Intensive Care Medicine

Letter to the Editor Un-edited accepted proof

Thrombotic events in SARS-CoV-2 patients: an urgent call for ultrasound screening

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Dear Editor,

COVID-19 outbreak in Wuhan city, China in December 2019 has rapidly spread until the level of Pandemia at the beginning of March 2020. A recent report from China has identified high inflammatory status as predictor of adverse outcome, suggesting that mortality might be due to virally driven hyper-inflammation status[1].

There is a well-established link between inflammation and increased risk of deep vein thrombosis (DVT). Potential explanations are that vessels wall inflammation initiates thrombus formation, through the activation of endothelial cells, platelets, and leukocytes that trigger the coagulation pathway[2, 3].

Additionally, procoagulant state has long been recognized also as part of ARDS pathophysiology, demonstrated by the identification diffuse pulmonary endothelial injury associated with platelets activation, macro- and micro-thrombi thought to be either embolic, formed in situ or both [4].

Moreover, the interactions pathway among platelets, neutrophils, and endothelial cells dysfunction in ARDS has been associated with deep vein thrombosis development[2]. High prevalence of acute pulmonary embolism (APE) has been recently reported in patients admitted with COVID-19 related pneumonia [5].

We report the prevalence of venous thrombotic events in patients consecutively admitted to ICU of Hub Hospital for SARS-Cov2 since the beginning of the Italian outbreak infection on February 21 2020. Informed consent was collected following the ad hoc procedures defined by the Ethics Committee for the Covid-19 pandemic. The treating physicians owed the responsibility of the patient's data management and protection aiming at the improvement in treatment and safety.

All patients were sedated, mechanically ventilated and treated with prophylactic low-molecular-weight heparin (LMWH) adjusted on body-weight since the admission.

Eight out of 54 patients (14.8%) were diagnosed with deep vein thrombosis of whom 6 central catheter-related. Additionally, one patient, had a thrombotic formation attached to the tricuspid valve in absence of predisposing factors. Sub-segmental pulmonary embolism was found in two patients undertaking computed tomography pulmonary angiography (CTPA) and one patient died

for cardiac arrest with pulseless electrical activity (PEA) as presentation rhythm and sudden right ventricular dilatation.

In our experience, overall 22,2% of patients (83% Male, 68 ±7 years-old; BMI 29.3±4.4 Kg/m^2; C-Reactive Protein 25.7±9.2 mg/dl, Fibrinogen 657.1±200.6 mg/dl) admitted to ICU due to SARS-Cov2 interstitial pneumonia had venous thrombotic events.
ICU admission and ARDS are considered both predisposing factors for a number of reasons, including the need of prolonged immobilization and hyper-inflammatory state. The prevalence of vein thrombosis in patients admitted with ARDS is currently unknown.
A recent report on 10 out of 25 patients admitted with pneumonia due to COVID-19 presented sub-segmental APE, assessed with CPTA. No associated deep vein thrombosis was reported as the authors did not perform ultrasound screening.

According to the pathophysiological linkage between inflammation and thrombosis development[3], especially in critically ill patients, the hyper-inflammatory status of patients with SARS-Cov2[1], high prevalence of APE[5] and of vein thrombotic events found in our population, we strongly suggest that a close vein ultrasound screening and monitoring should be performed in all patients hospitalized due to COVID-19 related infection. Additionally, right ventricular dilatation/dysfunction should trigger the suspicion of APE.

