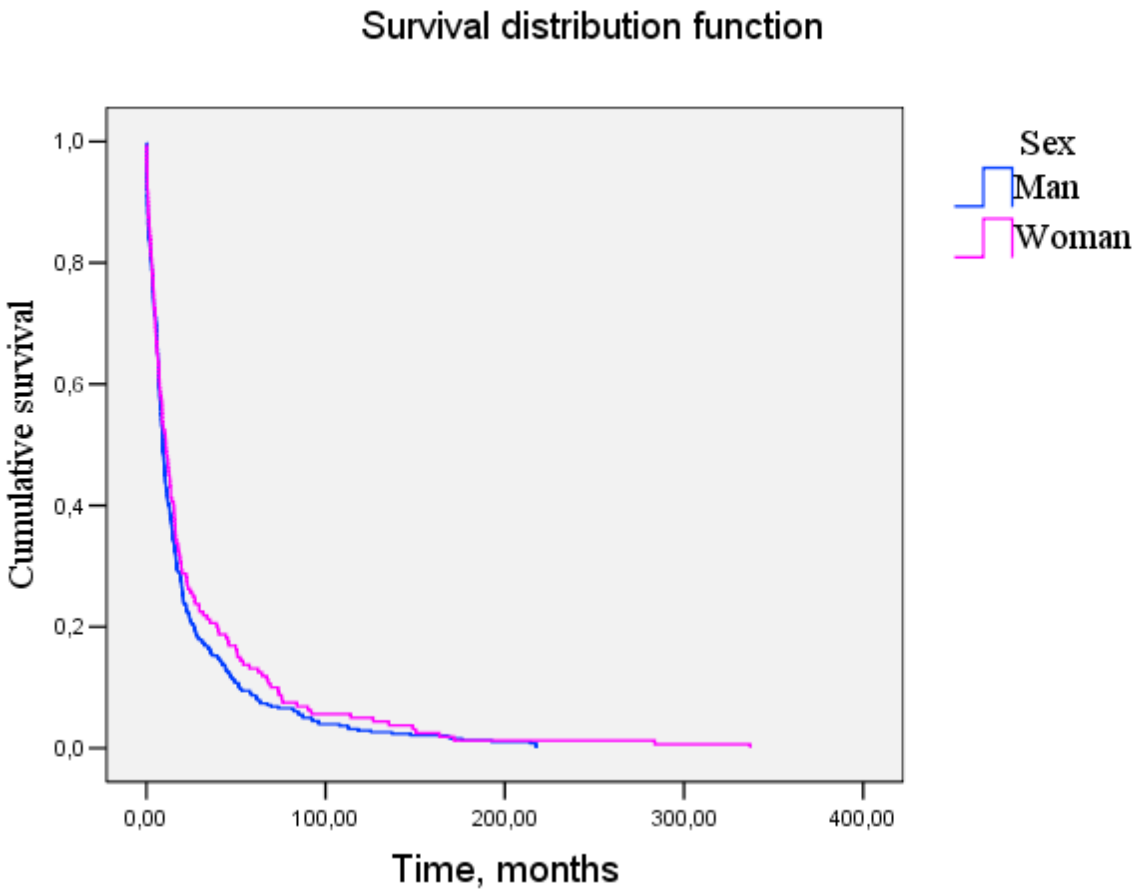

Fig. 1. Comparing survival distribution function for patients after combined total gastrectomy according to sex

There was studied the survival rate of 227 patients of both sexes who had combined SG (distal and proximal), while M was 45.96 months, m = ±4.42 months, (p <0.0001); Me – 16.37 months. Life expectancy of 162 male patients who had combined SG was studied separately, where M was 39.41 months, m = ±4.76 months, (p <0.0001); Me – 14.1 months. Life expectancy of 65 female patients with completed combined SG was also examined separately, where M was 62.25 months, m = ± 9.64 months, (p <0.0001); Me – 25.51 months. (Fig. 2)

