

ASSESSMENT OF THE SURGICAL TREATMENT RESULTS IN PATIENTS WITH COLORECTAL CANCER IN A DISTRICT HOSPITAL VERSUS TREATMENT RESULTS IN A HIGHLY SPECIALIZED CENTER

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In Poland there are about 15-16 thousand cases of colon cancer per year. The health care system allows the treatment of patients with colorectal cancer in highly specialized hospitals, oncology centers and district hospitals. The results of treatment within different reference level differ.

The aim of the study was to evaluate the results of surgical treatment of patients with colorectal cancer at a district hospitals compared with the results of highly specialized center.

Material and methods. A retrospective study. The material consisted of 171 consecutively operated patients diagnosed with colorectal cancer treated in the Department of Surgery, District Hospital in Wołomin. The control group consisted of 200 patients treated surgically at the Department of General and Colorectal Surgery, University Hospital in Łódź. In both centers, the patients were operated on by surgeons with experience in operations on the large bowel. The demographic data, information on the type of indication (elective vs emergent), and the severity of the disease by AJCC / TNM scale were collected. In the district hospital there were patients with more advanced disease ($p < 0.001$), older ($p = 0.0001$), and often operated under emergent indication ($p = 0.0001$). The telephone survey collected data on survival or the date of death of the patient and set the percentage of five-year survival.

Results. The proportion of five-year survival in the study group and control group was respectively 46% and 71% ($p < 0.0001$). The percentage of five-year survival among patients undergoing elective procedure in both centers were respectively for Wołomin and Łódź 58% and 73% ($p = 0.008$). The proportion of 5-year survival among “younger” patients (< 70) was respectively in Wołomin and Łódź 64% and 81% ($p = 0.004$) for “older” patients with (> 70) 50% and 60% ($p = 0.6747$)

Conclusions. Overall results of surgical treatment of patients with colorectal cancer in the district hospital are inferior to treatment results in a highly specialized center. The population treated in the district hospital is statistically significantly different in comparison to patients treated in highly specialized center. The following differences were captured: severity of the disease, age and type of indication (elective vs emergent). The differences has an influence on the outcomes. The five years survival for patients > 70 years undergoing elective procedure is not statistically different between the district hospital and highly specialized center.

Key words: colorectal cancer, the results of treatment of colon cancer

There are about 15-16 thousand of new cases of colorectal cancer per year and it has been an inclining tendency for many years in Poland (1, 2). At the same time, results of colorectal cancer treatment in Poland are one of the poorest in Europe (3, 4). Basic method of colorectal cancer treatment remains surgical procedure, which is radical in oncological terms and which is, at present, most often combined with pre-operative radiotherapy (rectal cancer) or a complementary (adjuvant) chemotherapy (colon cancer). It does not change the fact that only a complete excision of neoplastic tumor with a regional lymphatic drainage gives a chance for recovery from neoplastic disease. Healthcare system in Poland allows for surgical treatment of patients with colorectal cancer in both local centers such as district hospitals as well as in highly specialized hospitals which can offer a combination therapy. Many publications from the United States and Europe indicate that results of treatment in highly specialized hospitals are better (5). Relevant data related to Polish centers are scarce and describe results from particular regions and centers which often significantly differ from each other (6). The authors attempted to assess results of the surgical treatment of patients with colorectal cancer in a district center.

The main aim of this study was to compare results of surgical treatment of patients with colorectal cancer in a district center with results achieved in a highly specialized center as well as to identify factors which may affect differences in observed overall 5-year survival rates.

MATERIAL AND METHODS

It was a retrospective study. The study group included 171 patients with colorectal cancer who were successively operated at the Department of Surgery of District Hospital in Wołomin since January 2009 to December 2013. The control group included 200 patients which were surgically treated since January to September 2009 in the Clinic of General and Colorectal Surgery of the University Clinical Hospital in Łódź. In both groups, patients were qualified for adjuvant or neoadjuvant treatment (for both chemio- and radiotherapy) according to current standards. In both centers, patients were operated by surgeons who were

experienced in colorectal surgeries but number of colorectal cancer surgeries which were performed in a district center was significantly lower (about 40 surgeries/year) than in a highly specialized center (250 surgeries/year). Proportion of colorectal cancer surgeries per one surgeon was 20-25 cases per year in a highly specialized center and 16-19 cases in a district center respectively.