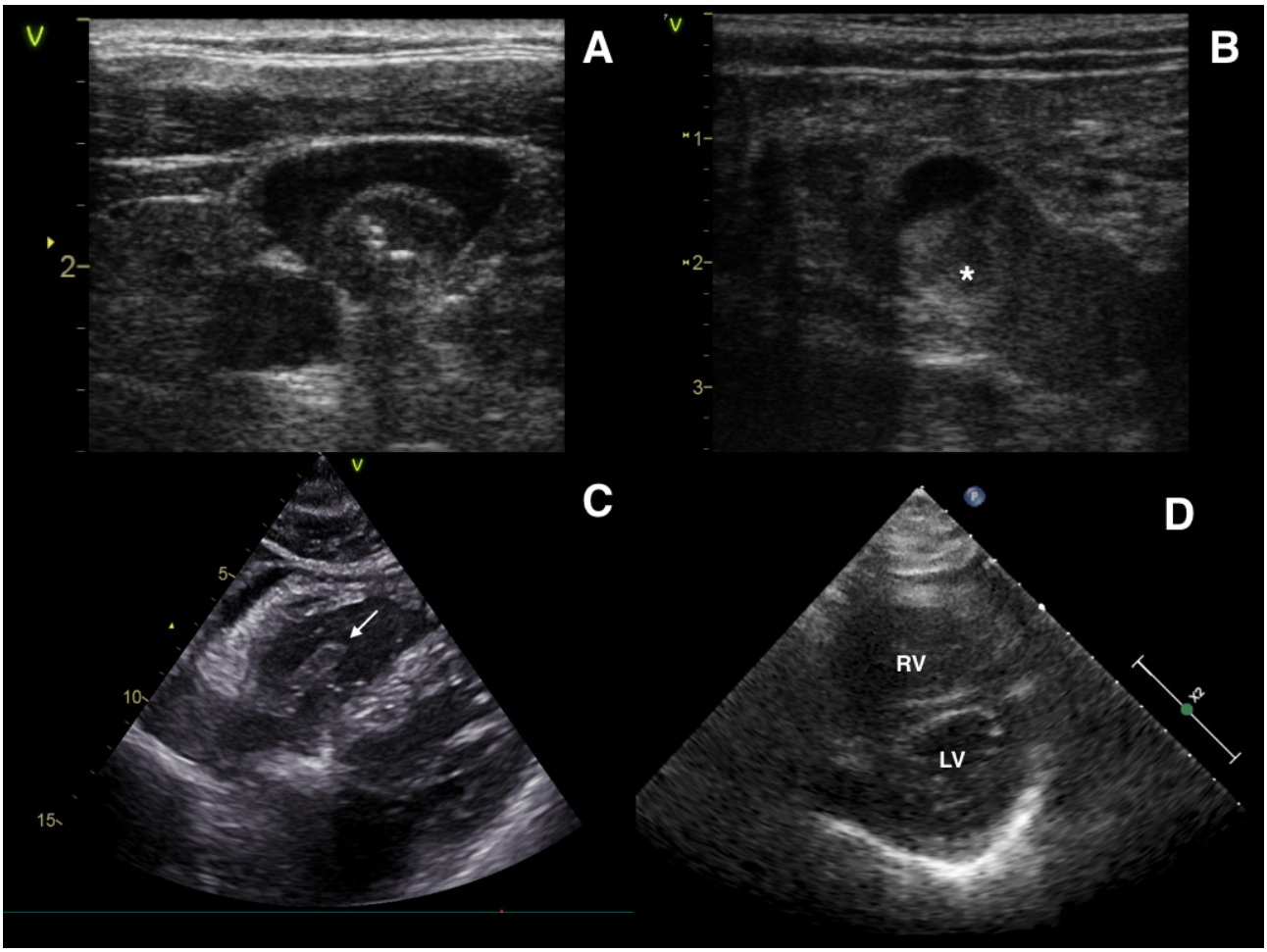

Figure 1:

Ultrasound demonstration of thrombotic events in patients admitted with SARS-Cov2.
Deep vein ultrasound showing (A – ESM1) the internal jugular vein with a thrombus surrounding a central catheter (central white point) and (B- ESM2) a thrombus of superficial and common femoral vein (white asterisk).
Trnsthoracic echocardiography subcostal view demonstrating (C- ESM3) a thrombus in the right ventricular cavity, attached to the tricuspid valve (white arrow) and (D- ESM4) parasternal short axis view in patient with right ventricular dilatation (Right ventricular /Left ventricular area 0.7) inducing interventricular paradoxical septal motion.

SUPPLEMENTARY VIDEO MATERIAL:
ACP in thrombosis.mov
Femoral thrombus.mov
Jugular thrombus.mov
RV thrombus.mov

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