

Scintigraphic Aspects of Pulmonary Lesions in COVID-19

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Abstract

COVID-19 is a systemic viral disease with respiratory tropism, highly contagious, poorly immunizing declared a pandemic on 03/11/2020 by the WHO. In the emergency of this pandemic, the overflow of the capacities of the health systems, the rapid spread of the virus, mortality and ignorance have forced many imaging procedures differently except CT of the lungs, considered essential. Therefore, with the resumption of activities, the question of the semiology of pulmonary lesions arises in other imaging modalities such as scintigraphy. The objective of this presentation is to report in a didactic approach the different aspects observed in lung scintigraphy in COVID-19 patients.

Keywords: COVID-19 nuclear medicine • Scintigraphy • Lung lesions

Introduction

COVID-19 is a systemic viral disease with respiratory tropism, highly contagious, poorly immunizing declared a pandemic on 03/11/2020 by the WHO. In the emergency of this pandemic, the overstretching of the capacities of the health systems associated with the rapid spread of the virus, mortality and ignorance have forced many imaging procedures differently except CT of the lungs, which is considered essential. Therefore, with the resumption of activities, the question of the semiology of pulmonary lesions arises in other imaging modalities such as scintigraphy.

The objective of this presentation is to report the different aspects observed in lung scintigraphy in COVID-19 patients to contribute to a better knowledge of the scintigraphic semiology of lung damage in an educational approach.

Methodology

We describe in this article the illustrative scintigraphic aspects of the different observable lesions in correlation with CT data from observed cases and data from the literature.

Results

Several semiological aspects are found in the scintigraphic exploration of COVID-19 lung damage following a systematic approach:

- We observed the declination of the thickening of the alveolar partitions without obliteration of the vascular framework giving the appearance of ground glass on CT scan under the appearance of

foci of hypermetabolism which can be moderate or intense on PET (Figure 1).

- Foci of condensation in the form of hyperdensity with disappearance of vascular contours appear on scintigraphy as foci of poorly systematized mixed defects (Figure 2).
- Foci of embolism in the form of a systematized perfusion defect can be found. The particularity is the presence of mixed lesions associated with COVID-19 (Figure 3).

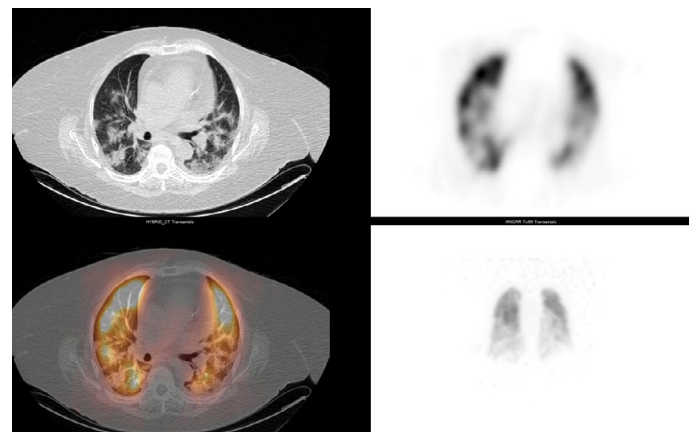


Figure 1. Diffuse foci of hypermetabolism

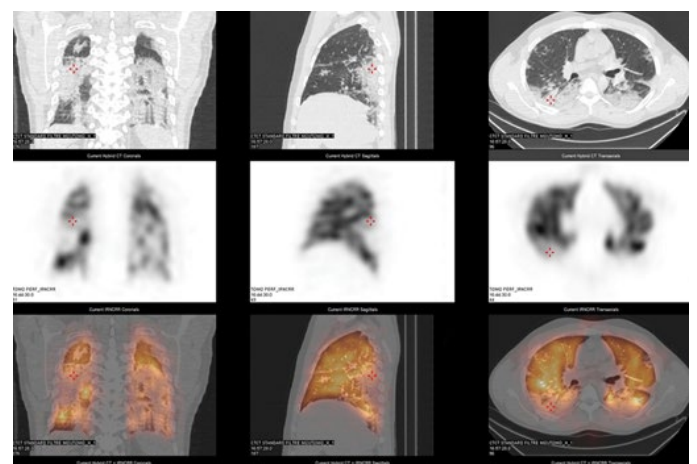


Figure 2. Foci of poorly systematized mixed defects.

