

CASE REPORT

The highest incidence in the world of rectal cancer is in Czech Republic

Vavra P, Andel P, Rydlova M, Pelikan A, Vavrova M, Martinek L, Gunkova P, Gunka I

Department of Surgery, University Hospital of Ostrava, Ostrava Poruba, Czech Republic. Petr.Vavra@fnspo.cz

Abstract

Czech Republic is among the countries with the highest incidence of rectal cancer.

The aim of the prospective study was to monitor the surgical treatment of patients with the diagnosis of rectal cancer. Certain aspects were examined: mainly the safety distance of the lower resection line during the operation of rectal cancer, the types of operations carried out, the amount of lymphatic nodes spotted in mesorectum and the possibility of laparoscopic utilization.

In our study we focused on patients with rectal cancer who were operated within the three-year period (2000–2002) at the Department of Surgery at University Hospital of Ostrava. During this time there were 188 patients with rectal cancer treated.

In the trial we have proved that in the direction from aboral margin of tumour the possibility of submucosal spread decreases in accordance with the literature. The submucosal spread of tumour occurs in 11.8 % of cases. The spread of the tumour was not found at a distance of 5 cm below the bottom margin of tumour. In cases of microscopical positivity below the bottom margin of tumour there was a middle or low differentiated adenocarcinoma. The spread of well differentiated adenocarcinoma was not found. (Tab. 4, Fig. 5, Ref. 18.)

Key words: adenocarcinoma, rectal cancer, laparoscopy, surgical treatment, Czech Republic.

Czech Republic belongs among the countries with the highest incidence of rectal cancer (14). The aim of the prospective study was to monitor the surgical treatment of patients with rectal cancer. As it will be mentioned in the results of this paper, certain aspects were observed – mainly the safety distance of the lower resection line, the types of operations carried out, the amount of lymphatic nodes spotted in mesorectum and the possibility of laparoscopic utilization.

Clinical material and methods

In our study we focused on patients with rectal cancer who were operated within the three-year period (2000–2002) at the Department of Surgery at University Hospital of Ostrava.

All patients with histologically verified rectal cancer localised 0–17 cm from the linea dentata were included in this group. During the three years we treated in total 188 patients with rectal cancer in our ward. We grouped all patients who underwent the classical, laparoscopic operation or TEM (transanal endoscopic microsurgery).

During the study we closely cooperated with the Pathological Anatomic Institute of the University Hospital of Ostrava where the dissected parts of rectum, were sent and were carefully investigated according to an existing specified protocol (1, 10, 15, 18). Each dissected part, except the general macro and micro description, was investigated from the position of microscopically spread of the tumour at macroscopically aboral edge of tumour in standard distances of 2 mm, 5 mm, 1 cm, 2 cm and 5 cm. These results were statistically assessed and compared with authors' results who in the past dealt with the same disease.

We examined, in particular the statistical assessment of average age, representation of the patients according to the sex,

Department of Surgery, University Hospital of Ostrava, Ostrava Poruba, Czech Republic, Institute of Pathology, Medical-Social Faculty of University of Ostrava, Czech Republic, and Department of Radiology, University Hospital of Ostrava, Ostrava Poruba, Czech Republic

Address for correspondence: P. Vavra, MD, PhD, Dept of Surgery, University Hospital of Ostrava, 17. listopadu 1790, CZ-708 52 Ostrava Poruba, Czech Republic.

Phone: +420.5.97375157, Fax: +420.5.97375054

Tab. 1. The results from the linear regression program.

	Coefficient	t-statistic	Importance	Upper 95 %	Lower 95 %
A	13,7426	5,6364	0,0110	5,9832	21,5020
B	-3,4395	-3,6049	0,0366	-6,4759	-0,4031

Correlation coefficient = 0,9014, Square R = 0,8124, F (1,3) = 12,9952, Importance F = 0,0366

Tab. 2. Results of the measurement of the distal intramural spread of the tumours from aboral edge of tumour (Vavra, 2003).