Based on source documentation, demographic data of the operated patients, information on type and mode of the performed surgery (elective or urgent/emergency – during ER), oncological radicality of the performed surgery, post-operative complications and disease stage in TNM scale according to AJCC (American Joint Committee on Cancer) were collected. Characteristic of patients from both groups is presented in tab. 1. Patients with more advanced disease ($p < 0.001$) were operated in the center in Wołomin. No statistically significant differences in sex ratio in both groups were reported ($p = 0.394$). Median age of the treated patients significantly differed in both groups and was 66.7 and 72.5 years for patients in Łódź and Wołomin respectively. Age difference between the study and control group was statistically significant ($p = 0.0001$). There is also a statistically significant difference between emergency and elective surgeries ($p = 0.0001$) in terms of a role which a particular hospital plays in healthcare structure. In the center in Wołomin emergency surgeries were more frequently performed.

In a telephone survey, data related to patient survival or date of death were collected from patients or their close relatives. Based on out-patient documentation, dates of the last contact with those patients from whom information was not collected in a telephone survey, were specified.

Statistical methods

Five-year survival rate was defined based on Kaplan-Meier curves and log-rank test. Calculations were performed for both (study and control) groups after consideration of different stages of disease and influence of such parameters as: age and type of surgery on patients survival. Multifactorial analysis according to Cox's model was used for assessment of influence of particular parameters on survival.

Table 1. Patient characteristics

	Study group (Wołomin) n=171	Control group (Łódź) n=200	p=
Gender:			
– men	87 (50,8%)	110 (55%)	0,3946
– women	84 (49,2%)	90 (45%)	
Age:			
– median	72,5	66,7	<0,0001
– range	34-90	32-87	
Type of surgery:			
– elective	95 (56%)	191 (95,5%)	<0,0001
– emergency	77 (44%)	9 (4,5%)	
Type of surgery:			
Right hemicolectomy	40 (24%)	40 (20%)	
Transverse colon resection	2 (1%)	9 (4,5%)	
Left hemicolectomy	19 (11%)	15 (7,5%)	
Sigmoid colon resection	19 (11%)	44 (22%)	
Anterior resection of the rectum	36 (21%)	74 (37%)	
Abdominoperineal resection of the rectum	4 (2,5%)	0 (0%)	
Colostomy	41 (24%)	9 (4,5%)	
Ileostomy	3 (1,5%)	0 (0%)	
By-pass	6 (3,5%)	9 (4,5%)	
Colectomy with ileostomy	1 (0,5%)	0 (0%)	
AJCC stage:			
Stage 0	0 (0%)	0 (0%)	0,0006
Stage I	7 (4%)	27 (13%)	
Stage II	41 (24%)	42 (21%)	
Stage III	61 (36%)	23 (19%)	
Stage IV	62 (36%)	93 (46%)	

RESULTS

Results of the basic analysis: It was possible to obtain survey information from 164 patients from the study group (Center in Wołomin – 96%). Data related to survival rate of remaining 4% patients were obtained based on documentation from the Clinic where the last out-patient visit was recorded. In the control group (center in Łódź), 166 (83%) surveys were collected and 34 pieces of information (17%) were gathered from documentation. Five-year survival rate in the study and control group was 46% and 71% ($p < 0.0001$) respectively (fig. 1). Main factor which affected treatment results expressed as a five-year survival rate was stage of disease. Diagrams 2 and 3 show likelihood of survival for patients with AJCC stage I and II (fig. 2) and III and IV (fig. 3). Five-year survival rate for patients with AJCC stage I and II in Wołomin and Łódź was 71% and 93% respectively and 34% and 55% for AJCC III and IV respectively. Treatment results in the center in Wołomin in both stage groups were poorer: AJCC I and II ($p = 0.0009$), AJCC III

and IV ($p = 0.0001$) and the difference was statistically significant.

Big difference in treatment results in both groups encourages to search for, other than disease stage, parameters which may affect the obtained results. Five-year survival rate among “younger” (< 70 years old) patients with low stage (AJCC I and II) was for Łódź and Wołomin 100% and 80% respectively ($p = 0.0038$),

