LOCAL ANTIBIOTIC THERAPY IN RECTAL CANCER SURGERY

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Infectious complications and their consequences are still key issues in rectal cancer surgery. Currently, intravenous antibiotic administration is a recognized method for lowering the rate of these complications.

The aim of the study was to assess the efficacy of complementary application of a gentamicin-imregnated sponge in the perineal wound or in the vicinity of intestinal anastomosis after abdominoperineal resection or low anterior resection.

Material and methods. 112 patients with primary rectal cancer were enrolled in this study. 42 patients were treated with a gentamicin sponge and drainage (group A) and 70 individuals were treated with drainage alone (group B). In the aforementioned groups a routine short-term regimen of antibiotic prophylaxis was used. We applied gentamicin-impregnated sponges in 27 patients in whom anterior resection was performed and in 15 patients from the abdominoperineal resection group (64% and 36%, respectively). In the control group, 44 anterior resections and 26 abdominoperineal resections were carried out (63% and 37%, respectively).

Results. We did not observe statistically significant differences in the incidence of suppurative complications (intraabdominal abscess, perineal wound infection): 4 cases (9.52%) in group A and 9 (12.58%) in group B and anastomotic leakage with clinical manifestation after low anterior resection: 1 case (3.7%) in group A and 2 (4.5%) in group B. Postoperative fever of unknown origin was noted more often in group A: 29 patients (32.8%) versus 10 patients (23.8%) in group A and this difference was statistically significant (p<0.05). Hospitalization after surgery was also significantly longer in group B (9-37 days, median 11 days) as compared with group A (8-26 days, median 13 days) (p<0.05).

Conclusions. Local antibiotic therapy in rectal cancer surgery lowered the incidence of postoperative fever of unknown origin and permitted shorter hospitalization after surgery. Local gentamicin application in rectal cancer surgery did not change significantly the rate of infectious complications.

Key words: rectal cancer, infectious complications, local antibiotic use

The incidence of colorectal cancer is high. In countries of the Western world and in urban populations carcinoma of the large intestine is the second leading cause of death after lung cancer (1). About 50% of all colorectal cancers are located in the rectum. In Europe and in the USA, five-year survival rates amount to 45-59% (2). Postoperative mortality of colorectal malignancy has diminished with time from 20% in the first part of the 20th century to 3% currently (3). Novel surgical techniques, modern anesthesia, better postoperative care and last but not least, effective antibiotics are contributory factors. However, infectious complications are still the Gordian knot which surgeons have to untie in daily clinical practice. The principal emphasis should be laid upon anastomotic leak, intra-abdominal abscess formation or perineal wound suppuration and their far-reaching consequences.

The aim of the study was to assess the efficacy of local antibiotic application in the form
of a gentamicin-impregnated sponge (apart from routine intravenous antibiotic prophylaxis) in the treatment of postoperative infectious complications in patients with colorectal cancer.

MATERIAL AND METHODS

This prospective study included 112 patients with rectal cancer admitted to the Department of Surgical Oncology between 1998 and 2004. We analyzed solely patients in whom radical surgery was performed such as anterior resection (AR) or abdominoperineal resection (APR). Individuals treated palliatively (colostomy) were excluded from the study. The presented data was obtained after analysis of the patients’ medical history, the temperature charts, the operating room report, and the hospitalization and follow-up records. Histopathological evaluation was carried out in the Department of Cancer Pathology, Medical University in Łódź. Data was collected using a special form. 53 females and 59 males were enrolled with the ages between 36-86 years (mean 66 years of age). The patients were treated either with local gentamicin and drainage (group A) or with drainage alone (group B). Group A consisted of 42 patients and group B included 70 patients. In both groups short-term routine antibiotic prophylaxis was instituted such as cefuroxime 0.75-1.5 grams dependent on the body mass three times daily and metronidazole 0.5 gram three times daily.

The patients’ age distribution is presented in tab. 1.

71 anterior resections (63%) and 41 abdominoperineal resections (37%) were performed. Preoperative radiation therapy with or without chemotherapy was delivered in 27 patients (24%); 11 (26%) in group A and 16 (23%) in group B, respectively. In 42 patients a gentamicin-impregnated sponge was inserted in the vicinity of the anastomosis (anterior resection) or in the perineal wound (abdominoperineal resection). These groups were examined in relation to age, tumor size (in centimeters), TNM staging, tumor location in the rectum (distance from the anal verge), neoadjuvant therapy and duration of antibiotic administration. In the study basic statistical parameters were calculated such as mean, median, minimum and maximum for the selected data. To determine homogeneity of the studied groups, we used the chi-square test or chi-square test with Yates’ correction.

RESULTS

Gentamicin-impregnated sponge application regarding the type of operation is presented in tab. 2.

We did not observe any statistically significant differences regarding the type of surgery in groups A and in group B (p>0.05). Comparison of the examined groups in relation to age, tumor size and location (distance from the anal verge), staging, intravenously administered antibiotic prophylaxis and neoadjuvant therapy is presented in tab. 3.

Table 1

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Group A</th>
<th>Group B</th>
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<tbody>
<tr>
<td>30-39</td>
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<td>1</td>
</tr>
<tr>
<td>40-49</td>
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In group A one case of anastomotic leak was noted which accounted for 3.7% of patients in whom anterior resection was performed; in group B two patients a leak was diagnosed (4.5% of patients in whom anterior resection was carried out).