The distance under the edge of the tumour	Number of the patients	Findings			
		positive		negative	
		n	%	n	%
2 mm	68	60	88.20	8	11.80
5 mm	67	61	91.00	6	9.00
1 cm	77	75	97.40	2	2.60
2 cm	69	65	94.20	4	5.80
5 cm	47	47	100	0	0

localization of tumour, distance of tumour from the linea dentata (16), types of operation etc.

Another subject of interest was the investigation of lymphatic nodes in the mesorectum.

The lymphatic nodes were investigated in three areas. There were the lymphatic nodes localized in the mesorectum under its own tumour, then in the same level as tumour itself and finally over the tumour. After careful examination of the sample from the mesorectum the pathologist diagnosed the exact number of the affected lymphatic nodes in the three mentioned areas and a number of positive lymphatic nodes also in accordance to its localization.

Regarding the fact that we had been using laparoscopy for the operation of tumours of the large intestine and rectum as the one of the first clinics in the Czech Republic, we made a comparison between the classical technique of operation and laparoscopy in the number of affected lymphatic nodes in the mesorectum.

Results

There were 188 patients with rectal cancer included in the group who were treated at the Department of Surgery at University Hospital of Ostrava from the year 2000 to 2002. From the all the patients, were 121 male (64.4 %) and 67 female. According to literature we noticed almost two third of the men with a rectal carcinoma and only approximately one third of women having the same illness.

The age of the women and men was almost the same. The average age of patients in the group was 65 (24–97) with no practical difference between the men's age which came to 64.9 (27–97) and the women's age which came to 65.2 (24–83).

During the examination of the dissected part removed operationally from patients we measured the first distance of the aboral edge of a tumour from the linea dentata. The distance was

on average 6.9 cm (0–17) but women's was bigger so it added up to 7.9 cm (0–17).

We mainly concentrated on the distal intramural spread (DIS) of the tumour over the microscopic aboral edge.

We recorded DIS in 11.8 % of cases. The results of each measurements of distal intramural spread of the tumour depending on the distance from macroscopical edge were as follows:

At a distance of 2 mm from the aboral edge of the tumour we noticed DIS in 11.8 % of cases, at 5 mm in 9 % of cases, at 1 cm in 2.6 % of cases, at 2 cm in 5.8 % and at 5 cm from macroscopical edge we recorded DIS in 0 % of cases.

Linear regression

There are given X (distance in mm) and Y (percentage of the positive findings).

The model $Y = A + B * \ln(X)$ was used for the explanation of the influence of X on Y.

The results were as follows from the linear regression program (Tab. 1).

The level of the importance serves for testing zero coefficient (they are less than 0.05, therefore zero ratio is rejected on the 0.05 level). We proved with the statistic test the connection of percentage share of the positive findings in accordance with a distance from the tumour in millimetres (Tab. 2).

Overall it can be observed that with a greater the distance from edge of the tumour, there was a lower probability of microscopic detection of the intramural spread and we did not see any distal intramural spread at a distance of 5 cm from tumour.

Also we did not note (even at a distance of 2 mm below aboral edge of tumour) distal spread of well differentiated adenocarcinoma. Positive result of tumour spread was only found in the low and medium differentiated adenocarcinomas.

