Using of hemofiltercytological blood test to monitor the quality of patients radically operated on for colorectal cancer adjuvant chemotherapy

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Application of hemofiltercytological analysis shows its ample opportunities in assessment of polychemotherapy completeness and quality through the study of drug pathomorphosis. The objective of the study was development and studying of the clinical relevance of hemofiltercytological venous blood test as completeness and quality control of patients with colorectal cancer adjuvant chemotherapy. 35 of 39 tested cancer patients who underwent radical surgery for colorectal cancer of different localization, including cases of locally advanced stage had cancer cells in peripheral blood. Thus, the percentage of patients who had atypical cells in venous blood in postoperative period was 89.7. Adjuvant chemotherapy was offered to all 35 patients with diagnosed carcinemia and after their consent it was held in modes FOLFOX-4 and XELOX. Evaluation of anticancer drugs therapeutic action is traditionally carried out using the criteria of objective and subjective effects. The criterion of objective effect during chemotherapy of solid tumors is reduction of tumor and metastases and the criterion of subjective one is well-being of a patient. In addition, it is important to notice the highest drug resistance observed at rectum cancer, because there is a predominance of smaller stages I to II of drug pathomorphosis (9 to 7) over greater stages III-IV (7 to 1) among these cancer patients. Consequently, hemofiltercytological blood test provides a real opportunity to assess the effect of polychemotherapy and to solve the problem of chemotherapeutic treatment courses number necessary to stabilize the cancer process.

Key words: Calibrated filter, hemofiltercytological blood test, carcinemia, microscreening.

INTRODUCTION

Until now, the issues of cancer patients’ radical treatment and survival remain urgent. The particularly unsatisfactory

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results of surgical treatment have patients with metastases in regional lymph nodes. However, already at stages I to II of colon cancer, circulating tumor cells are determined in blood of 40% of patients and micrometastases in bone marrow have got 39% of patients (Vogel et al., 2000). The purpose of adjuvant polychemotherapy after radical surgery is the destruction of distant micrometastases that leads to increase of overall and disease-free survival. Adjuvant chemotherapy of colorectal cancer is the most active area of clinical research in oncology today. Therapy should be appointed taking into account the initial stage of disease, in addition, Perevodchikova and Reutova (2001) believe that patients with metastases in lymph nodes may have benefited most from adjuvant therapy.

The experts’ views on expediency of adjuvant chemotherapy usage among radically operated patients with the stage II of disease are controversial, and today this method has not been recommended by the American Society of Clinical Oncology. Nevertheless, many experts stand for adjuvant chemotherapy use in treatment of patients of high-risk groups, as they are characterized by recurrence of the disease in more than 20% of cases. Adjuvant therapy is recommended for all patients with the stage III of colon cancer to increase survivability (Moertel et al., 1995). However, there is still no real effective method of chemotherapy effectiveness monitoring in clinical practice.

This research focuses on the development and study of the clinical relevance of hemofiltercytological venous blood test as completeness and quality control of patients with colorectal cancer adjuvant chemotherapy.

MATERIALS AND METHODS

The study included 39 cancer patients after radical surgery for colorectal cancer. Among them were 24 men and 9 women. Age of the examined patients ranged from 46 to 70 years. Before the blood test, the device for venous blood microsreening had been installed (Figure 1). At the bottom of a glass cylinder encased in plastic casing, a plastic grid with calibrated filter fixed by metal ring was placed. 9 ml of venous blood, taken independently of eating, from ulnar vein of a patient and diluted in 1 ml of sodium citrate, was poured from the tube into the glass cylinder through the upper opening. Then all studied venous blood was passed through a calibrated filter with pores of diameter 6 microns, herewith tumor cells were kept in filter residue (Figure 1). The residue was delivered to glass slides, previously degreased and cooled. Smears were fixed by 3% Leishman’s spirit solution in 2 to 4 min. Then they were rinsed by distilled water and dyed with azure-eosin mixture in 3:1 ratio for 6 to 8 min. After dyeing, smears were rinsed by distilled water, dried in air and viewed under a microscope.

