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MAGNETIC REZONANCE IMAGING AND COMPUTED TOMOGRAPHY IN ASSESSING THE EFFECTIVENESS OF REMOTE RADIOTHERAPY FOR MALIGNANT NECK TUMORS

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Introduction. Malignant neck tumors remain an important problem of modern oncology. One of the leading methods of treating such diseases is remote radiotherapy, which is aimed at achieving local control of the tumor process and preserving organ functions. Determining the effectiveness of treatment is necessary both for making further therapeutic decisions and for predicting the functional state of the patient [1].

Magnetic resonance imaging and computed tomography are the main imaging methods in monitoring after radiotherapy. Each of the methods has its advantages: magnetic resonance imaging provides high contrast resolution of soft tissues and allows assessing post-therapeutic changes, while computed tomography better

visualizes bone structures. Modern approaches to assessing the response of a tumor to treatment include objective criteria of size and functional indicators, which increases the accuracy of diagnosis [1,2].

Objectives. To assess the diagnostic informativeness of magnetic resonance imaging and computed tomography in dynamic monitoring of patients with malignant tumors of the neck who received radiotherapy, and to compare the informativeness of the methods in determining the response to treatment.

Subject and methods. The subjects of the study were 58 patients (38 men and 20 women) aged 42 to 73 years with histologically confirmed malignant tumors in the neck area who underwent a course of remote radiotherapy with a total dose of 60–70 Gray. The inclusion criteria were: confirmed diagnosis, completed course of radiotherapy and the presence of previous and control MRI studies.

CT was performed on a Philips Brilliance 64 spiral computed tomography scanner, magnetic resonance imaging - Philips Achieva 1.5 T, radiotherapy - Varian TrueBeam. The collection and processing of statistical data was carried out in accordance with the requirements of national (DSTU) and international standards (ISO) according to the module “Basic concepts of biological statistics. Data collection” and the module “Use of various types of analysis in conducting research”: DSTU ISO 3494:2007 Statistical processing of data. The ROC curve method was used to construct the diagnostic test.

Results and their discussion. According to the results of the study, the following dynamics of the response to treatment were observed:

• Complete regression (absence of visualization of viable tumor tissue according to morphological features) was recorded in 16 patients (27.6%) on MRI and in 14 patients (24.1%) on CT.

• Partial regression (tumor volume reduction ≥30% and <90%) was observed in 30 patients (51.7%) by MRI and in 28 patients (48.3%) by CT.

• Disease stabilization was observed in 8 patients (13.8%) by MRI and in 9 patients (15.5%) by CT.

• Progression was observed in 4 patients (6.9%) by MRI and in 5 patients (8.6%) by CT.

Magnetic resonance imaging demonstrated higher sensitivity in detecting soft tissue changes, including post-radiation edema, interstitial fibrous transformation, and local necrosis. Magnetic resonance imaging helped to separate viable tumor tissue from post-therapeutic changes by diffusion coefficient values; low values of diffusion coefficient correlated with tumor viability, while high values correlated with necrosis and edema [3,4].

Computed tomography was more informative in assessing bone invasion, changes in maxillofacial bone structures, and calcifications, which is important in planning reconstructive or additional surgical interventions. In addition, computed tomography provides higher spatial resolution for the assessment of thin-walled structures and small lymph nodes.

The combined use of both methods allowed to increase the overall accuracy of the diagnosis of treatment response compared with the use of only one method. In our

study, the combined approach provided the identification of changes with an accuracy of about 93%, while the separate use of magnetic resonance imaging or computed tomography gave an accuracy of about 86–88%, depending on the indicator.

When discussing the results, it should be noted that the interpretation of post-radiation changes always requires a comprehensive approach and consideration of clinical data. Magnetic resonance imaging better reflects soft tissue structures, but sometimes post-radiation changes can mask residual tumor; in such cases, diffusion indices and dynamic contrast are of crucial importance. Computed tomography remains indispensable in the assessment of bone changes and planning procedures that require precise anatomical orientation.

Conclusions

1.Evaluating the effectiveness of remote radiotherapy for malignant neck tumors requires highly accurate diagnostics, which are provided by MRI and CT. Although each method has its advantages and disadvantages, their combination allows you to obtain the most complete information about the state of the tumor after treatment. Further research should be aimed at improving image analysis algorithms and developing new diagnostic approaches that will increase the effectiveness of patient monitoring [5].

2.Magnetic resonance imaging (MRI) and computed tomography (CT) are key imaging methods in assessing the effectiveness of remote radiotherapy (RT) for malignant neck tumors. Their combination allows you to increase the accuracy of treatment planning and reduce the risk of complications.

3.Computed tomography is an indispensable method in planning and monitoring the effectiveness of remote radiotherapy for malignant neck tumors. Its high resolution and the ability to accurately model radiation make this method one of the key ones in modern oncology.

Keywords. Laryngeal cancer, CT, MRI, NI-RADS.

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