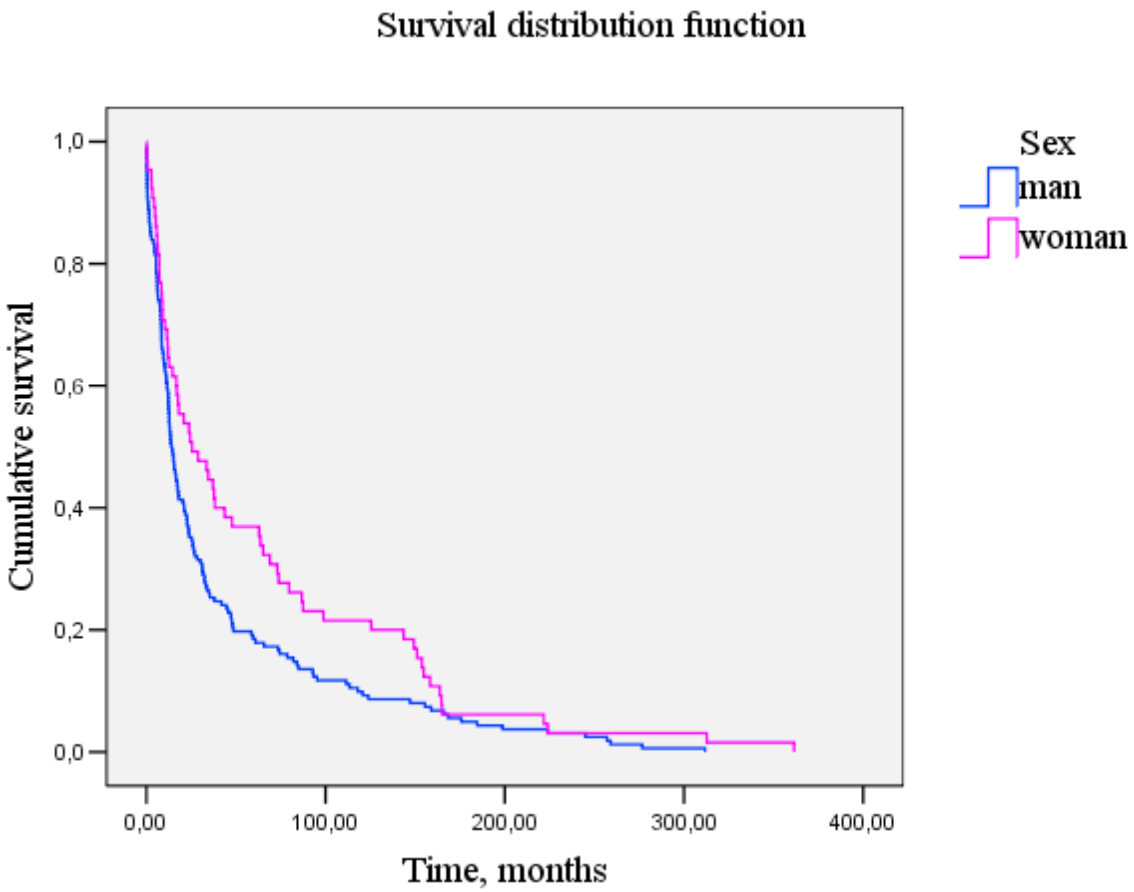

Fig. 2. Comparing survival distribution function for patients after combined subtotal gastrectomy according to sex

Comparison of the life expectancy of patients of both sexes who had combined TG and SG has revealed the significant difference between them – $p<0.01$ ($t = 4.89$). Similar difference was between the life expectancy of male patients who had combined TG and SG – $p<0.01$ ($t = 3.16$). The same difference in life expectancy was detected for female patients – $p<0.01$ ($t = 3.93$).

The difference between survival rates of patients who had combined SG and TG among men and women was statistically significant ($p <0.001$). This was especially evident in the interval of 25-250 months. (Fig. 3).