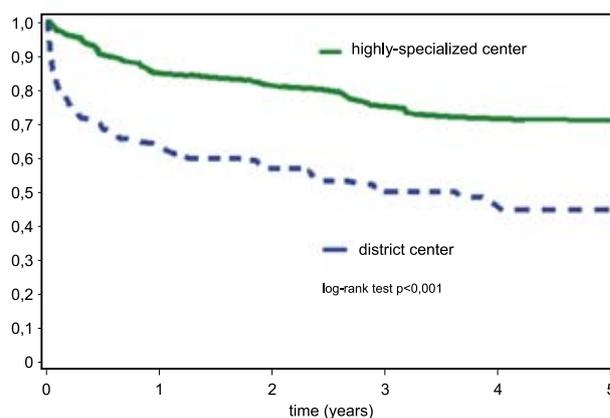


Fig. 1. Probability of 5-year survival

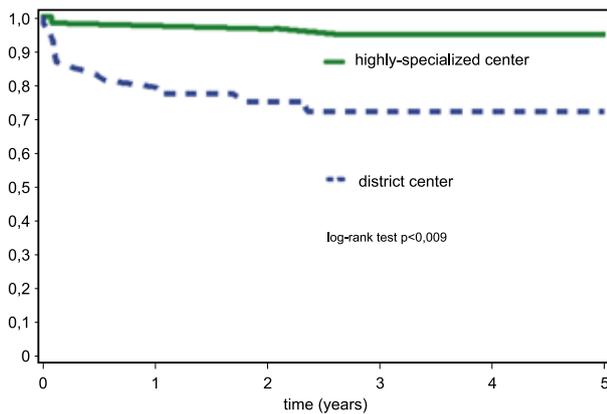


Fig. 2. Kaplan-Meier curves show likelihood of survival for patients with AJCC stage I and II

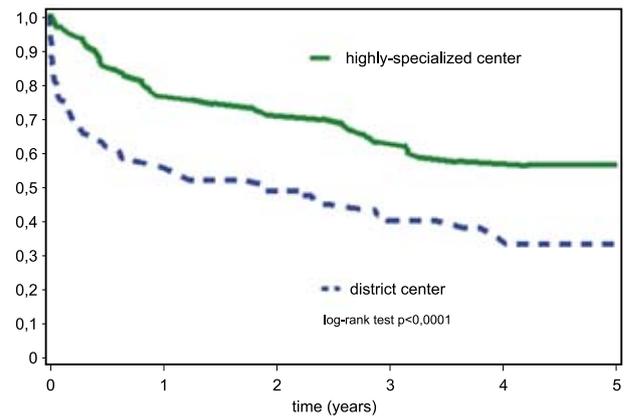


Fig. 3. Kaplan-Meier curves show likelihood of survival for patients with AJCC stage III and IV

but for “older” patients (>70 years old) 83% and 67% respectively ($p=0.1510$) (fig. 4). Five-year survival rate among patients with higher stage (AJCC III and IV) was in a group of “younger” patients (<70 years old) for Łódź and Wołomin 65% and 53% respectively ($p=0.0161$), whereas for “older” patients 44% and 20% ($p=0.047$). Difference in treatment results was statistically significant in those groups (fig. 5). Although elective and emergency surgeries were performed in both centers, the number of elective surgeries performed in both centers was: 56% vs 95% for Wołomin and Łódź respectively. Given the small number of emergency surgeries which were performed in hospitals of higher reference level, in order to unify the compared groups, only patients who underwent elective surgeries in both centers were submitted to the analysis. Five-year survival rate of patients who underwent elective surgeries in both centers was 58% and 73% for Wołomin and Łódź respectively and the results were statistically significant ($p=0.008$) (fig. 6).

Results of the analysis of patients who underwent elective surgeries after consideration of the influence of age on survival rate, were as follows. Five-year survival rate among ‘younger’ patients was for the compared groups from Wołomin and Łódź 64% and 81% ($p=0.004$) and for ‘older’ patients 50% and 60% ($p=0.6747$) (fig. 7). Difference was statistically significant only in a group of ‘younger’ patients.

DISCUSSION

The obtained results which characterize the study group (a district center) as a whole (46% of five-year survival rates) are comparable with current results obtained from the National Cancer Registry for the colon and rectum (47-48% respectively). Control group (highly-specialized center) results are significantly better than national mean values (7, 8). A similar discrepancy between the results from referential and city centers was observed in

