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The role of the radiologist in diagnosing the COVID-19 infection. Parma experiences

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Summary. The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is a new virus responsible for the coronavirus disease 2019 (COVID-19), a respiratory disease that ranges from an asymptomatic or mild flu-like illness to severe pneumonia, multiorgan failure, and death. Imaging might play an important role in clinical decision making by supporting rapid triage of patients with suspected COVID-19 and assessing supervening complications, such as super-added bacterial infection and thrombosis. Further studies will clarify the real impact of imaging on COVID-19 patients' management and the potential role of radiology in future outbreaks. (www.actabiomedica.it)

Key words: COVID-19

The spread of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has taken pandemic proportions. This virus is responsible for the coronavirus disease 2019 (COVID-19), a respiratory disease that can be very severe and even life-threatening. Italy was the first country in Europe to witness a widespread outbreak of COVID-19, which has infected 1,991,562 people worldwide, until April 16, 2020 (1). Currently, Italy has the third-highest number of confirmed cases globally, after the United States of America and Spain. Unfortunately, Italy records the highest number of fatalities, with over 20,000 associated deaths, as for mid-April reports. In Parma, a city located in one of the most affected Italian areas so far, the massive load of acute respiratory referral during the pandemic has made it necessary to carry out prompt, dynamic response strategies (2). A great effort has been made to minimize the risk of contamination and to cover the expanding clinical necessities, including the development of an operational plan for a dedicated care site for COVID-19, implementation of the recommended infection prevention techniques, and making personal protective equipment (PPE) available as early as possible.

As an integral part of a tailored diagnostic decision making, imaging has proven to be useful in managing patients with suspected COVID-19, namely in the evaluation of moderate to severe symptomatic patients selected from a first-line dedicated triage. One major advantage of imaging has been to provide quick answers to such a massive referral while complementing the required molecular diagnostic test, a real-time reverse transcription-polymerase chain reaction (RT-PCR). Although RT-PCR remains the standard of diagnosis, its variable reported sensitivities (3,4), potential shortage, and necessary turnaround time (i.e., at least 12 hours in most sites), represent significant limitations in an emergency setting. Conversely, thoracic imaging, and especially computed tomography (CT), potentially complements the contingency demand by

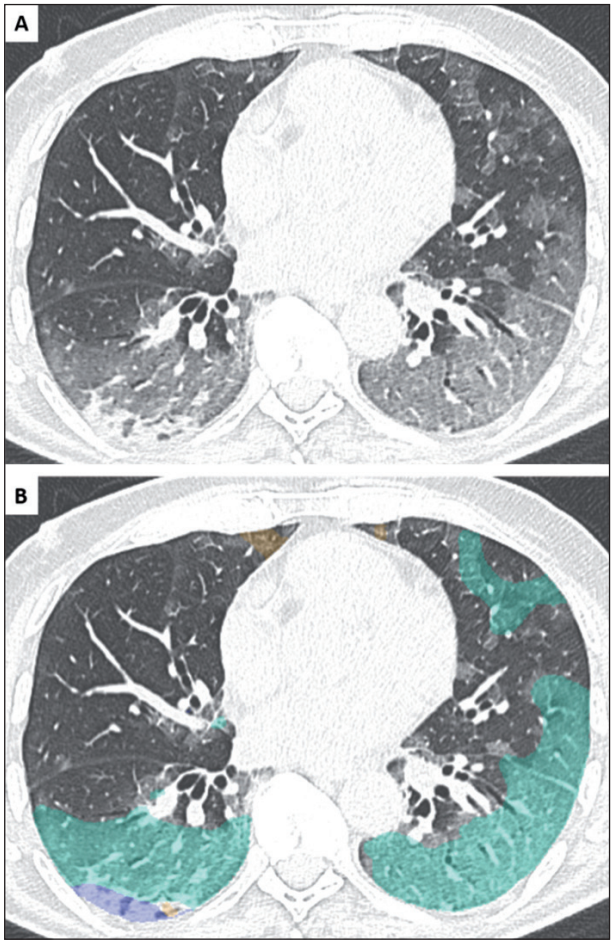

Figure 1. High-resolution computed tomography (HRCT) in a 50-year-old man with COVID-19 pneumonia. (A) Axial HRCT image depicts bilateral, extensive ground-glass opacities admixed with consolidations. (B) The corresponding color-overlay image derived from a texture-based automated quantification system shows extents of different regional patterns: green= ground-glass, violet= consolidation, yellow= reticular opacity.

feeding rapid triage, with the consciousness of diagnostic limits of this approach.

CT has been reported to have higher sensitivity compared to that of initial RT-PCR results, with 60% to 93% of patients presenting with CT findings of COVID-19 before the initial positive RT-PCR results (4). Moreover, even though non-specific imaging findings consistent with COVID-19 (i.e., ground-glass opacities and consolidations) (Figure 1) may be reasonably taken as a presumptive diagnosis of the disease when found within highly prevalent areas (5), thus potentially improving the overall clinical workflow efficiency. Also, CT enables the identification of other potential causes of severe acute respiratory symptoms, which may allow patients to be discharged from COVID-19 dedicated protocols and appropriately treated (6,7).

Radiologists and clinicians must be aware of the limitations of imaging in assessing suspected COVID-19 patients, always keeping in mind that a normal CT does not rule out SARS-CoV-2 infection (8). Atypical imaging pattern of the disease may be found when preexisting lung disorders, immunodeficiency, or concomitant heart failure are present, making it often challenging, if not impossible, to safely suggest the presence or absence of findings attributable to COVID-19 in these patients. Moreover, even if imaging enables the assessment of disease extent and patterns, its real prognostic value is still unclear.

The aforementioned potential contributions of imaging to such an unprecedented diagnostic workflow have been perceived to be really impactful on daily clinical practice so far. However, further studies are needed to clarify if and how imaging tools have really influenced patients' clinical management during this pandemic. Analysis of the available data is no mere question of speculative interest but can provide valuable insights on how to face both this and future outbreaks properly. Tech innovations that have not yet made their way in daily clinical practice, notably the Artificial Intelligence, could also play a critical role in teasing out the best treatment and diagnostic strategies (9).

Conflict of interest: Each author declares that he or she has no commercial associations (e.g. consultancies, stock ownership, equity interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article

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