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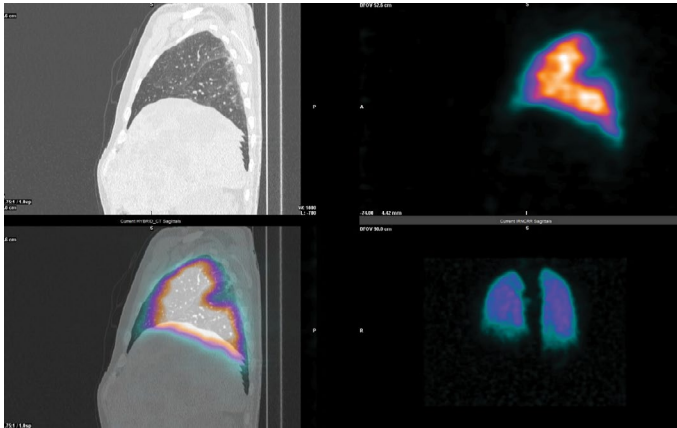


Figure 3. Well systematized perfusion defect.

Discussion

- ▶ Respiratory signs are generally the most striking picture of covid 19. Dry cough is found in about 60% of cases [1]. Thus, COVID-19 is a systemic viral disease with respiratory tropism, very contagious, poorly immunizing. SARS-CoV-2 uses angiotensin-converting enzyme 2 as its main cell receptor to enter the host cell. After an incubation of about five days, 70% of infected patients develop a cough, fever, or dyspnea. This phase of viral invasion is followed, in some patients, by an unsuitable immune reaction marked by worsening respiratory symptoms and inflammatory syndrome, generally eight to ten days after the first symptoms. This dysimmune phase, sometimes called cytokine storm, can be associated with coagulopathy, the whole corresponding, for some authors, to viral sepsis. This inflammatory and vascular cascade would be at the origin of the lung damage observed [2].
- ▶ CT data show bilateral lung involvement in approximately 75% of cases [3,4], predominantly peripheral. The most common radiological lesion is "ground glass" (68 to 83% of cases), followed by "crazy-paving" lesions (15 to 34%). Unions are present in 32 to 58% of cases [3]. The presence of a pleural effusion is unusual (5% of cases).
- ▶ In an emergency, the scanner is the standard imaging examination for exploration. Therefore, the question of the semiology of pulmonary lesions arises in radioisotope imaging. Lung scintigraphy is a functional examination to study the physiological processes of perfusion and to rule out an embolism. It remains relevant in the absence of diagnosis

on CT angiography [5].

- ▶ It should be noted that most of the work on COVID-19 in nuclear medicine focuses on the incidence of thromboembolic complications. The study of semiological scintigraphic aspects of COVID-19 lung lesions is all the more relevant as ignoring them can lead to misinterpretations. However, the golden rule for an imager is to always take into account the context for an objective interpretation of images. Moreover, although scintigraphy is sensitive and early in the diagnosis of pulmonary embolism, the need to take perfusion and ventilation images entails a risk of contamination for medical personnel. Many teams suggest limiting themselves to perfusion scintigraphy in the epidemic context to make the diagnosis [6].

Conclusion

- ▶ The questions of scintigraphic semiology on COVID-19 lesions are all the more relevant as their ignorance can lead to false interpretations.
- ▶ However, the golden rule for an imager is to always take into account the context for an objective interpretation of images. Moreover, the theranostic molecular approach of nuclear medicine gives it the potential to provide evidence and clarify certain contradictions in the inflammatory involvement of this virus-induced disease.

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