

lek. Marta Hałaburda- Rola

Zastosowanie kliniczne tomografii komputerowej wysokiej rozdzielczości (HRCT) w diagnostyce płucnych powikłań infekcyjnych u chorych z chorobami hematologicznymi.

**Rozprawa na stopień doktora nauk medycznych i nauk o zdrowiu
w dyscyplinie nauki medyczne**

Promotor: Dr hab. n. med. Laretta Grabowska- Derlatka

Zakład: II Zakład Radiologii Klinicznej



Obrona rozprawy doktorskiej przed Radą Dyscypliny Nauk Medycznych
Warszawskiego Uniwersytetu Medycznego

Warszawa 2023 r.

Streszczenie w języku angielskim

Introduction:

High-resolution computed tomography (HRCT) is a widely used diagnostic imaging method for diagnosing infectious complications in the lungs. HRCT is an objective, reproducible and broadly available method. Knowledge of the radiological signs typical of pulmonary infections in relation to the current diagnostic criteria correlates with the prognosis for the patient and correlates directly with clinical management.

Manuscript #1 in the dissertation series

Hałaburda-Rola M, Dzieciatkowski T, Górka M, Rowiński O, Grabowska-Derlatka L. Clinical utility of the updated European Organization for Research and Treatment of Cancer/Invasive Fungal Infections Cooperative Group and the National Institute of Allergy and the Mycoses Study Group Education and Research Consortium computed tomography criteria of invasive pulmonary aspergillosis in hematological malignancies. Hematology. 2021 Dec;26(1):398-407. doi: 10.1080/16078454.2021.1931739.

This article is an original research paper that aimed to analyze the clinical usefulness of the updated EORTC/MSG criteria for the diagnosis of IPA based on radiological criteria, in patients with hematological diseases. The paper included a literature review, extensively discussed the issue of radiological manifestations and detailed the criteria for the diagnosis of IPA.

The study material consisted of baseline HRCT of patients with hematological diseases, neutropenia and clinically suspected IPA.

All HRCT were performed on a 64-row CT scanner, on full inspiration, single-phase, without contrast agent administration. Studies included in the analysis were fully anonymized and evaluated by two independent radiologists for quality, location and size of lesions. The differences in interpretation were resolved by third, independent radiologist. Qualitative analysis included evaluation of radiological signs typical of IPA such as well-defined nodules with or without halo, the air crescent sign and cavitations, as well as the new criterion for the diagnosis of IPA- wedge-shaped segmental or subsegmental consolidations. In addition, radiologic signs atypical of IPA such as ground glass opacities (GGO), pleural fluid, thickening

of interlobular septa and mediastinal lymphadenopathy were noted. All patients in the study group had typical radiological signs of IPA and met the criteria of probable IPA. The most common radiological signs were nodules with halo, which were present in 88.5% of patients. Radiological signs atypical of IPA, such as GGO, pleural fluid, thickening of interlobular septa, mediastinal lymphadenopathy, were diagnosed in 60% of patients, occurring in 31.4%, 34.3%, 14.3%, 11.4% of the population, respectively. Segmental or subsegmental wedge-shaped consolidations were present in 48.6% of patients, with 11.4% constituting the only radiological signs of IPA. Based on the results, it can be concluded, the updated radiological criteria allowed the diagnosis of probable IPA in 11.4% more patients in comparison to the previous classification.

Manuscript #2 in the dissertation series

Hałaburda-Rola M, Drozd-Sokołowska J, Januszewicz M, Grabowska-Derlatka L. Comparison of Computed Tomography Scoring Systems in Patients with COVID-19 and Hematological Malignancies. Cancers. 2023; 15(9):2417. <https://doi.org/10.3390/cancers15092417>

The publication is an original, retrospective comparative analysis of semiquantitative scales used in HRCT to assess the extent of pulmonary parenchymal involvement by lesions occurring in the course of COVID-19 infection in patients with hematological diseases. Fifty patients with hematologic malignancies and confirmed COVID-19 infection were included in the analysis, and all patients underwent chest HRCT without contrast agent administration, on full inspiration. Three semi-quantitative scales, i.e., CT Severity Score, CT Score and Total Severity Score, and one qualitative scale, the modified Total Severity Score, were used to analyze HRCT images. The studies analyzed were fully anonymized and interpreted by two radiologists with the experience in interpreting chest CT images in hematology patients. The time of analysis, interobserver concordance and the sensitivity and specificity of the selected scales in diagnosing COVID-19 with severe and mild disease were analyzed. Based on the interpretation of the studies, the following results were obtained: Chest CT score and Chest CT Severity Score have very high sensitivity and specificity in terms of diagnostic accuracy. Additionally, considering the shortest median of the interpretation time in the chest CT Severity Score, the method can be proposed as dedicated for semi-quantitative assessment of chest CT in hematological patients with COVID-19.

Conclusions

The presented results of the work constituting the series of publications forming the dissertation prove that HRCT is an indispensable imaging method in the diagnosis of infectious complications in hematological patients. The ability to interpret HRCT images of the chest based on the latest diagnostic criteria for the diagnosis of probable IPA, allows the diagnosis to be made in a higher percentage of patients, which translates directly into clinical management. For patients with hematologic diseases and COVID-19 infection, an objective, semi-quantitative standardized assessment of the degree of pulmonary parenchymal involvement correlates with the patient's clinical status and translates into therapeutic management of the patient.