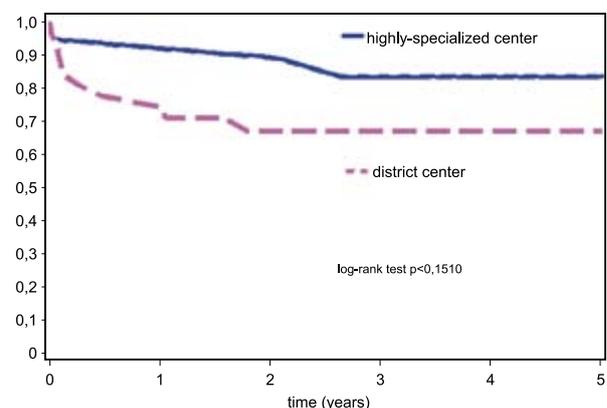
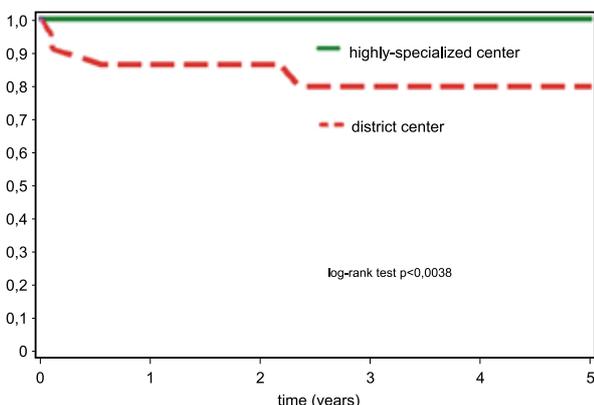


Fig. 4. Survival curves for patients with AJCC stage I and II and with division into age groups: $>$ and < 70 years old

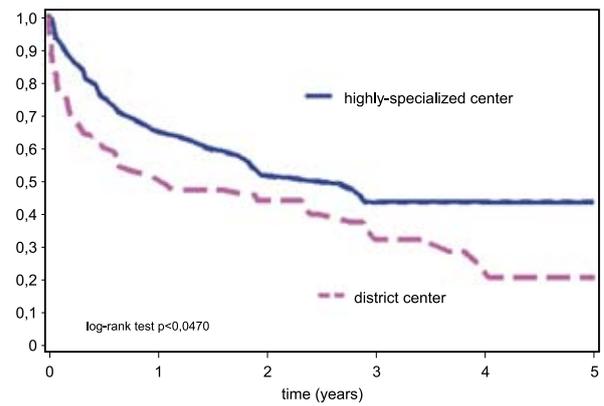
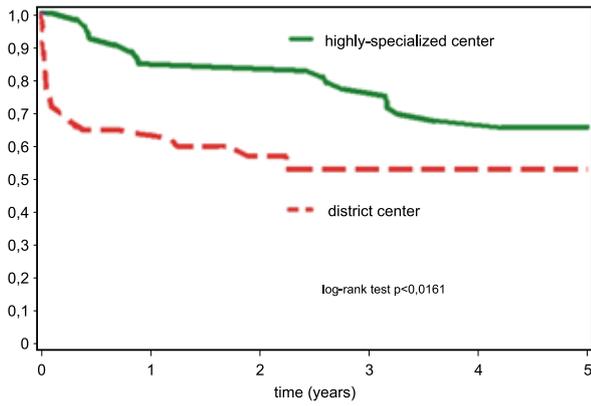


Fig. 5. Survival curves for patients with AJCC stage III and IV and with division into age groups > and < 70 years old

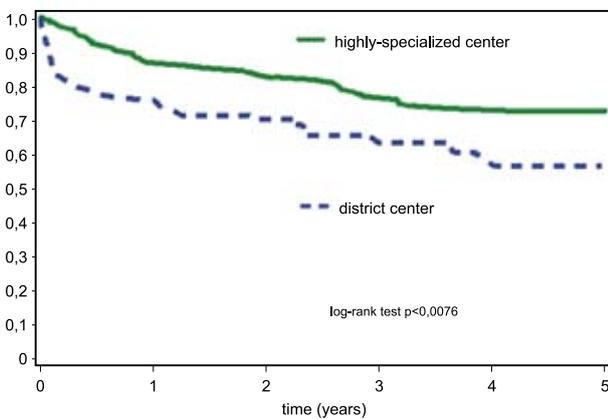


Fig. 6. Survival curves for patients who underwent elective surgeries

studies based on the example of Dolnośląskie voivodship.

