Aim: Sonodynamic chemotherapy (SDCT) allows increasing antitumor effects, but morphologic response of tumors to that influence, including SDCT in distant gamma-therapy (DGT) for cancer of the oral mucosa (COM), is poorly studied.

Methods: SDCT 5 mg platidiam+ solcoseryl gel was performed locally in tumor focus, ultrasound 0,88 MHz ±0,33%, I = 1,0W/cm² (patent 2488412), between fractions of a single focal dose 1,2 + 1,2 Gy in DGT in 31 patients with COM T2-4N0-2M0. 30 patients of the control group received DGT only. Tumor biopsies were studied by standard morphologic methods before the treatment and after a scheduled break at a dose of 40 isoGy.

Results: Proportion of tumor stroma increased in SDCT + DGT group by 1,9 times in comparison with the index before the treatment, and by 1,6 times in comparison with the control. Mitotic activity of cells decreased by 3,9 and 1,9 times respectively (4,9 + 1,4% versus 19,0 + 1,1% and 9,5 + 1,3%, p < 0,05). Index of parenchyma damage was 56,3 in the main group while in the control it was by 2,4 times lower - 23,9 (p < 0,05). Fibrosis was observed in the main group, as well as foci of cells represented by “shadow cells” with expressed degenerative changes in the nucleus and cytoplasm. Ki-67 proliferation index remained high (up to 60-75%) in the control group, as well as apoptotic index - 50-65% of all tumor cell layers. Absence of proliferative and apoptotic activity of COM cells was detected in tumor samples of SDCT + DGT group. Cells of the basal layer of squamous epithelium around the tumor expressed Ki-67, p53 to 10-15% of the area and did not differ from the normal level. Levels of Ki-67 marker and expression of p53 gene in comparison with the initial data in the control group decreased only by 1,3 and 1,5 times, respectively, while in the main group – by 7,1 and 6,5 times (p < 0,05).

Conclusions: SDCT provides suppression of biological aggressiveness of the tumor and significantly more pronounced antitumor effect in comparison with ionizing radiation alone.

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