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Michele Scialpi Sara Scialpi Irene Pisciole Giovanni Scalera
Fernando Longo



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Pulmonary thromboembolism in critical ill COVID-19 patients

Michele Scialpi^φ, Sara Scialpi[^], Irene Pescioli^{*}, Giovanni Scalera[§], Fernando Longo[¶]

^φSection of Diagnostic, Department of Surgical and Biomedical Sciences, Santa Maria della Misericordia Hospital, University of Perugia, Perugia, Italy

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

^{*}Division of Radiology, Budrio Hospital, Bologna Italy

[§]Section of Radiology1 Santa Maria della Misericordia Hospital, University of Perugia, Perugia, Italy

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

Correspondence to: Michele Scialpi, MD, Full Professor of Radiology, Perugia University, S.M. della Misericordia Hospital, S. Andrea delle Fratte, 06156 Perugia, Italy. Tel.: +39 075.5783507, Fax: +39 0755783488, e-mail: michelescialpi1@gmail.com

Highlights

- COVID-19 in critical ill patients causes death not only for pneumonia but also for multiple organ injuries;
- in critical ill COVID-19 patients with pneumonia, pulmonary thromboembolism may be considered;
- in critical ill COVID-19 patients contrast-enhanced CT of the chest is mandatory to assess parenchymal patterns and to diagnose pulmonary thromboembolism

Dear Editor,

the outbreak of novel Coronavirus disease 2019 (COVID-19) in the city of Wuhan, Hubei province of China, has been declared a pandemic by the World Health Organization (WHO) on March 21st, and has since then forced the scientific community to consider two fundamental aspects: first off, SARS-CoV-2 does not only cause pneumonia and second, the death of many critical ill patients is caused by multiple organ failure (involving the heart, liver, kidneys, blood and immune system). 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 (1).

Since the first report of Dr Zhu et al. (2) on COVID-19 pneumonia, 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 the time of COVID-19 pneumonia (3,4). Other findings include enlarged subsegmental pulmonary vessels in 59%-89% of COVID-19 pneumonia cases (5,6) which could be related to pro-inflammatory factors or hyperemia (7,8), Pulmonary thrombembolism (PTE) has been reported by CT in patients with COVID-19 pneumonia with high D-dimer levels (9,10) and in COVID-19 patient with normal D-dimer level, without strong predisposing risk factors for venous thrombo-embolism (VTE) (11).

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 (12). Critically ill patients are likely to be at increased risk of VTE, especially if they become immobilised 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 (13). Lee

at al (14) in a observational study suggest that up to 5-10% of patients with COVID-19 infection who require mechanical ventilation have acute pulmonary embolism and/or deep venous thrombosis.

Coronavirus determines direct endothelial cells injury of the microvessels with subsequent release of damaged endothelial cells into the bloodstream (15); severe COVID-19 patients are often immobile and present with an acute inflammatory state that leads to hypercoagulability. Therefore PTE 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 (16).

CT plays a critical role in the pathological pulmonary changes observed in severe and critical COVID-19 patients (17). Contrast-enhanced CT of the chest is mandatory to assess parenchymal patterns and their evolution over time. Moreover, CT allows the diagnosis of PTE, a common finding in severe COVID-19, guiding correct treatment after a careful evaluation of the patient's pre-existing comorbidities.

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

Conflict of Interest

No conflict of interest to declare.

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Ethical Approval

Approval was not required.

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Authors contributions

- Writing manuscript: MS, SS;
- Editing Manuscript: MS, SS, IP, GBS, FL;
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