Five-year survival rate in patients with colorectal cancer in Dolnośląskie Centre of Oncology was 53% and in other centers 36% (9). Both examples show that it is necessary

to assess results after consideration of significant differences between groups of patients who are treated in the centers of various referential level. They result mainly from different tasks of city/district hospitals (treatment of emergency cases and treatment of patients scheduled with consideration of option for referring patients with advanced diseases to higher-level centers) and referential centers – treatment of patients in each stage of disease (almost exclusively patients scheduled). Similar differences were observed in the presented study. Patients from the study and control group were different in terms of stage ($p < 0.001$), age ($p < 0.001$) and type of the surgery in the first place ($p < 0.001$). Patients who were treated in Wolomin were on average 6 years older. Risk of comorbidities significantly increases with age which definitely may affect survival. Almost half of the patients in the study group were patients who were operated due to emergency indications. Age of elderly patients who need emergency surgeries, increases the risk of perioperative

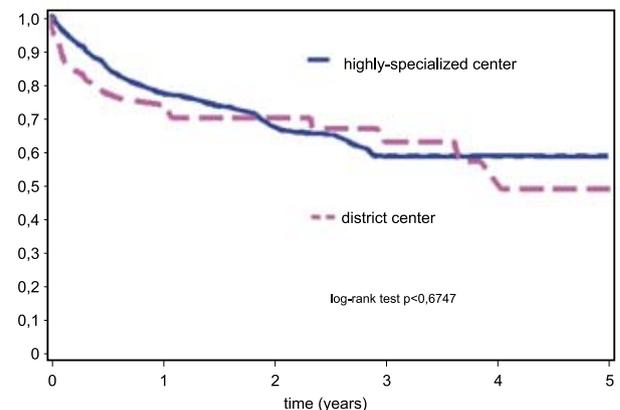
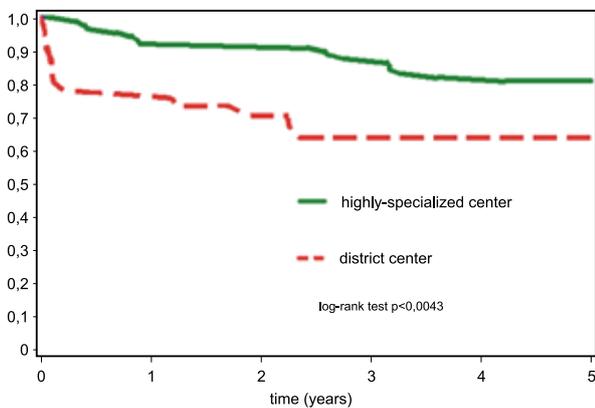


Fig. 7. Survival curves for patients who underwent elective surgeries with division into age groups > and < 70 years old

complications and contributes to poorer results of treatment at the same time. It was observed in the studies which were performed in the Center of Oncology in Warsaw (10).

When comparing results of the study group with national results in reference to various stages of disease (both for AJCC I and II – 71% and AJCC III and IV – 34%), they are within ranges which are defined for the same stages of disease which for AJCC stage I and II and III and IV are as follows: 70-90% and 25-80%. (11) In the described groups, proportion of patients with low stage of cancer (AJCC I and II), who underwent emergency procedures was 2.5% for the center in Łódź and 30% for the center in Wołomin which partially may explain higher perioperative mortality rate in patients in a district center and a great discrepancy between final results from the study and control group.

According to data published by Japanese researchers, perioperative mortality significantly increases among patients who are operated due to obstruction and five-year survival rates in case of tumor perforation associated with obstruction do not exceed 19% (12). Curves which refer to patients with higher stage of disease (AJCC III and IV) are similar. Higher proportion of emergency surgeries among elderly patients is also described in the study of German researchers which included 300 hospitals of all referential levels in Germany (64,740 patients) (13).

Significantly poorer results, when compared to the control group, are observed in a perioperative period and through the first half a year of observation which may be explained as above. In the control group, it was definitely more often decided to perform only a palliative surgery ($p < 0.001$), which was justified not only by a stage of disease but also by patients age and severity of emergency indications for surgery. As it was also shown in the German study, better results were achieved in a group of persons > 80 years old who underwent emergency procedures, better results were achieved after starting palliative treatment (13).

