Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Letter to the editor

Pulmonary thromboembolism in critical ill COVID-19 patients

Dear Editor,

The outbreak of novel coronavirus disease 2019 (COVID-19) in the city of Wuhan, Hubei Province, China, was declared a pandemic by the World Health Organization (WHO) on March 21, 2020. Since then, this outbreak has forced the scientific community to consider two fundamental aspects: severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the causative agent of COVID-19, does not only cause pneumonia, and the death of many critically ill patients is caused by multiple organ failure (involving the heart, liver, kidneys, blood, and immune system) (Wang et al., 2020). Therefore, attention should be paid to potential multiorgan injury, and its prevention should be part of the treatment of COVID-19, especially in critically ill patients (Wang et al., 2020).

Since the first report of COVID-19 pneumonia by Zhu et al. (Zhu et al., 2020), several studies have been published highlighting the role of chest computed tomography (CT) in detecting typical and atypical parenchymal patterns and in assessing the evolution over time of COVID-19 pneumonia (Chung et al., 2020; Pan et al., 2020). Other findings include enlarged subsegmental pulmonary vessels in 59–89% of COVID-19 pneumonia cases (Bai et al., 2020; Caruso et al., 2020), which could be related to pro-inflammatory factors or hyperaemia (Ye et al., 2020; Li et al., 2003). Pulmonary thromboembolism has been reported on CT in patients with COVID-19 pneumonia with high D-dimer levels (Danzi et al., 2020; Xie et al., 2020), and in COVID-19 patients with normal D-dimer levels, without strong predisposing risk factors for venous thromboembolism (VTE) (Chen et al., 2020).

At the moment it is unclear whether hospitalized patients with COVID-19 have a greater risk of VTE than other patients who have chest infections and elevated D-dimer values (Darzi et al., 2020 Feb 24). Critically ill patients are likely to be at increased risk of VTE, especially if they become immobilized on critical care. However, the risk of VTE must be assessed in all patients admitted to the hospital, and prevention should be administered to all high-risk patients according to international guidance on thromboprophylaxis (Anderson et al., 2019). Lee et al. (Lee et al., 2020) performed an observational study and suggested that up to 5–10% of patients with COVID-19 who require mechanical ventilation have acute pulmonary embolism and/or deep venous thrombosis.

Coronavirus causes direct endothelial cell injury to the microvessels, with subsequent release of damaged endothelial cells into the bloodstream (Zhang et al., 2020 Mar). Patients with severe COVID-19 are often immobile and present with an acute inflammatory state that leads to hypercoagulability. Therefore pulmonary thromboembolism may be considered in COVID-19 patients with sudden onset of oxygenation deterioration, respiratory distress, and reduced blood pressure. This might be supported by the altered D-dimer values, and although it is true that D-dimer is a non-specific acute-phase reactant, elevated D-dimer values have been used to identify those severe COVID-19 patients at increased risk of VTE (Spyropoulos et al., 2020 Mar 13).

CT plays a critical role in identifying the pathological pulmonary changes observed in severe and critical COVID-19 patients (An et al., 2020). Contrast-enhanced CT of the chest is mandatory to assess parenchymal patterns and their evolution over time. Moreover, CT allows the diagnosis of pulmonary thromboembolism, a common finding in severe COVID-19, guiding correct treatment after a careful evaluation of the patient's pre-existing comorbidities.

In COVID-19, which is associated with a high morbidity and mortality rate, largely due to respiratory failure, a pathophysiological role of pulmonary embolism and the usefulness of contrast-enhanced CT in diagnosis may be considered.

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Michele Scialpi[a,*]
Sara Scialpi[b]
Irene Piscioli[c]
Giovanni Battista Scalera[d]
Fernando Longo[e]

[a]*Division of Diagnostic Imaging, Department of Surgical and Biomedical Sciences, Santa Maria della Misericordia Hospital, University of Perugia, Perugia, Italy*

[b]*Department of Anaesthesia and Intensive Care, University Hospital Pisa, Pisa, Italy*

[c]*Division of Radiology, Budrio Hospital, Bologna, Italy*

[d]*Division of Radiology 1, Santa Maria della Misericordia Hospital, University of Perugia, Perugia, Italy*

[e]*Department of Anaesthesia and Intensive Care, University Hospital Perugia, Perugia, Italy*

* Corresponding author. Division of Diagnostic Imaging, Department of Surgical and Biomedical Sciences, Perugia University, Santa Maria della Misericordia Hospital, S. Andrea delle Fratte, 06156 Perugia, Italy. Tel.: +39 075 5783507; fax: +39 075 5783488.
E-mail address: michelescialpi1@gmail.com (M. Scialpi).

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