BRIDGE/HSS 2021: COVID-19 and Anticoagulation

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Abstract

- The COVID-19 pandemic has affected millions of people worldwide. Besides COVID-19 affecting several organs in the body, it has increased the incidence of thrombotic conditions, especially hospitalized patients who are at high risk for developing thrombotic conditions. Thrombosis continues to remain an important concern in these patients. The authors have researched the possible relationship of COVID-19 and risk of thrombosis, its management and prevention.

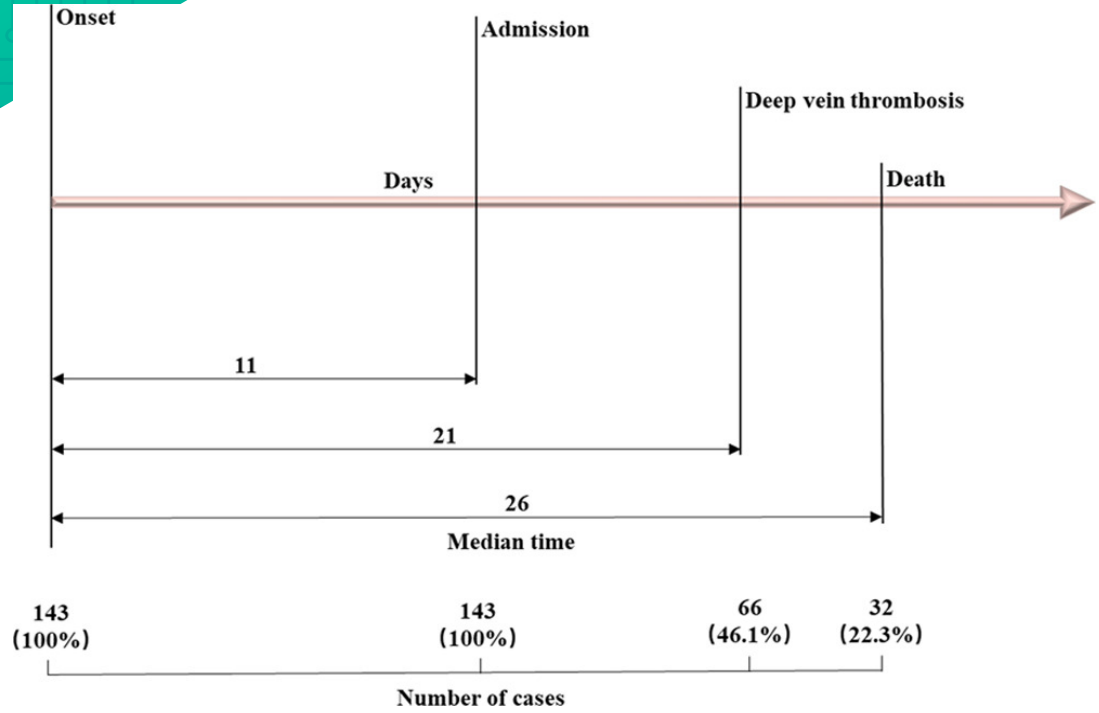
Introduction

- The COVID-19 virus has caused a pandemic that has swept through the world and caused over 3.85 million deaths worldwide to date.
- Most of the population experiences respiratory illness and recovers quickly.
- Certain segments of the population including the elderly and those with pre-existing conditions such as diabetes, obesity, and immunosuppressed patients are more likely to be heavily impacted.

Introduction

- One of the most serious complications of COVID-19 is thrombotic events.
- For COVID-19, in addition to the specific treatment/prevention guidelines, simple precautions such as the use of masks and social distancing can help the community stay safe.

Timeline of COVID-19 After the Onset of Illness



- Figure 1: Timeline of COVID-19 after onset of illness

Symptoms of COVID-19

- Cough, congestion in chest, loss of appetite, loss of smell and taste, shortness of breath.
- Long term complications: Cognitive impairment, pneumonia (which can cause long-term damage to alveoli in lungs leading to long-term breathing problems), sepsis, acute respiratory distress syndrome, and thrombosis.