Human factor. Surgeon (its knowledge and experience) is an independent prognostic factor (14). Both centers are substantially different in terms of experience related to the number of surgeries which are performed per year. In the Clinic of General and Colorectal Surgery in Łódź, about 200 surgeries of colorectal can-

cer (about 250 surgeries per year) were performed in the discussed period, 10 operators perform on average 25 surgeries per year. At the Department of Surgery of District Hospital in Wołomin, 171 surgeries were performed which means that 35 surgeries are performed due to colorectal cancer per year. In majority of cases, surgeries of patients with colorectal cancer were performed by 2 surgeons which means on average 17 surgeries performed due to colorectal cancer per each surgeon. Higher amount of experience is certainly reflected in better treatment results. However, it is incredibly difficult to objectively evaluate and interpret this factor in a quantitative manner and thus to show a direct influence of this parameter on the results of patients treatment. It is even more difficult when a trial is performed on groups which differ from each other so much in many terms (in particular in terms of age and type of surgery). Also Belgian and Polish researchers emphasized difficulties in assessment of such a parameter as influence of experience and lack of clear relationship between number of surgeries and results achieved by a surgeon (15, 16, 17).

Abrupt declination of survival curves in the study group in the first year of the observation and their parallel course in the following years in reference to the control group indicate significantly higher mortality in of the patients who were treated in the district center in the first year after the surgery. While abrupt declination of survival curves in the first year for the whole study group can be explained by higher mortality of patients who underwent emergency surgeries, similar tendency in case of elective surgeries requires detailed analysis of deaths in that period. Among “younger” patients (< 70) who underwent elective surgeries, 8 deaths were observed in the first year of observation, 4 out of which took place as early as during postoperative hospitalization. In two cases, death was associated with surgical complications (1 postoperative obstruction, 1 duodenal fistula in a patient after the surgery of the sigmoid colon tumor which infiltrated the duodenum). In other 6 cases, death was a result of cardiovascular diseases (3 patients) and cancer cachexia (3 patients). All the patients from that group suffered from cancer stage IV and had many risk factors for perioperative complications: arterial hypertension ($n=5$), diabetes ($n=4$), ischemic heart disease /infarc-

tion (n=3), cerebral stroke (n=2), obesity (n=2) and pulmonary metastases (n=2), cancer cachexia (n=3), POCHP (n=1). In 6 out of 8 patients only palliative surgery was performed and those patients were admitted for elective surgery, after a consultation in a referential center from which, due to generalization of the cancer and rapidly developing symptoms, they were referred to a district center in order to appoint stoma. Resection was performed in other 2 patients.

Deaths in the first year since surgery in the described group of patients who were operated in a district center were associated with severe baseline condition of patients, high stage of cancer and numerous comorbidities. The applied palliative treatment resulted from recommendations of consultants and was associated with humanitarian factors.

Analysis of "older" patient group (>70) who underwent elective surgeries revealed 9 deaths in the first year. In two cases, deaths were associated with surgical complications (anastomotic dehiscence and sepsis), other deaths were consequences of cardiovascular diseases (6 patients) and a brain stroke (1 patient). Six patients from this group had a stage IV of cancer, 2 – III and one- stage II of cancer. All the patients had numerous risk factors: arterial hypertension (n=9), diabetes (n=6), cardiovascular insufficiency (n=7) and ischemic heart disease/infarction (n=2), renal insufficiency (n=4), obesity (n=1), cachexia (n=2), POCHP (n=1). All patients were qualified in a district center and a resection surgery was performed in 8 out of 9 patients in spite of numerous comorbidities. It may be concluded that qualification of patients with numerous comorbidities for resection surgery contributed to the increase of intra- and postoperative complications and to death of patients. Better results of treatment of elderly patients with numerous comorbidities, who were qualified only for palliative procedures, are also described in literature (12).

The presented results should be analyzed with caution since retrospective type of this study is associated with certain limits. Firstly, the survey did not include percentage of patients from both centers who were submitted to adjuvant treatment after the surgery. According to guidelines, all the patients who met criteria of qualification for adjuvant therapy were referred for that type of treatment, however in case of the district center, subsequent therapy performed out of hospital limited the possibility to control the commencement and completeness of such treatment, which definitely might have affected final results. Criterion of the number of excised lymph nodes in the samples or assessment of resection margins which indicate completeness of surgery were not considered in the study and they might have facilitated assessment of the impact of surgeons on the results. This parameter is however a result of experience and engagement of not only a surgeon but also of a pathologist who assesses the sample which might have affected the real image.

CONCLUSIONS

1. Overall results of treatment of patients with colon cancer in the district center are poorer than treatment results in the highly-specialized center.
2. Population of patients who are treated in a district center is different, and it is statistically significant, from patients who are treated in a highly-specialized center in terms of the stage of cancer, age and type of surgery which affected results of treatment.
3. Five-year survival rates among patients > 70 years old who undergo elective surgery do not statistically differ between district and highly-specialized centers.

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