Perineal wound infection or intra-abdominal abscess were observed in four patients from group A (9.52%) and in nine patients from group B (12.85%). Differences regarding the aforementioned complications were not statistically significant (p>0.05).

In group A, ten patients were febrile which accounted for 23.8%. In group B postoperative fever was noted in 23 subjects (32.8%). This difference was statistically significant (p<0.05).

Comparing the duration of hospital stay after surgery, we have concluded that in group A it ranged between 8 and 26 days (median 11 days) and in group B- between 9 and 37 days (median 13 days) which was statistically significant (p<0.05).

In the current paper not many cases of perineal wound infection were noted; four in group A and nine in group B, which were not statistically significant. It appears that local application of a gentamicin-impregnated sponge does not decrease the percentage of infectious complications and this correlation is not statistically significant. However, it should be emphasized that in our study a gentamicin sponge was also inserted in low anterior resections where observations regarding infectious complications of pelvic wound were more demanding as compared with the studies conducted by Gruessner and Rosen confined to patients after abdominoperineal resections (9, 10).

**DISCUSSION**

Infectious complications still pose a challenge in colorectal surgery. For many years several studies have been conducted to optimize antimicrobial regimens. Antibiotics given orally, which were not absorbed from the digestive system, did not fully satisfy these needs. It appeared that these medications caused fast proliferation of antibiotic-resistant strains and did not have an influence on infection prophylaxis in the operated tissue (4, 5). Similarly, attempts to perform whole gut irrigation were unsuccessful (6, 7, 8). It is known that the bowel sterility is simply impossible and potentially hazardous. Currently, there is no question that perioperative intravenous administration of antibiotics is beneficial. Obviously, efficacious antimicrobial agents should meet particular requirements that include a long half-time and a high inhibitory concentration not only in blood but also in tissues.

In the current article we attempted to assess the efficacy of local use of antibiotics in rectal cancer surgery. Such approach seemed to be substantiated because therapeutic concentrations of antibiotics given intravenously in the weakly vascularized site of rectal removal were not acceptably high, thus insufficient to inhibit infection in such unfavorable conditions. These theoretical factors were validated in the study from 2001 in which local application of an absorbable gentamicin sponge significantly diminished the number of bacteria, such as Enterobacteriaceae, Staphylococcus and Pseudomonas in bacteriological culture from the perineal wound (9).

## Table 3

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Group A</th>
<th>Group B</th>
<th>(p)</th>
</tr>
</thead>
<tbody>
<tr>
<td>65.4</td>
<td>64.1</td>
<td>ns</td>
<td></td>
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| Tumor size (in centimeters) | 4.32 | 4.85 | ns |

| Tumor location (distance from the anal verge in centimeters) | 8.7 | 7.8 | ns |

### Staging

<table>
<thead>
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<th></th>
<th>Group A</th>
<th>Group B</th>
<th>(p)</th>
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<td>I</td>
<td>10</td>
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<td></td>
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<tr>
<td>II</td>
<td>16</td>
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<td>24</td>
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</tr>
<tr>
<td>IV</td>
<td>1</td>
<td>5</td>
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| Duration of antibiotic administration (intravenously) in days | 6.61 | 6.82 | ns |

| Preoperative radio- or radiochemotherapy | 11 (26%) | 16 (23%) | ns |

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Subsequently, the presence of anastomotic leakage and postoperative fever after low anterior resection were carefully evaluated.

In the analyzed material anastomotic leakage was observed in one patient in group A (3.7% of anterior resections) and in two patients in group B (4.5% of anterior resections), which was not statistically significant. These values are situated within the range between 3% and 19% reported by the ample literature concerning this issue (11-14). Multicenter studies conducted by Fielding in 1980 revealed that only 10% of leaks were clinically manifested and required vigorous management (15). Such conclusions were also drawn in the current study. The aforementioned observations were also validated in the study performed at the University of Oslo in 2005. Conventional rectal radiography and computed tomography performed 6-10 days postoperatively revealed twice as many leaks as compared with clinical assessment alone (16).

Thus, a noteworthy number of cases may be silent or with scarce symptoms. The experienced colorectal surgeon should always consider this complication when the patient’s convalescence is impaired or fever of unknown origin occurs (17).

To sum up, fever after surgery was the main focus of attention. As it was reported, in group A fever was observed in ten patients (23.8%), and in group B in 23 subjects (32.8%). This fact was statistically significant. It should be added that these data concern only cases of fever of unknown origin and do not include patients having fever not induced by surgical site infections but for example due to pneumonia or urinary tract infection.

Subsequently, we analyzed the length of hospitalization after surgical procedures. The mean duration of hospital stay was 12.07 days in group A and 15.65 days in group B, respectively. This difference was statistically significant. The clinical efficacy of local application of antibiotics after rectal cancer surgery is expressed as the lower percentage of patients with postoperative fever and shorter hospitalization which can have an essential economic aspect.

CONCLUSIONS

1. Local application of antibiotics in rectal cancer surgery diminished the incidence of postoperative fever of unknown origin and permitted us to shorten significantly the duration of hospitalization following surgery.

2. Local use of antibiotics in rectal cancer surgery did not change significantly the rate of infectious complications.

REFERENCES


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