Thrombotic Complications due to COVID-19

- The critically ill patients invariably have a disrupted coagulation function, predisposing them to coagulopathies, and both venous and thromboembolic complications.
- The incidence of VTE in COVID-19 patients varies from a range of 1.1% in non–ICU hospital wards to 69% in ICU patients screened by a lower extremity ultrasound.

Thrombotic Complications due to COVID-19

- Common events include PE, DVT, ischemic stroke, MI, and systemic arterial embolism.
- Acute limb ischemia, abdominal and thoracic aortic thrombosis, mesenteric ischemia, myocardial infarction, venous thromboembolism, acute cerebrovascular accident, stroke, and disseminated intravascular coagulation have also been seen to occur.
- Prolonged immobilization leading to VTE.

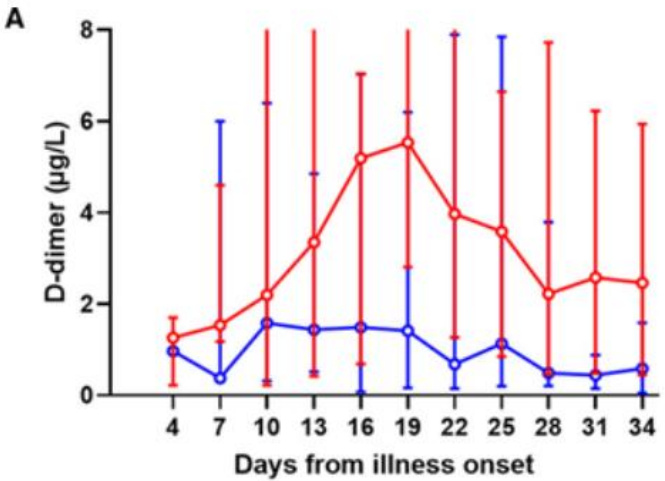
Thrombotic Complications due to COVID-19

- Patients with additional risk factors (e.g., older, male, obesity, cancer, history of VTE, comorbid diseases, ICU care), have a higher risk of VTE than those with mild or asymptomatic disease.

Mechanism of Thrombosis in COVID-19

- The virus is known to cause excessive inflammation, endothelial injury, hypoxia, and disseminated intravascular coagulation, contributing to thrombosis.
- Believed to be due to a hyperinflammatory response caused by the virus.
- Common laboratory findings when investigating include thrombocytopenia, elevated D-dimer, fibrin degradation products, and fibrinogen, all of which have been associated with greater disease severity.

Changes in D-Dimer



- Figure 2: Timeline chart for D-dimer from onset of illness in patients with COVID-19 with and without deep vein thrombosis
- (xx Without DVT, XX With DVT)

Management of COVID-19 Induced Thrombotic Complications

- Patients who are receiving anticoagulant or antiplatelet therapies for underlying conditions should continue these medications if they are diagnosed with COVID-19.
- All hospitalized adults with COVID-19 should receive pharmacologic thromboprophylaxis with LMWH (low-molecular weight heparin) unless the risk of bleeding outweighs the risk of thrombosis.

Management of COVID-19 Induced Thrombotic Complications Contd.

- If a patient has suffered from heparin-induced thrombotic thrombocytopenia (HITT), fondaparinux is recommended.
- Dose adjustment in obese patients needs to be made according to the institutional guidelines.

VTE Prophylaxis in COVID-19 Patients

- The decision to initiate VTE prophylaxis should be based on the patient's individual risk of thromboembolism and bleeding, and the balance of benefits versus harms.
- COVID-19 patients receiving VTE prophylaxis can be split into two categories: Hospitalized and Nonhospitalized patients.

Hospitalized Patients with COVID-19

- All hospitalized patients should routinely receive some form of DVT prophylaxis (compression devices or pharmacologic).
- In patients for whom anticoagulants are contraindicated or unavailable, use of mechanical thromboprophylaxis (e.g., pneumatic compression devices) is recommended.
- Combined pharmacologic and mechanical prophylaxis is not generally recommended.
- Prophylaxis with heparin or a related drug is recommended unless the risk of bleeding outweighs the likely benefits.

