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Opinion

3D Volume Rendering Pulmonary Reconstructions in Covid-19 pneumonia at Computed Tomography

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Abstract

Covid-19, acronym of the English Coronavirus Disease 19, also known as SARS-CoV-2 acute respiratory disease or coronavirus disease 2019, is an infectious respiratory disease caused by the virus SARS-CoV-2 belonging to the coronavirus family. The Covid-19 Coronavirus infectious pandemic started since December 2019. It caused mainly bilateral interstitial pneumonia in the patients. The heterogeneity of the course and clinical frameworks of the disease represents an important problem both for the acute phase and for the possible complications. Imaging Computed Tomography (CT) had a key-role in the diagnosis and follow-up, allowing an optimal management for the patients [1,2]. Many typical imaging features of the pneumonia were described: bilateral multilobar ground-glass opacity (GGO), with a peripheral or posterior distribution, mainly in the lower lobes; consolidative areas of the lungs; septal thickenings; pleural thickenings; subpleural involvements and pleural effusion [3,4]. The 3D-Volume Rendering Reconstructions at the CT of the lungs represent an important and superior model to evaluate the pulmonary envolvement by Covid-19 and is currently being used in support of "classic" CT reconstruction (MPR, MIP) as a guidance for the evaluation in their complexity of the patients affected by Covid-19 pneumonia (Figure 1-3).

Discussion

Covid-19 pneumonia had an unpredictable clinical course, and varies from patient to patient, until getting to severe disease, with development of acute respiratory failure and organ failure. The use of 3D Volume Rendering pulmonary CT reconstructions had spread during the Covid-19 pandemic. Thanks to their main characteristics (real-time imaging, execution speed, safety and availability), they can be used for the monitoring of the patients with Covid-19 pneumonia, as well as for a fast stratification and triage of symptomatic patients. Therefore, we have introduced in our manuscript a model of reconstructions that can be applied individually for each case of patients with Covid-19 pneumonia, in order to examine them in the shortest possible time and with the best diagnostic accuracy that each CT multislices offers us.

