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Concomitant boost in preoperative irradiation of rectal cancer

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The question of delivery of concomitant boost –additional small dose about 0.3 Gy locally to the tumor in the same fraction of external irradiation - is still under consideration. It was discussed in the literature from time to time. Especially it concerns the irradiation of rectal cancer. An obvious obstacle to this regime of irradiation is the additional time spent on an additional planning involving medical physicist and radiotherapist and additional load on the accelerator. Nevertheless, the analysis of the results in comparing of the treatment with and without concomitant boost could be of help in gaining deeper knowledge in radiobiology of tumor response to different regimes.
The aim of the work was to evaluate tumor regression after irradiation of the rectum cancer with and without additional dose 0.3 Gy locally in the same radiation session.
Groups of the patients. 39 patients with confirmed colorectal cancer and the same clinical status have been involved into the study.
Colonoscopy has been performed followed by histological analysis.
In CT and MRI studies pathological lymph nodes in the iliac region have been diagnosed in 22 patients (N1-N2), in 17 patients the affected lymph nodes were absent at CT/MRI studies.
In all patients, histological examination confirmed squamous cell carcinoma. No distant metastases were detected (M0).
Patients were divided into two randomized groups.
The first group before the operation received 2 Gy for the small pelvis by opposite fields up to 46 Gy. In the second group after delivery of 1.8 Gy to the small pelvis by opposite fields, rectum was irradiated locally by three fields technique up to 0.3 Gy.
The dose was administered over 23 fractions 5 times per week. Thus, in the second group, the pelvis received 41.4 Gy and the rectum –52.9 Gy respectively.
Supportive care was the same in the first and the second groups. 5-FU with the aim of immunomodulation was prescribed in both groups according to protocol.
Results. The degree of tumor response was assessed by comparing CT/MRI scans before irradiation and two weeks after it. Surgical evaluation of treatment outcomes was also taken into account. From the side of critical organs, there was no difference in the number of reactions to irradiation in both groups. Vomiting, frequent urination, problems with bowel emptying in a percentage value was actually equal in both groups. About 75 % of patients in both groups experienced discomfort with the indicated symptoms during the treatment period.
Nevertheless patients in the second group not reliably were in a better state during irradiation.
In the first group where patients received standard fractionation, the degree of tumor regression amounted to 20 % of the initial volume in average (from 0 to 55 %). In the second group –up to 40 % on average (from 0 to 80%). In the independent assessment of surgeons it was indicated that the second regime with additional dose was preferable. It is interesting to note that we used concomitant boost in not-operable patients with brachytherapy followed external irradiation. It was based on more tumor regression in concomitant boost treatment. It facilitates brachytherapy. In the case of the large tumors it is necessary to introduce needles into the pararectal zone for appropriate tumor irradiation. And in the case of sufficient tumor response, it is enough to indicate intracavitary brachytherapy with standard normalization 0.5 cm from the mucous.
Conclusion. Concomitant boost (0.3 Gy additionally to 1.8 –2 Gy) in preoperative irradiation of rectal cancer results in more significant tumor regression compared with the standard fractionation. Patients tolerate this regime with the same degree of radiation reactions as in standard fractionation.
Concomitant boost can be used before brachytherapy giving the possibility to irradiate tumor intracavitary in the case of essential tumor regression.

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