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The role of vascular surgeons in the treatment of COVID-19-associated pulmonary embolism



As the world is currently going through a pandemic caused by the severe acute respiratory syndrome coronavirus 2 (SARS-COVID-2), the international medical community is collecting data on coronavirus disease (COVID-19). In this battle, vascular surgeons are not directly involved in the diagnosis and/or treatment of COVID-19. Their role is still to be determined, mainly by examining whether they could intervene in cases of pulmonary embolism (PE) caused by severe SARS-COVID-2 infection. This is exactly the point that a vascular surgeon should join efforts to combat this infection and possibly save patients in a dire situation.

PE is a potentially lethal form of venous thromboembolism with a nonspecific clinical presentation and a rather challenging diagnosis. The number of diagnosed PE cases have been continually increasing, mainly owing to the introduction improved diagnostic workup and increased awareness from medical personnel. Septic PE (SPE) is a form of secondary PE and alike PE its diagnosis is challenging.

It is already described that disseminated intravascular coagulation can occur in patients with severe COVID-19 leading to SPE.¹⁻³ COVID-19-related SPE is already described as a lethal complication and a negative prognostic factor.⁴ Published data on COVID-19-related SPE remains limited to a small number of case reports.

Besides anticoagulation, PE treatment consists of systemic fibrinolysis (SF), catheter-directed thrombolysis (CDT), and surgical thrombectomy (STE).⁵ SF shows both a high survival rate and significant bleeding risk for stable PE patients. SF is recommended in high-risk patients and in deteriorating patients. STE is recommended in high-risk PE patients with contraindications for SF or when SF has already failed. CDT (including aspirational thrombectomy) seems to have more benefits than risks for the patient compared to STE and it is considered an alternative to STE when there is contraindication for SF or when SF has failed.

Very limited data exist regarding SPE treatment. Therefore, it should not come to our surprise that SPE is not part of any society's guidelines and any treatment is based on PE data.

Anticoagulation and SF can be performed by physicians other than vascular surgeons. On the other hand, the two methods used in PE patients who saw little or no benefit from anticoagulation—STE and CDT—could be performed by vascular surgeons. In patients with COVID-19, any CDT technique could be of great clinical benefit because it improves pulmonary circulation without the risks of SF or STE. Most CDT techniques are performed in existing setups of specialized centers by multidisciplinary PE response teams consisting of cardiologists, interventional radiologists, vascular surgeons,

intensive care physicians, and pulmonary specialists. These teams rapidly evaluate the frail or quickly deteriorating patient, then choose the optimal technique for maximum patient benefit and finally execute the plan.

Despite a lack of solid evidence regarding SARS-COVID-2, COVID-19 patients presenting with SPE should receive life-saving pulmonary reperfusion performed by an experienced vascular surgeon as a member of a multidisciplinary team.

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COVID-19 and SIC (!)



Accurate risk stratification tools are paramount for optimal disease management. Patients with cardiovascular conditions, diabetes, and cancer are most susceptible to coronavirus disease-2019 (COVID-19) complications, leading to poor outcomes.¹ These systemic diseases relate to enhanced fibrin formation and thromboinflammation. Indeed, the severity of peripheral occlusive arterial disease correlates with the levels of both fibrinogen and its turnover measure D-dimer.² In severe COVID-19 infection, elevation of D-dimer and sepsis-induced coagulopathy (SIC) predicts a poor prognosis. The incidence of venous thromboembolism in patients with severe COVID-19 pneumonia is 25% (!).³ Furthermore, endothelial injury inherent to vascular procedures may predispose to coagulopathy in COVID-19. The