COVID-19 and its implications for thrombosis and anticoagulation

Jean M. Connors, Jerrold H. Levy

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Author of the commentary: Dr Raquel Ferrandis Comes. Medical Specialist in Anaesthesiology and Reanimation. University and Polytechnic La Fe Hospital, Valencia. Associate Professor Faculty of Medicine, Valencia

The authors present an interesting review, starting from a global point of view and then focusing on coagulopathy associated to COVID-19, based on information currently available. Regarding COVID-19-induced infection, ISTH (International Society on Thrombosis and Haemostasis) has described two coagulation changes, SIC (sepsis-induced coagulopathy), and DIC (disseminated intravascular coagulopathy). SIC-associated changes are less severe and occur earlier than in patients with DIC; if the sepsis-induced infectious process is not resolved, SIC progresses to DIC. The acronym CAC, COVID-19-associated coagulopathy, has been used to describe the early changes observed in coagulation tests, without the observation of clinical coagulopathy or increase in the risk of associated bleeding. COVID-19 infection has been associated with a slight increase in prothrombin time (PT) and activated partial thromboplastin time (aPTT), together with a marked increase in D-dimer, in parallel with increased biomarkers of inflammation, such as IL-6. Moreover, additional reports indicate patients with severe infection treated with heparin show improved outcomes compared with non-heparin treated patients.

The activation mechanism of coagulopathy is unknown. Nevertheless, SARS-CoV-2 infection involves, as in other infections, the activation of the inflammatory system, which in turn is closely related to the activation of coagulation. It was also suggested that the increase in D-dimer levels, could be a reflection of the seriousness of the infection, following the activation of inflammation and coagulation as the disease progresses. It is also thought that both elevated basal D-dimer levels at admission and subsequent D-dimer increase over time have been associated with increased mortality in patients with COVID-19.

In addition, the angiotensin-converting enzyme 2 (ACE2) receptor has been described as the molecule for viral adhesion. Viral replication in the endothelial cell has been related to inflammatory cell infiltration, endothelial cell apoptosis and microvascular prothrombotic effects, which likely contribute to the COVID-19 clinical profile.

Regarding the management of patients with COVID-19 and given the known increase in thrombotic events in these patients, all patients should receive thromboprophylaxis, unless contraindicated, at hospital admission. However, the dose of heparin remains controversial, with an increasing number of authors suggesting higher doses should only be used in patients with severe COVID-19 infection. The risk of venous thromboembolism (VTE) associated with increased anticoagulation in patients with COVID-19 lacks clinical evidence, but this approach has been used in patients with suspected pulmonary embolism, based on echocardiography, and in patients with clinical evidence of sudden respiratory decompensation or deep vein thrombosis.