In coloscopic examinations there was interesting data regarding the precise measurement of the distance of the tumour from

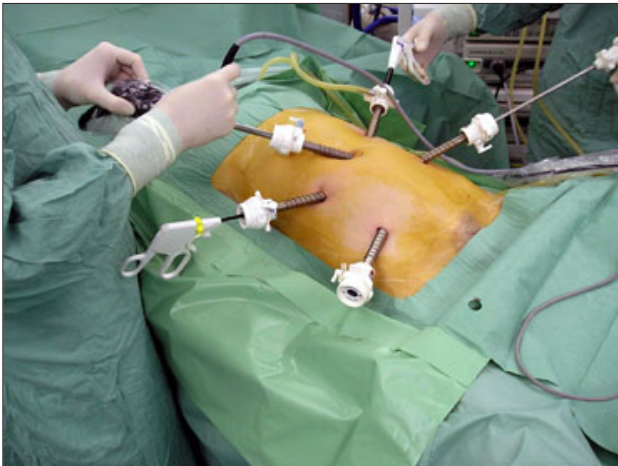


Fig. 1. Laparoscopic approach to operation for rectal cancer.



Fig. 2. The 7th day after laparoscopic surgery for rectal cancer.

the linea dentata. The average distance of the tumour from the linea dentata was measured at 9.8 cm. In reality (tolerance ± 1 cm) the colonoscopic examination was correct in 46.6 % of the patients and incorrect in 53.3 % of patients.

In our group the average distance of the lower resection line from aboral edge of the tumour was 3.7 cm (0–8).

Another investigated parameter was the grading of the tumour. We found in our study altogether 61 patients with a grading G 1 (32.4 %), from this amount 2 with mucous production (3.3 %), 74 patients with a grading G 2 (39.4 %), from this amount 6 with mucous production (8.1 %) and 31 patients with a grading G 3 (16.5 %), from this amount 5 with mucous production (16.1 %). Grading was not determined in 22 of cases (11.7 %).

We carried out in all, 194 operations, of this there were 83 (42.8 %) anterior resections of the rectum, 51 (26.3 %) abdominoperineal amputations, 29 (14.9 %) colostomies, 5 (2.6 %) Hartmann's operations, 6 (3.1 %) transanal excisions according to Parks and 9 (4.6 %) TEM (transanal endoscopic microsurgery). In one patient there we performed a total colectomy with ileal J-pouch (0.5 %), in another one proctocolectomia laparoscopica, 1 (0.5 %) ileostomia terminalis and in another patient tentamen-resectio recti, 1 (0.5 %) haemostasis haemorrhagiae praesacralis. In eight (4.1 %) of patients, a self-expandible stent was installed.

For all of the 171 operations where we can take into the consideration conventional or laparoscopic method of operation (resection, abdominoperineal amputation, colostomy, Hartmann's operation), there were 129 patients operated with the classical method (58 rectal resections, 45 abdominoperineal amputations, 19 colostomies, 1 total colectomy, 3 Hartmann's operations, 1 haemostasis haemorrhagiae praesacralis) and 42 patients (24.6 %) with the laparoscopic method (25 anterior resections of rectum, 6 abdominoperineal amputations, 10 colostomies, 1 proctocolectomy).

We recorded 19 (9.8 %) acute operations and there were 175 (90.2 %) planned.

In resection the anastomosis had to be reconstructed (84 patients). 19 of these cases (22.6 %) were sutured by hand. The stapler technique was used in 65 of cases (77.4 %).



Fig. 3. Prepared extra colic fat tissue on paraffin board.

During the investigation, we discovered lymphatic nodes in 128 patients. In total there were 1383 lymphatic nodes which is 10.8 lymphatic nodes per patient. In total, the number of nodes that were found was 271 nodes or (19.5 %) metastasis impact of tumour process, which is 2.1 affected lymphatic nodes per a patient.

We found that in 65 patients, where nodes (total amount of 719) were examined separately according to the localization, that 50 lymphatic nodes (6.9 %) were localized in the mesorectum under the tumour itself (0.8 LN per patient), 301 (41.9 %) nodes were localized in mesorectum in the tumour level (4.6 LN per patient) and 368 (51.2 %) in the mesorectum above tumour itself (5.6 LN per patient).

As far as metastasis is considered, lymphatic nodes under the tumour were positive in 14 % of cases, in the same level as the tumour in 18.9 % and above the tumour in 16.5 % of cases.

