Thrombotic Events in COVID-19 vs Sepsis Patients

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Background: Since its onset, the Covid-19 pandemic has significantly altered the world's economy, livelihood, healthcare infrastructure, and patient care. The clinical disease of the virus is a primary respiratory compromise; however, emerging studies are identifying genetic and physiologic variables that impact patient survival. Although there is currently no cure for Covid-19, mortality risk stratification can assist in identifying patients who benefit from early preventative therapies. Several recent studies have demonstrated that Covid-19 infection is associated with a hypercoagulable state. Guan et al. showed an association between Covid-19 infection and elevated D-dimer, consistent with the finding in autopsy studies of fibrin thrombi and extensive fibrin deposition in small vessels and capillaries of Covid-19 positive deceased. Tang et al. found DIC (disseminated intravascular coagulation) in over 70% of patients who succumbed to Covid-19. Klok et al. reported a rate of 31% VTE (venous thromboembolism) in Covid-19 ICU patients. Al-Samkari et al. evaluated the incidence of thrombotic and bleeding events in patients diagnosed with Covid-19. They found a VTE rate of 4.8% in Covid-19 patients and a bleeding rate of 4.8%. In addition, variables such as D-dimer, ESR, CRP were associated with thrombosis. Together, these observations suggest that altered coagulability may be a part of the pathophysiology of Covid-19 disease and may be associated with adverse outcomes and mortality.

Historically, studies have also demonstrated high rates of thrombotic events among patients with sepsis. For example, a multicenter prospective study done by Kaplan et al. found that 37.2% of patients with severe sepsis and septic shock developed VTE. This rate appears similar to a meta-analysis conducted by Porfida et al., which showed a VTE rate of approximately 26% in patients with Covid-19. Therefore, whether the associated increase in thrombotic events results from Covid-19 specific infection or a general severe infection response is unknown. To further elucidate the pathophysiology of Covid-19 hypercoagulability, we aim first to compare the risk of thrombotic events in patients with Covid-19 disease and all patients with sepsis or septic shock.

Methods/Design: A retrospective chart review was performed of patients admitted to Tampa General Hospital intensive care unit with a diagnosis of COVID-19 or sepsis secondary to other organisms. These records were reviewed and subsequently performed data variables extraction by the information technology (IT) department. Patients were assessed for comorbidities including age, obesity,

malignancy, heart failure, respiratory failure, rheumatologic disorders, diabetes, history of VTE. For the rest of the variables, a manual chart review is being performed to calculate the Charlson Comorbidity Index. Subjects will be matched by age, BMI, DM2, and Charlson Comorbidity Index to compare VTE rates.

Outcome: Currently in the data collection phase and will soon start data analysis.

Learning Objectives:

- Describe the risk of venous and arterial thrombotic events in inflammatory states including COVID-19 disease and sepsis secondary to other organisms
- Compare and contrast the incidence of VTE in COVID-19 patients admitted to the ICU, and ICU patients with a diagnosis of sepsis
- Discuss comorbidities that increase risk of VTE