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Information Radiology Diagnostics in Traumatology

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INTRODUCTION. The rapid development of diagnostic radiology observed in the last two decades has opened up fundamentally new opportunities for clinical medicine, making almost all organs and tissue structures of the human body available for research. To develop and improve new methods of radiation diagnostics in traumatology and orthopedics, 145 patients with various injuries and diseases of the musculoskeletal system were examined using radiography, ultrasound, CT, and MRI. Largely due to the success of radiation diagnostics in the leading clinics of the world, the time from the patient's admission to the hospital to the diagnosis does not exceed 40-60 minutes. Radiation research methods have long been in second place in terms of the frequency of their use, second only to the most common and mandatory laboratory tests. Data from statistical studies of major global medical centers show that it is thanks to radiation methods that the number of erroneous diagnoses during a patient's initial visit today does not exceed 4% [1-3]. Classical radiology in many areas of surgery, therapy, and cardiology no longer plays a leading role in the production of medical images. According to WHO, about 80% of diagnoses are made through the direct use of radiation research materials. In this regard, modern radiation diagnostics, which has various methods of visual control, is increasingly focused on comprehensive solutions to diagnostic and therapeutic problems using new methods. 100% of orthopedic and traumatology patients require examinations using radiological diagnostic methods. 85% of the information necessary for making a decision on treatment is provided by radiation diagnostic methods (in traumatology and orthopedics - up to 100%).

Purpose of the study. show the capabilities of modern radiation diagnostics and improved techniques in increasing the efficiency of the diagnostic process and improving the results of treatment of patients with diseases and injuries of the musculoskeletal system.

RESEARCH RESULTS. The widespread use of new technologies has not only improved the diagnosis of diseases, but also had a tremendous impact on the development of modern treatment methods and forced us to reconsider many established traditional approaches. Thus, the achievements of modern radiation diagnostics significantly improve the quality of diagnosis. They reduce the time a patient stays in the clinic and increase the efficiency of the diagnostic and treatment process, expand the horizons of scientific research and practical application of various imaging tools in clinical medicine and traumatology and orthopedics in particular. To develop and improve new methods of radiation diagnostics in traumatology and orthopedics, patients with various injuries and diseases of the musculoskeletal system were examined using radiography, ultrasound, CT, and MRI.

The improvement of diagnostic methods has undoubtedly led to the discovery of new patterns of the emergence and development of the pathological process, the identification of more accurate and early symptoms of diseases, and the determination of more subtle mechanisms of influence of therapeutic measures. Classical radiology has been supplemented by such modern imaging methods as ultrasound diagnostics, computed tomography, magnetic resonance imaging, photoemission and positron emission tomography, and interventional radiology [5-7]. The depth

and accuracy of research that modern methods of radiation diagnostics are capable of cannot but amaze, since radiation diagnostics has crossed the border of anatomical concepts and quite widely identifies biochemical and functional disorders in various organs. One of the earliest and most closely related disciplines to radiation diagnostics is traumatology and orthopedics, the development and improvement of which is impossible without the use of modern research methods. The development and improvement of diagnostic algorithms for diseases and injuries of the musculoskeletal system are based on an integrated approach to the selection of methods and techniques of radiation examination, which consists of a combination of classical and modern, radiation and non-radiation diagnostic methods. Considering the unequal sensitivity and specificity of various medical imaging methods in displaying pathological changes in bone, cartilage and soft tissue structures, modern radiation diagnostics makes it possible to more accurately characterize the morphological features and prevalence of pathological processes, helps clarify the pathogenesis, and improves the semiotics of diseases and injuries of the musculoskeletal system. New diagnostic technologies and algorithms make it possible to monitor the effectiveness of treatment stages and the final result, contribute to the improvement of existing and the creation of new treatment methods .

New techniques and methods for studying muscles using ultrasonography and computed tomography have been proposed. Criteria for assessing the condition of muscles during the lengthening process have been developed to predict the outcomes of surgical lengthening of the lower extremities. Adaptive-compensatory and recovery processes in the muscles of the thigh and lower leg after their lengthening culminate in the formation of new muscle-tendon relationships, which in their parameters approach the corresponding age norms

To identify the nature, extent, morphological features of the pathological process. To monitor the effectiveness of treatment. To resolve the issue of treatment results. To study long-term results. Table 1 shows data on the sensitivity of imaging methods when displaying certain tissues and environments and their tissue characteristics, which explains the need for a comprehensive study in many diseases and clear algorithms when choosing research methods, including in traumatology and orthopedics. For the same purpose, Table 2 is presented, which shows the capabilities of various visualization methods, which allows you to motivatedly choose a specific technique based on the tasks assigned to radiation diagnosticians. What is modern radiation diagnostics anyway? First of all, this is: high-tech equipment; impeccable image quality; operational reliability and reproducibility of information; information content of the method for this specific task; complexity; exact algorithm; precise quantitative control; availability; “partner” of surgical and medicinal medicine; a reasonable combination of methods to achieve the best results; safe equipment for both patients and medical staff. Table 1 Sensitivity of imaging methods for imaging certain tissues and media and their tissue characteristics Test method Gas Liquid High protein liquid (pus, detritus)

Capabilities of various visualization methods Method Diagnostic capabilities of the method Molecular level Diagnostics of metabolic processes However, when using some diagnostic methods, potential harm to the patient remains, and economic costs are quite high. Including analogue and digital radiography, ultrasound research methods, including vessels, joints, soft tissues, distraction regenerate, computed tomography, densitometry, radioimmunoassay, modern digital angiography, magnetic resonance imaging. Here are several examples of the use of modern diagnostic methods in traumatology and orthopedics.

CONCLUSIONS. The use of modern methods of radiation diagnostics has made it possible to obtain new data on X-ray morphological changes in the joints and long bones of the extremities in patients with systemic and dysplastic diseases with a quantitative assessment of the severity of the pathological process. An algorithm for describing the distraction regenerate has been proposed and methods for quantitative assessment using CT and MRI have been developed. A set of indicators has been developed to assess the condition of the soft tissues of the limbs during lengthening, depending on the period of lengthening and the research method. CT made it

possible to determine quantitative criteria for bone density in post-traumatic necrosis of free bone fragments and the end sections of the main bone fragments in chronic post-traumatic and postoperative osteomyelitis. 8. It was found that a characteristic sign of a quantitative change in bone tissue density in patients with deforming arthrosis is its general decrease with a relative increase in the density of the subchondral layer, which are detected much earlier in CT studies.

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