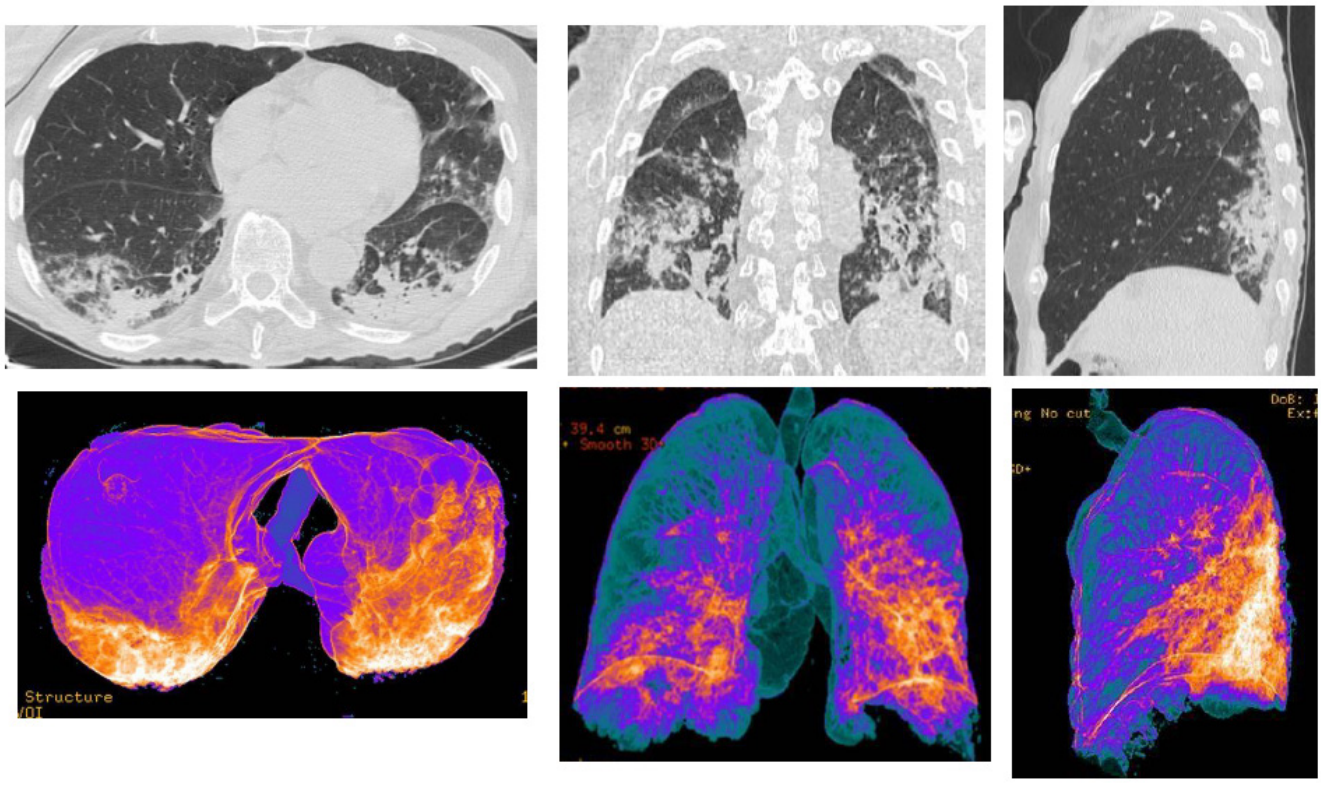

Figure 1: CT patterns of bilateral Covid-19 pneumonia of a 75-year-old male patient. In the upper line, MPR (axial, coronal, sagittal) reconstructions, that showed bilateral typical "ground-glass" areas, with interstitial thickenings. In the line above, Volume Rendering (VRT) "colored" reconstructions, that indicated as blue the areas representing the normal lung parenchyma, while orange/white areas indicate the inflammatory pulmonary involvements.

