

HRCT of the Chest and the Role of Artificial Intelligence in the Evaluation of Patients with COVID-19

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Abstract : Introduction: Early diagnosis of coronavirus disease (COVID-19) is extremely important to isolate and treat patients in time, thus preventing the spread of the disease, improving prognosis and reducing mortality. High-resolution computed tomography (HRCT) chest imaging and artificial intelligence (AI)-based analysis of HRCT chest images can play a central role in the treatment of patients with COVID-19. Objective: To investigate different chest HRCT findings in different stages of COVID-19 pneumonia and to evaluate the potential role of artificial intelligence in the quantitative assessment of lung parenchymal involvement in COVID-19 pneumonia. Materials and Methods: This retrospective observational study was conducted between May 1, 2020 and August 13, 2020. The study included 2169 patients with COVID-19 who underwent chest HRCT. HRCT images showed the presence and distribution of lesions such as: ground glass opacity (GGO), compaction, and any special patterns such as septal thickening, inverted halo, mark, etc. HRCT findings of the breast at different stages of the disease (early: andlt 5 days, intermediate: 6-10 days and late stage: >10 days). A CT severity score (CTSS) was calculated based on the extent of lung involvement on HRCT, which was then correlated with clinical disease severity. Use of artificial intelligence; Analysis of CT pneumonia and quot; An algorithm was used to quantify the extent of pulmonary involvement by calculating the percentage of pulmonary opacity (PO) and gross opacity (PHO). Depending on the type of variables, statistically significant tests such as chi-square, analysis of variance (ANOVA) and post hoc tests were applied when appropriate. Results: Radiological findings were observed in HRCT chest in 1438 patients. A typical pattern of COVID-19 pneumonia, i.e., bilateral peripheral GGO with or without consolidation, was observed in 846 patients. About 294 asymptomatic patients were radiologically positive. Chest HRCT in the early stages of the disease mostly showed GGO. The late stage was indicated by such features as retinal enlargement, thickening and the presence of fibrous bands. Approximately 91.3% of cases with a CTSS = 7 were asymptomatic or clinically mild, while 81.2% of cases with a score = 15 were clinically severe. Mean PO and PHO (30.1 ± 28.0 and 8.4 ± 10.4 , respectively) were significantly higher in the clinically severe categories. Conclusion: Because COVID-19 pneumonia progresses rapidly, radiologists and physicians should become familiar with typical TC chest findings to treat patients early, ultimately improving prognosis and reducing mortality. Artificial intelligence can be a valuable tool in treating patients with COVID-19.

Keywords : chest, HRCT, covid-19, artificial intelligence, chest HRCT

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