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APPLICATION OF COMPLEX RADIOLOGY DIAGNOSTICS IN ASSESSING OF DAMAGES

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Annotation
The article provides data on the use of complex radiation diagnostics in forensic medical assessment of injuries. To assess the capabilities of radiation diagnostic methods in the practice of a forensic expert, the submitted radiographs and MSCT tomograms of 405 victims were analyzed, which were provided for consultation and description to the X-ray diagnostic room of the department of medical forensics of the Republican Scientific and Practical Center for Forensic Medical Examination for 2021 - 2023. until June. It has been shown that traditional X-ray techniques provide limited information about the presence of fractures of the skull and large joints. Multislice computed tomography (MSCT), which is more informative, is proposed to be considered as a necessary component of x-ray examination in forensic medical examination in cases of damage to the musculoskeletal system.

Keywords: radiation, diagnostics, assessment, damage.

Introduction

Every day, forensic medical examinations are ordered to determine the presence and severity of bodily injuries. Radiation diagnostic methods are used for visualization, namely: standard radiography and multislice computed tomography (MSCT). All this predetermines the need for scientific substantiation of the criteria for x-ray images of bone injuries for the correct selection of a medical criterion when determining the severity of harm caused to human health [1, 2].

According to a number of researchers, about 64% of cases of damage to bone and near-bone structures are diagnosed using classical X-ray examination [3, 4].

The introduction into practical healthcare of new high-tech methods of radiation diagnostics, which have the capabilities of three-dimensional reconstruction in real time, which multislice computed tomography has, makes it possible to obtain the

necessary information about the condition of bones, internal organs, tissues and blood vessels [5].

Multislice computed tomography has high sensitivity and specificity in detecting damage to skeletal bones - 97.2% and 96.6%, respectively [6], which in turn provides the radiologist and forensic expert with all the necessary information about the volume and nature of damage, the condition of the surrounding tissue, for a fairly accurate diagnosis and when choosing adequate conservative or surgical treatment [7].

Despite the widespread introduction of high-tech and non-invasive methods of x-ray diagnostics of various fractures, forensic experts, when conducting examinations, do not pay due attention to the quality of x-ray images on various media available to victims, which leads to an erroneous determination of the presence of damage, its nature, mechanism of formation and degree severity of bodily injury.

The target of the study is to evaluate the possibility of radiation diagnostic methods in determining the presence of bodily injuries in injured persons.

Materials and methods of research

To assess the capabilities of radiation diagnostic methods in the practice of a forensic expert, we analyzed the submitted radiographs and MSCT tomograms of 405 victims, which were provided for consultation and description to the X-ray diagnostic room of the department of medical forensics of the Republican Scientific and Practical Center for Medical Examination for 2021 - 2023. until June.

Results of research and discussion

Were analyzed 865 radiographs, MSCT tomograms and Magnetic resonance imaging (MRI) tomograms of 405 victims. The presented radiographs were performed in standard positions (direct and lateral), MSCT and MRI in a standard algorithm using a reconstruction algorithm. Sections generated in the DICOM image format were read using the Radiant program . When analyzing the expert material, much attention was paid to the quality of forensic medical documentation and X-ray radiological images: the correctness, objectivity and thoroughness of its design, description of the circumstances of the injury, completeness of presentation of data from medical documents, results of objective research, additional research methods. Of 865 radiographs and tomograms, 481 (55.6%) cases had fractures of the maxillofacial region. Data from standard radiography for injuries of the facial area significantly complicated the diagnostic search for injuries and their nature in images

of mainly the bones of the skull and facial skeleton. Standard radiography of the skull turned out to be more vulnerable to violations of the shooting technique. A comparison of the results of radiography and MSCT in victims with traumatic injuries of the facial skeleton showed that a clearer image of the main radiological signs of fractures of the bones of the facial region occurs with MSCT examination. Based on the results of MSCT examination of the brain using a bone window, we studied in detail the anatomical landmarks of traumatic injuries. Which in turn helped to compare anatomical landmarks with the classification of the severity of bodily injuries. For example, in 112 patients with a suspected fracture of the medial wall, only in 3 (2.7%) cases, using MSCT, a fracture of the posterior part of the medial wall, which was formed by the greater wing of the sphenoid bone, was diagnosed - qualified as serious bodily injury. The remaining 109 cases (97.3%) were fractures of the lateral wall of the ethmoid bone. Of the 481 victims who were consulted about fractures of the maxillofacial region, in 65 (13.1%) bone-traumatic injuries were excluded based on the presented radiographs and MSCT tomograms.

182 (21.0%) cases were consulted regarding the presence of bone-traumatic changes in the bone frame of the chest. When analyzing standard radiographs, attention was paid to the correctness of the X-ray examination for rib fractures. Of 282 chest radiographs and tomograms, in 89 (48.9%) cases only plain chest radiography was performed. If rib fractures are suspected, polypositional radiography is recommended (not only in the direct projection, but also in two oblique projections). All patients with suspected dynamic rib fractures were examined using MSCT for a detailed study of the presence of fractures, as well as to determine the duration of the fractures with a full assessment of the signs of formation and stage of callus.

The most informative results were the results of multislice computed tomography of the chest organs, which made it possible to formulate conclusions and determine the nature. In one case, the process was a manifestation of a lung disease (cause of formation) and a long-standing pathological process, which made it possible to exclude its traumatic origin.

202 (23.4%) of the submitted radiographs out of 865 showed injuries to the upper and lower extremities, pelvic bones, spine, and large joints (shoulder, elbow, knee and ankle joints). When visualizing radiological signs of skeletal bone fractures, we assessed the presence of fracture lines, displacement of bone fragments, changes in the distance between adjacent structures and the condition of surrounding tissues in order to establish the nature and extent of damage.

In case of fractures of large joints, especially in the lateral projection, the images of the fracture lines were summed up into one shadow, which made it impossible to

trace it. In such cases, we recommended MSCT studies of the area of interest in dynamics.

MSCT data in all cases provided evidence of direct signs of damage to the skeletal bones of any area of the body.

Conclusions

Thus, traditional radiographic techniques provide limited information about the presence of skull and major joint fractures. Multislice computed tomography (MSCT) should be considered as a necessary component of x-ray examination during forensic medical examination in cases of damage to the musculoskeletal system . The use of MSCT expands the boundaries of information for a forensic medical expert and allows one to speak in detail about the nature, extent of damage, and the condition of the bone structures and internal organs.

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