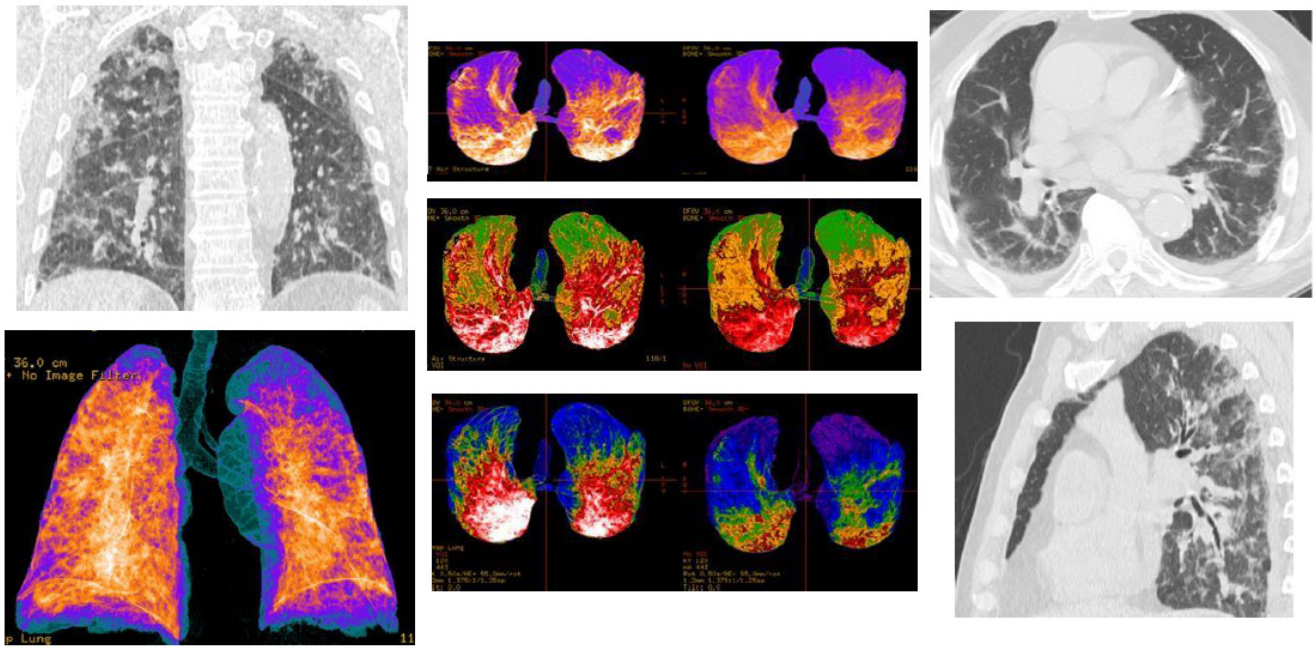

Figure 2: CT patterns of extended bilateral Covid-19 pneumonia of a 80-year-old male patient. MPR (axial, coronal, sagittal) reconstructions showed: bilateral and multifocal typical "ground-glass" areas; bilateral interstitial thickenings, with some consolidations areas; bi-basal pleural effusion. In the Volume Rendering (VRT) "colored" reconstructions, the blue areas represented the normal lung parenchyma (also in the ventral and dorsal areas), while orange/white and red areas indicate the inflammatory pulmonary involvements, with consolidations.

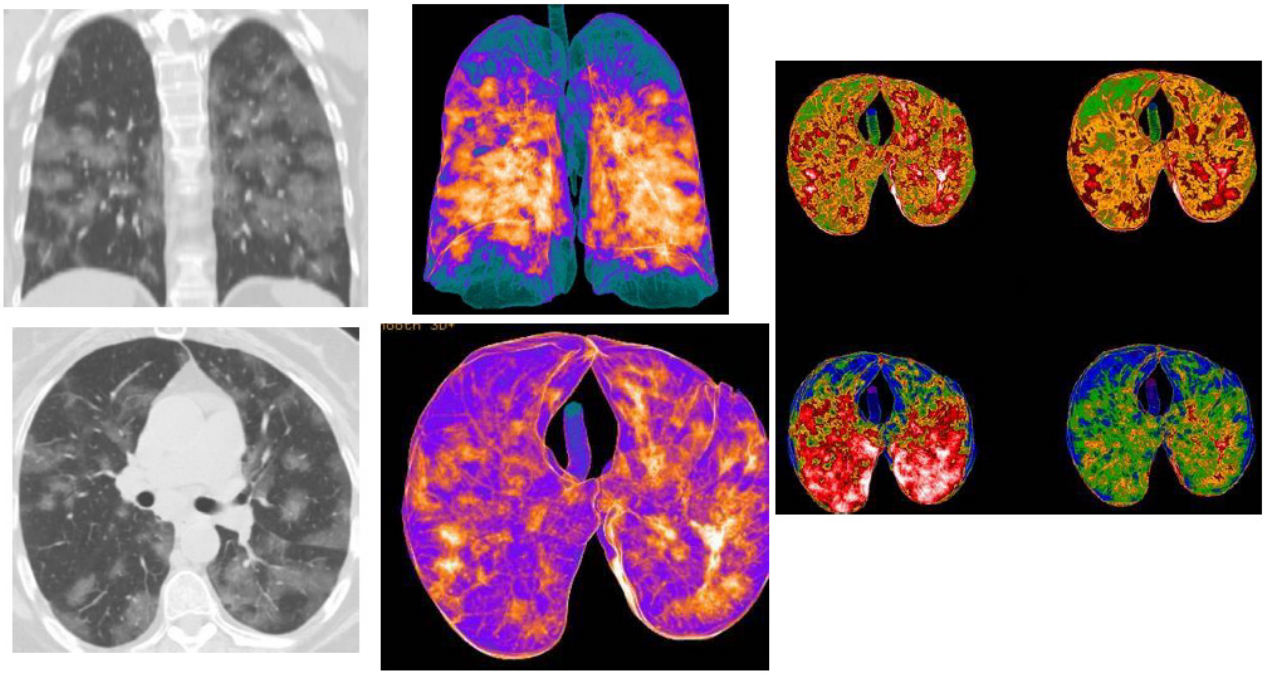

Figure 3: CT patterns of bilateral Covid-19 pneumonia of a 60-year-old female patient. MPR (coronal and axial) reconstructions showed: multiple bilateral consolidations areas, with bilateral interstitial thickenings, and few "ground-glass" areas. In the Volume Rendering (VRT) "colored" reconstructions (three images), the blue/green areas represented the normal lung parenchyma (also in the ventral and dorsal areas), while orange/white and red areas indicate the inflammatory pulmonary involvements, with consolidations.

Conclusion

Computed Tomography had an important role for the diagnosis, the severity assessment, monitoring and management of Covid-19 infection, thanks to a high sensitivity and rapid execution, thus orienting towards the best management/clinical outcome for the patients.

Acknowledgement

None.

Conflicts of Interest

No conflicts of interest.

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