RESULTS AND DISCUSSION

35 of 39 tested cancer patients, who underwent radical surgery for colorectal cancer of different localization, including cases of locally advanced stage (Table 1) had cancer cells in peripheral blood. Thus, the percentage of patients who had atypical cells in venous blood in post-operative period was 89.7 (Figure 2). Adjuvant chemotherapy was offered to all 35 patients with diagnosed carcinemia and after their consent, it was held in modes FOLFOX-4 and XELOX (Haller, 2001). Evaluation of anticancer drugs therapeutic action is traditionally carried out using the criteria of objective and subjective effects. The criterion of objective effect during chemotherapy of solid tumors is reduction of tumor and metastases and the criterion of subjective one is well-being of a patient (Guidelines for chemotherapy of tumoral diseases, 2011). These criteria, unfortunately, have quite significant drawbacks: for example, an objective assessment is not possible for small (less than 10 mm) tumors, and the second
Table 1. The extent of drug pathomorphosis at different locations of colorectal cancer.

<table>
<thead>
<tr>
<th>Localization</th>
<th>Number of patients</th>
<th>Therapeutic pathomorphism degree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Colon cancer</td>
<td>8</td>
<td>-</td>
</tr>
<tr>
<td>Sigmoid colon cancer</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>Rectum cancer</td>
<td>24</td>
<td>9</td>
</tr>
<tr>
<td>In total</td>
<td>35</td>
<td>9</td>
</tr>
</tbody>
</table>

Component suffers from "subjectivism", that is, difference in the degree of symptoms perception. Therefore, we proposed using of hemofiltercytological blood test to monitor the adjuvant chemotherapy quality of patients, radically operated on colorectal cancer (Figure 3). All patients got polychemotherapy during this course and after it hemofiltercytological venous blood test had been carried out to assess the therapeutic pathomorphosis.

By means of comparative study of cytograms data, we made an attempt to compare their results with the accepted classification of drug pathomorphosis:

1. At stage I, cytomorphological cancer cells mutations are weak. Cancer cells are polymorphic in a small extent with focal degenerative and necrobiotic changes. The presence of mitosis is observed.
2. At stage II, cytromorphological changes are expressed moderately. Polymorphism of cancer cell is intensified, degenerative changes growth in the form of nuclei and cytoplasm vacuolization is observed. There is no mitosis.
3. At stage III, degree of cytromorphological changes are significantly expressed. Cancer cells are characterized by sharp polymorphism and predominance of "naked" nuclei with pronounced signs of degeneration, lysis, necrosis and presence of cytoplasmic detritus (Perevodchikova and Reutova, 2001).
4. At stage IV, elements of malignant growth that is, tumor cells were not identified (Table 1).

Figure 2. Patient D., 50 years old. Tumor cells with polymorphic irregular contours of nuclei. Chromatin is lumpy. Cytoplasm is scanty Max ×3000.
As is evident from Table 1, 9 patients with colorectal cancer have the first stage of drug pathomorphosis, 11 had the second, 13, the third and 2, the fourth (Figures 4 and 5). In addition, it is important to notice the highest drug resistance observed at rectum cancer because there is a predominance of smaller stages I-II of drug
pathomorphosis (9 to 7) over greater stages III-IV (7 to 1) among these cancer patients. Consequently, hemofiltrercytological blood test provides a real opportunity to assess the effect of polychemotherapy and to solve the problem of chemotherapeutic treatment courses number necessary to stabilize the cancer process (Perevodchikova and Reutova, 2001).

**Conclusion**

Availability and efficiency of hemofiltrercytological test allows recommending it for widespread use in clinical practice. Hemofiltrercytological venous blood test makes it possible to assess qualitatively the completeness and the quality level of patients with colorectal cancer polychemotherapy.

**Conflict of interest**

The authors declare that there is no conflict of interest.

**REFERENCES**


