MOST COMMON RADIOINDUCED REACTIONS OF LUNG CANCER RADIOTHERAPY

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Introduction. The treatment of lung cancer is based on multidisciplinary approach which includes surgery, radiotherapy, systemic therapies such as chemotherapy, immunotherapy and targeted agents, as well as interventional radiology and palliative care. Among these methods, radiotherapy is the only treatment method that is indicated for all stages of the disease and also possible for patients with perfomance status ECOG 3.

Over the years, radiotherapy has advanced rapidly. New methods include standard configuration of computed tomography on linear accelerators, stereotactic ablative body radiotherapy, intensity-modulated radiotherapy and respiratory gating. All these methods are used to decrease incidence of complications of radiotherapy that could occur due to effect to the surrounding normal tissue by large margins of radiation beam and tumour motions.

Occurence of radiotherapy complications can be due to various reasons including, individual radiosensitivity, dose rate, comorbid status and age of the patient, type of radiation, clinical exposure volumes, and the chosen fractionation regimen. There are concepts of "radiation injuries" and "radiation reactions," which are often misinterpreted. A radiation reaction is a reversible functional or morphological change in an organ or tissue that develops within three months of the start of radiotherapy. Radiation damage is an irreversible change in an organ or tissue that often requires special treatment and occurs after radiation exposure. The concept of "toxicity" of radiation therapy (in Russian literature, "radiation complications") is considered separately, which can be acute (early, up to 6 weeks after the start of treatment) and late (after 6 weeks after the start of treatment). Acute toxicity is associated with the reaction of ionizing radiation to radio-sensitive tissues. As a rule, these tissues regenerate well and recover in a short time. Late toxicity concerns radioresistant tissues, changes in which are associated with cytolysis, microcirculatory disorders, and the formation of fibrous and sclerotic changes.

During high-precision radiotherapy of lung cancer, the most common symptoms of acute toxicity that occur during therapy are radio-induced esophagitis, pulmonitis, dermatitis, asthenic syndrome, thoracalgia and cardiotoxicity.

The RTOGEORTC scales are used to standardize assessment approaches and to systematize data on the development of radiation reactions during and after radiotherapy. Assessment of damage to risk organs during planning is carried out in accordance with the dose-volume parameter based on the recommendations of the special group for the analysis of tissue effects of QUANTEC.

Aim of the study. To assess the severity of radiation reactions during and after high-precision radiation therapy for lung cancer.

Materials and methods. A retrospective analysis of outpatient records of patients treated at the Department of Radiology of the Grodno State Clinical Hospital No. 3. The Program Microsoft Excel is used for data processing.

Results and discussion. In the period from March to September 2024, 15 male patients with non-small cell lung carcinomas, histologically verified (86.67% of cases) and based on instrumental diagnostic data (13.33%), were treated using a linear electron accelerator using the VMAT technique at the Department of Radiology of the Grodno City Clinical Hospital No. 3. During treatment, clinical changes in the condition associated with the accumulation of a single focal dose were recorded. The toxic effects of the treatment were also evaluated in patients who arrived for control after treatment (the data are recorded in Tables 1-2.).

Table 1. – **Acute toxic effects of lung cancer radiotherapy (up to 6 weeks from the start of treatment)**

Type of toxicity	Grade 1	Grade 2	Grade 3
Pulmonitis	n=12 (80%)	n=3(20%)	–
Esophagitis	n=3 (20%)	n=11 (73,3%)	n=1(6,7%)
Dermatitis of the chest wall	n=3 (20%)	–	–
Thoracalgia	n=2 (13,3%)	–	–
Asthenic syndrome	n=13 (86,7%)	n=2 (13,3%)	
Cardiotoxicity (blood pressure lability, rhythm disturbances)	–	–	n=1 (6,7%)

Table 2. – **Late toxic effects of lung cancer radiotherapy (after 6 weeks of treatment initiation)**

Type of toxicity	Grade 1	Grade 2	Grade 3
Pulmonitis	–	n=3 (66,67%)	–
Esophagitis	n=2 (13,3%)	–	–
Dermatitis of the chest wall	n=2 (13,3%)	–	–
Thoracalgia	n=2 (13,3%)	–	–
Asthenic syndrome	n=4 (26,6%)	–	–
Cardiotoxicity (blood pressure lability, rhythm disturbances)	–	–	–

Conclusion. Radiotherapy for lung cancer is associated with the development of radiation damage to healthy surrounding organs. The most common acute radiation injuries include esophagitis, pulmonitis, and asthenic syndrome. It is not uncommon for one patient to have a combination of several pathological radio-induced conditions. Pulmonitis is one of the most common late effects of radiotherapy, and its treatment requires long-term support with glucocorticosteroid medications. Before the initiation of radiation therapy, the patient should be informed of the possible reactions to radiation to avoid unexpected situations and it should be clarified that these reactions are treatable if the doctor is informed about them in a timely manner.

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МЕЖДУНАРОДНАЯ НАУЧНО-ПРАКТИЧЕСКАЯ КОНФЕРЕНЦИЯ СТУДЕНТОВ И МОЛОДЫХ УЧЕНЫХ «SCIENTIA INFINITA» ПРИУРОЧЕННАЯ К 30-ЛЕТИЮ ОСНОВАНИЯ ФАКУЛЬТЕТА ИНОСТРАННЫХ УЧАЩИХСЯ ГРОДНЕНСКОГО ГОСУДАРСТВЕННОГО МЕДИЦИНСКОГО УНИВЕРСИТЕТА

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