Examination of lymphatic nodes – contingency tables.

The following contingency table was used to test of hypothesis that the probability of positiveness of the findings in LN does not depend on location to TU (Tab. 3).

Tab. 3. Test of hypothesis that the probability of positiveness of the findings in LN does not depend on location to TU.

Frequency	Positive	Negative	Total
Under TU	7	43	50
In level of TU	57	244	301
Above TU	61	307	368
In total	125	594	719

The value of the statistic Chi-Square is 1.0713. It corresponds to probability $p=0.5853$. As $p>0.05$, it is not possible to rule out the mentioned hypothesis on level 0.05. As $p>0.05$, it is not possible to rule out the mentioned hypothesis on level 0.05.

From a statistical point of view it is clear that it is not possible to rule out the initial hypothesis and so that positivity of the findings of lymphatic nodes does not depend on their localization to the tumour.

Thereafter we compared the number of the lymphatic nodes affected in the mesorectum in connection with the usage of conventional or laparoscopic operation. We found that there was no difference between laparoscopic and conventional surgery in oncological radical operation. We recorded in our study, conventional operation of 111 patients in total 1196 lymphatic nodes, therefore it is 10.7 LN per a patient, of this 19.7 % were positive cases therefore 2.1 positive LN per a patient. We found with the examination of the lymphatic nodes after laparoscopic operation comparable results: number of patients 17, total LN was 187, therefore 11.0 lymphatic nodes per a patient, positivity 18.7 % and 2.0 affected lymphatic nodes per patient.

Also this comparison between the conventional and laparoscopic methods of operation regarding the finding of lymphatic nodes was assessed by a statistician.

The following contingency table was used for testing the hypothesis that the probability of finding LN and positivity does not depend on type of operation chosen (Tab. 4).

From statistical estimation it is clear that it is not possible to rule out the initial hypothesis and so that the positivity of the findings of lymphatic nodes does not depend on the type of chosen operation (laparoscopic or conventional).

Discussion

The data of our study corresponds to earlier published data, which is to say that the longer the distance of the imaginary resection line from the lower edge of the tumour the lower the probability of distal intramural spread of the tumour. We did not record any sign of malignant spread at a distance of 5 cm from the aboral edge of the tumour.

The results of our research of the distal intramural spread of tumour past its aboral macroscopical edge are fully comparable to earlier published data. Also as far as the total number of patients involved in the study is concerned, this amount is adequate for comparing the results to the literature.

We found DIS altogether in 11.8 % of patients in our study. The same result from authors who were dedicated to DIS tumours

Tab. 4. Test of hypothesis that the probability of positiveness of the findings in LN does not depend on type of operation chosen.

Frequency	Positive	Negative	Total
Conventional operation	236	960	1196
Laparoscopic operation	35	152	187
Total	271	1112	1383

The Value of the statistic Chi-square is 0.1059. It corresponds to probability $p=0.7448$. As $p>0.05$, it is not possible to rule out the mentioned hypothesis at level of 0.05.

too was reached by Shirouzu (12) in 1995. He recorded DIS in 10 % of his patients and his largest study contains 610 patients (Shirouzu, 1995).

Both Penfold in 1974 and Grinnell in 1954 (4) also recorded comparable results to our study. The distal intramural spread of tumours was in 8.8 % of cases (Penfold, 1974) and in 12 % of cases (Grinnell, 1954).

From this history it is interesting to mention Dunphy's work (3) from 1951 who recorded DIS tumour distances of more than 5 cm from the macroscopical edge. He recommended the edge of the healthy tissue to be 10 cm in resection (Dunphy, 1951).

Concerning authors whose research results lie at the extremes, if we compare their results in the sense of plus or minus, very beneficial work can be found from Leo in 2000 (8). He presents in his results of DIS in 32.6 % of cases (Leo, 2000). The most controversial result from the whole range of authors are presented by Madsen (9), who recorded DIS of tumours in 58 % of cases in his work from 1986 (Madsen, 1986).