Hospitalized Patients with COVID-19: Contd.

- Prophylaxis with heparin has been shown to significantly reduce pulmonary embolisms in hospitalized patients, although blooding events were increased.
- Parenteral anticoagulation with heparin is referred vs oral agents as they are shorter acting if bleeding complication occurs.

Hospitalized Patients with COVID-19: Contd.

- For hospitalized children with COVID-19, indications for VTE prophylaxis should be the same as those for children without COVID-19.

Doses for Anticoagulants for Hospitalized Patients

- LMWH: Enoxaparin (preferred)
  40 mg once a day (up to 120 kg)
  40 mg twice a day (> 120 kg or BMI > 40)
- Unfractionated Heparin (if creatinine clearance <30)
  5,000 units twice a day (<50 kg)
  7,500 units three times a day (> 120 kg or BMI>40)

Non-hospitalized Patients with COVID-19

- Anticoagulants and antiplatelet therapy should not be initiated for the prevention of venous thromboembolism (VTE) or arterial thrombosis unless the patient has other indications for the therapy.
- Anticoagulant or antiplatelet therapy should not be used to prevent arterial thrombosis outside of the usual standard of care for patients without COVID-19.
- Continuing anticoagulation with extended VTE prophylaxis after hospital discharge can be considered for patients who are at low risk for bleeding and high risk for VTE, per the protocols for patients without COVID-19.

Special Considerations During Pregnancy and Lactation

- If antithrombotic therapy is prescribed during pregnancy prior to a diagnosis of COVID-19, this therapy should be continued.
- For pregnant patients hospitalized for severe COVID-19, prophylactic dose anticoagulation is recommended unless contraindicated.
- VTE prophylaxis after hospital discharge is not recommended for pregnant patients. Decisions to continue VTE prophylaxis in the pregnant or postpartum patient after discharge should be individualized, considering concomitant VTE risk factors.

Special Considerations During Pregnancy and Lactation, Contd.

- Anticoagulation therapy use during labor and delivery requires specialized care and planning. It should be managed in pregnant patients with COVID-19 in a similar way as in pregnant patients with other conditions that require anticoagulation in pregnancy.
- Unfractionated heparin, low molecular weight heparin, and warfarin do not accumulate in breast milk and do not induce an anticoagulant effect in the newborn; therefore, they can be used by breastfeeding individuals with or without COVID-19 who require VTE prophylaxis or treatment.
- Use of direct-acting oral anticoagulants during pregnancy is not routinely recommended due to lack of safety data.

Contraindications for Prophylactic Anticoagulation

- Active bleeding or recent bleeding or high risk for bleeding
- Patients with coagulopathy (international normalized ratio greater than 1.5)
- Planned surgical procedure in the next 6 to 12 hours.
- Severe thrombocytopenia (platelet count less than 50,000)
- Major trauma

Contraindications for Prophylactic Anticoagulation, contd.

- Previous intracranial hemorrhage
- Intracranial or spinal tumor
- Severe uncontrolled hypertension
- Bleeding disorders

Conclusion

- COVID-19 is a deadly virus that has claimed over 3 million lives Worldwide and has been labeled as the 5th pandemic after the Spanish Flu. It has produced several complications, including thrombotic complications, such as abdominal and thoracic aortic thrombosis, mesenteric ischemia, acute cerebrovascular accident, and myocardial infarction. We have discussed the management of these thrombotic complications with the use of anticoagulants.

Future Directions

The following areas have not been touched upon in this presentation due to lack of time, and will be a project for our research in the future:

1. For patients requiring ICU or critical level of care.
2. How should we manage COVID-19 patients who experience recurrent clotting of access devices (e.g., central venous catheters, arterial lines)?
3. Should COVID-19 patients receive post-discharge thromboprophylaxis?

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