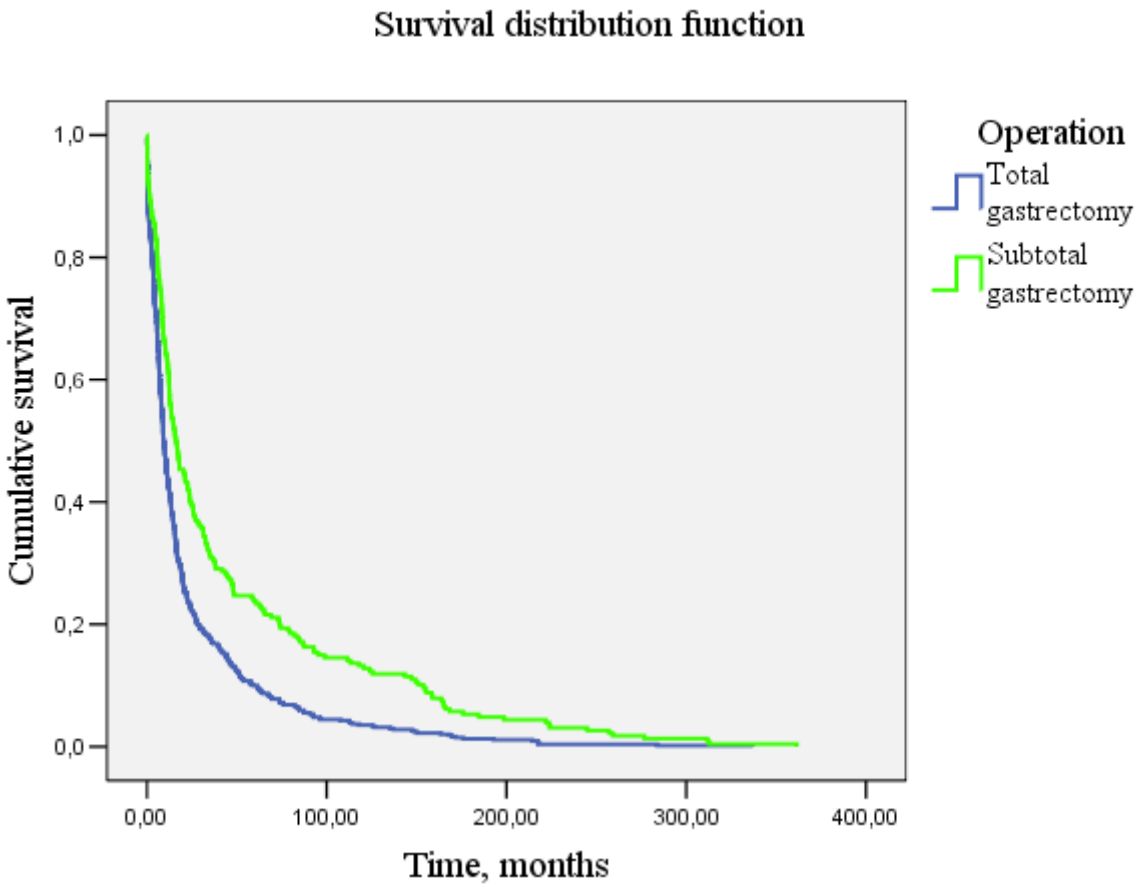

Fig. 3. Comparing survival distribution function for patients of both sex after combined subtotal gastrectomy and total gastrectomy

4. Discussion

Significant differences between the average life expectancy of men and women who had combined TG were not found ($p>0.1$). A significant difference between the average life expectancy of men and women who had combined SG ($p>0.05$) was established (Ahn et al 2011). While comparing the survival of patients of both sexes who had combined TG and SG, a significant difference between survival in both men and women ($p <0.001$) was found. This is especially evident in the interval of 25-250 months (Carboni et al 2005; Li et al 2004). 3 and 5-year survival after combined TG was respectively 16.7% and 10.1%, with no significant difference between the men and women ($p=0.861$). 3- and 5-year survival rate after combined

SG of the stomach was respectively 29.6% and 24.2%, for men – 25.5% and 21.1%, and for women – 39.2% and 31.4%. The difference between the 3 and 5-year survival of patients of both sexes who had combined SG was statistically significant ($\chi 2 = 4.692$, $p = 0.032$) (Ahn et al 2011; Dzhuraev et al 2008; Kitamura et al 2000).

Conclusions

Combined surgeries on locally disseminated stomach cancer mainly were performed on older patients, mostly men. This should be considered with the view of the current trend of operational interventions volume increase and expanding indications for their conduct. Our results show the feasibility of the implementation of this type of surgeries that extend the capabilities of radical surgical treatment of stomach cancer.

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