On the other end of the spectrum we can see authors who have found DIS in few cases. Kirwan (5) in 1988 found DIS only in 5 % of cases (Kirwan, 1988) and Quer (11) in his work found DIS more than 1.5 cm from tumours in only 1 from 89 patients treated on curative anterior resection (Quer, 1953).

Along with the literature (Köckerling, 1993; Dostalík, 2002) we can see the main problem of the laparoscopic method is the adequate extent of lymphatic node dissection, furthermore in construction of safe anastomosis and in removing the dissection from the abdominal cavity (2, 7, 17).

We must also agree with Kim's (6) opinion saying that the remaining problem during the laparoscopic operation is the localization of the tumour. Coloscopic examinations have been frequently showed as not precise (Kim, 1997). We consider an adequate a coloscopic examination during the localization of tumour in the rectum or close to the Bauhins chamber. In other cases we advise pre-operational colonoscopy with colouring the place of the tumour or irrigographic examination.

Comparing conventional and laparoscopic rectal cancer surgery regarding lymphatic nodes, we found that there is no difference between the laparoscopic and conventional method of operation in oncological tumour grade. We recorded in our study in mesorectum medical findings of 10.7 of lymphatic nodes per a patient during the conventional method of operation. From this amount there were 10.7 % positive cases. We recorded com-



Fig. 4. Specimen of rectum with tumour.

parable results in the examination of lymphatic nodes after laparoscopic method of operation. There were 11.0 medical findings of lymphatic nodes per patient and the positivity of nodes was 18.7 %.

These results of conventional and laparoscopic operation are fully comparable, which was also confirmed by statistic tests.

In our study we demonstrate a brief resume of knowledge gained from literature which has given us more experience with the diagnosis and treatment of rectal cancer patients.

Concerning our own study results, we can divide the conclusion into the following points:

1) Along with the literature we have confirmed that distal intramural spread in direction from aboral edge of the tumour gradually falls. We recorded DIS in 11.8 % of cases. At a distance of 2 mm from the aboral edge of the tumour we noticed DIS in 11.8 % of cases, at 5 mm in 9 % of cases, at 1 cm in 2.6 % of cases, at 2 cm in 5.8 % and at 5 cm from macroscopical edge we recorded DIS in 0 % of cases. We have no evidence of the tumour spread at a distance of 5 cm from aboral edge of the tumour.

2) In our study we have no evidence of the spread of well-differentiated adenocarcinoma, not even at a distance of 2 mm from aboral edge of the tumour. All the positive findings of dis-



Fig. 5. Miniinvasive resection of generalised rectal carcinoma using T.E.M. method.

tal intramural spread were found in the medium and lower differentiated adenocarcinomas.

3) We have pursued observation of lymphatic nodes in mesorectum within the study. In total there were 1383 lymphatic nodes investigated in this study. From this figure we found in 271 nodes a metastatical tumour process which is 19.5 %. In each patient there were on average 10.8 lymphatic nodes.

4) We have found that in 65 patients of which were lymphatic nodes examined separately (total 719 LN) that 6.9 % of lymphatic nodes were localized in the mesorectum under the tumour itself, 41.9 % of lymphatic nodes were localized in the tumour level and 51.2 % in mesorectum over the tumour itself. As far as metastatic is concerned, lymphatic nodes under the tumour were positive in 14 % of cases, in the tumour level in 18.9 % and above the tumour in 16.5 % of cases. These differences are not statistically significant after statistical assessment.

5) We also indicated that the initial results with the comparison of laparoscopic and conventional methods during rectal cancer operation. It is possible to observe that objections from some of surgeons to laparoscopic operation as regards tumour grade are not substantiated and that results of conventional and laparoscopic method as regards removing the lymphatic nodes in mesorectum are comparable.

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