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## DENSITOMETRIC CONTROL OF TREATMENT OF COMPLICATED FORMS OF PULMONARY TUBERCULOSIS

### ДЕНСИТОМЕТРИЧНИЙ КОНТРОЛЬ ЛІКУВАННЯ УСКЛАДНЕНИХ ФОРМ ТУБЕРКУЛЬОЗУ ЛЕГЕНЬ

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**Introduction: Tuberculosis (TB) is still a major public health concern.** The treatment of tuberculosis and its complications is as relevant as it ever was. There is a need for a rapid and objective algorithm aimed at preventing and treating complications of the bronchopulmonary system

**Materials and methods.** In order to assess the features of surgical treatment of patients with pulmonary tuberculosis, we examined 150 patients with specific lung lesions complicated, who were treated at F.G.Yanovsky's National institute of phthisiology and pulmonology of

national academy of sciences of Ukraine (NIPP) during the 2017–2021 period. The study was performed in the accredited clinic at NIPP at the expense of the state budget.

A retrospective analysis of clinical and radiological forms and prevalence of tuberculosis was performed. Analysis of duration of preoperative treatment, morphological manifestations and activity indicators of a specific processes was carried out. Indications for surgical treatment were done in accordance with current regulations, but were fine-tuned by us based on densitometric analysis. MedLung-type endobronchial valves were used. Patients with specific lung lesions complicated by broncho-pleural fistula during hospitalization underwent thoracoscopic sanation of the empyema cavity with the formation of a mono cavity and adequate drainage, which is an essential part of treatment. Administration of contrast showed defects of the bronchial tree, which were subject to blockage.

The medical information system EMCIMED-Scientific and the free workstation DICOM VIEVER PHILIPS were used to process the data in NIPP. The density of lung tissue lesions in the selected area of the axial CT section was measured and evaluated. Reconstructions, valve selection and automated measurement of volumetric parameters were performed using 3-d Slicer 4.13.0 Lung CT Analyzer, Lung CT Segmenter Trachea Stent Plannind. Segmentation and analysis were performed using the Dragonfly software, presented for non-commercial research by OBYECTRESERCHSYSTEMS (ORS), Montreal, Canada. Quantitative indicators were compared using the Student's t test, while qualitative – using the Wilcoxon's signed-rank test. Collection, storage and mathematical evaluation of research materials was carried out using licensed software products, which were included in the Microsoft Office Professional 2007 package, license Russian Academic OPEN No Level № 43437596.

**Study results:** Timely use of computed tomography (CT) in tuberculosis patients allowed to correct treatment tactics and choose methods of surgical treatment. When comparing densitometric indicators of computed tomography with the results of histopathological examination of resected drugs, it was found that at an average density ( $33.4 \pm 10.5$ ) HU correlated with low activity of the tuberculosis process, values of ( $28.2 \pm 7.1$ ) HU – moderate activity of the tuberculosis process, and at an average density value density ( $16.2 \pm 15.3$ ) HU and below signified high activity of the specific process. Density values of ( $92,3 \pm 49,4$ ) HU and above correlated with absence of inflammatory process.

It was established that at high and moderate activity of specific inflammatory process mycobacteria were cultivated in in 65.7% of cases. It

was found that in all patients with unfavorable intra- and postoperative period densitometric indicators were different from the conventional norm.

**Conclusions.** The use of densitometric control in the treatment of patients with tuberculosis complicated allows to assess the course of a specific inflammatory process in the lung parenchyma, to make an informed choice of treatment techniques. Implemented densitometric control allows to predict the development of recurrence of the disease and prevent the development of pleuropulmonary complications. The use of specialized 3-D software allows for non-invasive determination of the the state of the lung parenchyma and directly the lesion, location and size of the endobronchial valve used for treatment. Densitometric analysis of the lung parenchyma in dynamic timeline allows to detect both emphysematous processes in the lung parenchyma and the degree of atelectasis of blocked areas.

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