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D-Dimer Levels for Diagnosis and Prognosis Assessment of COVID-19 Severity and Death

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Coagulopathy and increased levels of antiphospholipid antibodies are more prevalent in critically ill-COVID-19 patients and may predispose patients to both arterial and venous thrombotic diseases, due to blood circulation stasis, endothelial dysfunction, platelet activation, and excessive inflammation [1, 2]. D-dimer, a marker of fibrinolysis and a proxy for ongoing thrombosis is the sensitive change in coagulation parameters in COVID-19, whereas it has low specificity for the detection of venous thromboembolism [3]. A retrospective cohort study in France demonstrated that D-dimer levels at baseline significantly higher in patients with deep venous thrombosis (DVT) ($p < 0.001$), whereas the positive predictive values for venous thromboembolism (VTE) for baseline D-dimer levels that were equal to 1.0 µg/mL or more and more than 3 µg/mL were 44 % and 67 %, respectively and the negative predictive values for baseline D-dimer levels that was less than 1.0 µg/mL for VTE and pulmonary embolism (PE) were 90 % and 98 %, respectively [4]. VTE risk was predicted by elevated D-dimer concentrations of more than 1.0 µg/mL [4]. In another prospective study of 165 consecutive hospitalized-non-intensive-care-unit-COVID-19-related pneumonia patients with D-dimer levels of more than 1,000 ng/mL and complete compression doppler ultrasonography screening revealed that the D-dimer levels were higher in diagnosed-DVT patients, compared to other patients (4,527 ng/mL vs. 2,050 ng/mL; $p < 0.001$) [5]. He et al demonstrated that a D-dimer level of 2.025 mg/L was the suitable probability cutoff or a prognosis of death, whereas male gender, advanced age, dyspnea, and some underlying diseases were the influencing factors D-dimer levels impacting COVID-19 prognosis, whereas Poudel et al demonstrated that D-dimer level of 1.5 µg/mL on hospital admission is the proper cutoff level for predicting the mortality in COVID-19 patients [6, 7]. Zhan et al conducted a meta-analysis and meta-regression on diagnostic value of D-dimer levels in COVID-19 patients and revealed that the specificity of the prognostic performance of D-dimer levels for the severity, mortality, and VTE in COVID-19 were 71 % (95 % CI : 64 %-77 %), 83 % (95 % CI : 77 %-87 %), and 60 % (95 % CI : 60 %-60 %), respectively, and the pooled sensitivity were 77 % (95 % CI : 73 %-80 %), 75 % (95 % CI : 65 %-82 %), and 90 % (95 % CI : 90 %-90 %), respectively [8].

In conclusion, D-dimer level testing is not useful for the diagnosis of PE due to low positive predictive values of increased D-dimer levels. The high levels of D-dimer in COVID-19 patients do not definitely making the diagnosis of DVT, but can be used for screening VTE-related-COVID-19. Reduction in D-dimer levels may correlate with COVID-19 clinical improvement.

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