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Local hyperthermia in the complex treatment of patients with malignant tumors

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It is generally accepted that hyperthermia is the most powerful modifier of chemoand radiotherapy. However, hyperthermia in cancer treatment is not widely available. Classical concept of hyperthermia is simple and based on the ability of elevated temperature to enhance cell metabolism, on the one hand, and on the characteristics of tumor blood flow, on the other hand. The blood flow in healthy tissues continuously and significantly increases (approximately 10-fold) as the temperature gets higher (up to 44-45 °C). Compared to the normal tissue blood flow, the tumor blood flow increases slightly (1.5 to 2-fold), and drops sharply if the temperature reaches 42-43°C. The decreased blood flow under conditions of the maximum tumor tissue metabolism leads to the development of hypoxia, acidosis and ultimately to the death of the tumor cells.

Purpose: To conduct clinical testing of local hyperthermia Celsius TCS to install in combination with radiation therapy in the combined treatment of patients with malignant tumors of various localizations.

Materials and methods: The Tomsk Cancer Research Institute in 2013, a study on the use of local hyperthermia in combination with radiation therapy in patients with malignant tumors of the larynx / hypopharynx, brain, lung, soft tissue, cervical cancer. For two years (2013-2014) treated more than 160 patients. Local hyperthermia was administered to the tumor with 2-3 days from the start of radiotherapy.

Duration: 60 minutes at a temperature of 42-45 ° C. The multiplicity: 2-3 times a week. The number of sessions: 8 sessions using hyperthermia to radiotherapy (40-44 Gy) in the preoperative mode and 10-12 sessions at radical course of irradiation (60-70 Gy). The effect of treatment was assessed 3-4 weeks. Methods: diagnostic ultrasound, CT and MRI.

25

The greatest number of patients treated with local hyperthermia: patients with cancer of the larynx / hypopharynx (n- 46) and soft tissue sarcomas (n-32).

Results: The preliminary treatment outcomes were analyzed for 40 patients with laryngeal cancer and 6 patients with laryngopharyngeal cancer (T1-3N0-2M0). Out of these patients, 26 received 40 Gy preoperative radiation therapy and 20 patients received 60 Gy radiotherapy. Local hyperthermia (8-10 sessions) resulted no in radiation-induced skin damage. Preventive tracheostoma was not an obstacle for the treatment. Laryngeal and laryngopharyngeal cancer patients with tumor regression

< 50% or stable disease underwent surgery. The extent of surgery depended on the location of the primary tumor and its size. Resection of the larynx was performed in 10 patients, laryngectomy combined with lymphodissection in 8 patients, laryngectomy in 6 patients and resection of the pharynx with plastic repair of the defect by musculocutaneous flap in 2 patients. Histological examination of surgical specimens revealed that complete pathological response was achieved in all patients who received combined modality treatment. Patients with laryngeal and laryngopharyngeal cancer, having tumor regression > 50% received radiotherapy combined with local hyperthermia.

Patients with soft tissue sarcomas (n=32) represented another large group of patients who received preoperative radiation therapy in combination with local hyperthermia. Local hyperthermia applied to a tumor resulted no in serious complications. Radiotherapy was well tolerated by patients and none of the patients showed any markedly pronounced radiation-induced reactions. Soft tissue edema was observed in 6 patients (19%), requiring no further treatment. Only 1 patient (3%) experienced radiation-induced dermatitis resulting in the interval prolongation before surgery. External beam radiotherapy did not affect the postoperative period. Purulent necrotic complications were observed in 3 patients (9%). None of the patients had disease progression.

26

Partial tumor regression was observed in 19 (59 %) patients. The remaining patients had stable disease. Pathological tumor response of grade 3 was noted in 22 (69 %) patients, of grade 2 in 6 (19 %) patients and of grade 1 in 4 (12 %) patients. In addition to the above cancer localizations, local hyperthermia combined with radiation therapy was used for glioblastoma, locally advanced cervical cancer and lung cancer. In all cases, tumor regression or stable disease were achieved.

Conclusion: Local hyperthermia was shown to be a promising treatment modality, which is capable of increasing the sensitivity of cancer cells to radiation therapy, thus reducing the recurrence rate and improving long-term survival rates.