Follow-up computed tomography scan in post-COVID-19 pneumonia

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Specialty type: Radiology, nuclear medicine and medical imaging

Provenance and peer review: Unsolicited article; Externally peer reviewed.

Peer-review model: Single blind

Peer-review report's scientific quality classification
Grade A (Excellent): A
Grade B (Very good): B
Grade C (Good): C
Grade D (Fair): 0
Grade E (Poor): 0

P-Reviewer: Arteaga-Livias K, Peru; Naswhan AJ, Qatar; Valencia GA, Peru

Received: December 17, 2021
Peer-review started: December 17, 2021
First decision: February 21, 2022
Revised: February 24, 2022
Accepted: March 26, 2022
Article in press: March 26, 2022
Published online: April 28, 2022

Abstract
The coronavirus disease 2019 (COVID-19) global pandemic can be a severe illness that leads to morbidity and mortality. With the increasing number of COVID-19 pneumonia survivors, several long-term changes may persist, including abnormal imaging of lung parenchyma. In addition to the clinical course, it is vital to follow up on pulmonary imaging during the post-infectious period, which is not routinely required in other common pulmonary diagnoses. Computed tomography (CT) scan of the chest is an effective and diagnostic tool for pneumonia which gives an insight into structural abnormalities within the lungs, complications, and possible progression of the disease. Several studies have monitored COVID-19 pneumonia and its complications using serial CT chest imaging from the initial phase of infection, hospitalization, and post-discharge. Nonetheless, long-term follow-up imaging data in post-COVID-19 is still limited. We have summarized the findings utilizing a systematic review of the literature regarding COVID-19 pneumonia imaging, including long-term follow-up.

Key Words: COVID-19; Pneumonia; Computed tomography; Evolution; Progression

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Core Tip: Changes seen in computed tomography imaging related to coronavirus disease 2019 (COVID-19) pneumonia appear to progress and peak around two weeks post-hospitalization. Overall improvement and complete resolution of COVID-19 pneumonia-related changes imaging can be seen in the majority of the patients with long-term follow-up. We have summarized the findings utilizing a systematic review of the literature regarding COVID-19 pneumonia imaging, including long-term follow-up.
The duration of initial interval is inversely correlated with the amount of consolidations, air bronchograms, and irregular lines[3]. The intervals will be longer if irregular and reticular lines are seen on the peak CT and pre-discharge CT. After that, COVID-19 pneumonia lesions on the CT chest may resolve completely, while GGO, irregular and reticular lines may remain[3]. In a similar study conducted by Chen et al[5], 41 patients were followed with chest CT during the hospital stay and at two weeks, one month, three months, six months, and one year after discharge. The study concluded that patients showed continuous improvement on lung CT scans during the 1-year follow-up time; however residual lesions (GGO and reticular patterns) may still be found, which are associated with lung volume parameters and risk of developing lung opacities[5]. Liu et al[6] retrospectively evaluated chest CT follow-ups on 51 patients with COVID-19 performed on the day prior to discharge, two weeks post-discharge, and four weeks post-discharge. The results of this study indicated that changes seen were significantly reduced, including density reduction on follow-up scans as compared to the scans done at the time of discharge.

Unlike the systematic review by Casartelli et al[1], these results showed that 64.7% of discharged patients progressed to complete resolution of previously seen lung lesions at 4-wk follow-up, indicating that damaged lung tissue could heal in patients with COVID-19 pneumonia[5]. In another study conducted by Liu et al[7], 41 patients diagnosed with COVID-19 were followed up after seven months with chest CT and cardiopulmonary exercise testing. The predominant chest CT patterns at seven months included parenchymal bands (41%), interlobular septal thickening (32%), and traction bronchiectasis (29%). Sixty-one percent of the patients achieved complete radiological resolution, while 29% went on to develop pulmonary fibrosis. Those patients who went on to develop fibrotic lung disease appeared to have an increased risk due to older age and comorbid conditions[7].
While CT scan of the chest is an effective tool in COVID-19 patients, the side effects to patients of repeat irradiation need to be kept in mind and the use of low dose CT to follow up these patients can be considered. In conclusion, CT scans of the chest are an effective diagnostic tool which can provide insight into the structural pathology of pulmonary disease, its progression, and its association with long-term effects. Future studies should be utilized to define its utility in determining long-term progression in patients with COVID-19 pneumonia.

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