Are there links between the surge in DVT cases and COVID-19 ?

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Abstract

In this past year, there has been a large increase in the number of deep vein thrombosis cases. A significant potential cause of this could be the COVID-19 pandemic. In fact, several in-depth studies prove how the incidence rates of DVT in the general population are remarkably lower than the incidence rate in COVID-19 patients. Additionally, COVID-19 induces a hypercoagulable state, triggering thrombotic episodes. Analyzing the overlaps of the risk factors of both these conditions and the specific anticoagulant thromboprophylaxis prevention of thrombosis in COVID-19 patients once again highlights how there seems to be a strong link between COVID-19 and the recent surge of DVT cases.

Introduction

- COVID-19 has been present for nearly 1.5 years now, and the effects of this pandemic are innumerable.
- Yet another potential effect of COVID-19 is the increase in the number of Deep Vein Thrombosis (DVT) cases. Over the course of this past year, a multifold number of DVT cases are being reported compared to just a few years ago.
- This project aims to find a potential link between the surge in DVT cases and the ongoing COVID-19 pandemic.
- Methodology: Literature Search: Pubmed
  - Key Words: Covid-19, Thrombosis risk factors, Covid-19 patients at higher risk of thrombosis, Venous thrombosis, DVT, Incidence rates

Epidemiology

- SARS-CoV-2 virus started in Wuhan, China in 2019
- 175 million cases and nearly 4 million deaths around the world
- An airborne disease, causing it to spread rapidly to anyone an infected person may contact
- Preventive techniques that evolved include using disinfectants, staying masked, and keeping a six-feet distance between people.

Statistics

After the COVID-19 outbreak, the number of reported DVT cases increased significantly. At a specific hospital, a study shows that in mid-2019, the occurrence of DVT was 0.017%. Just a year later, this went up to 0.084%.

1. Hundreds of COVID-19 patients
   - 11% of patients developed DVT
   - 14% of critical patients developed DVT

2. COVID-19 patients who took a venous ultrasound in a specific hospital:
   - Over one-third of the developed DVT

3. Hospitalized COVID-19 and hospitalized non-COVID-19 patients:
   - 16% of COVID-19 patients developed DVT

4. & 5. General Population (10,000 & 100,000 people)
   - Only 0.5% of these populations developed DVT

Pathophysiology/Mechanisms Of COVID-19

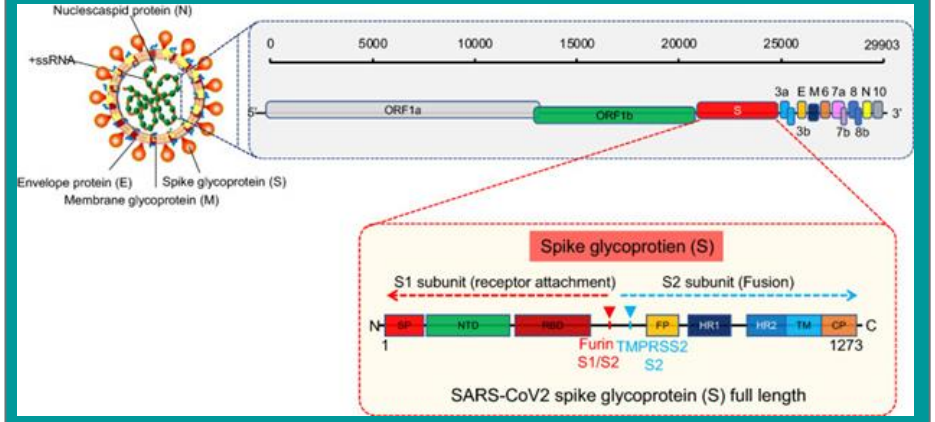

Figure 1: SarsCoV-2: single strand RNA surrounded with several spike proteins

Mechanism of entry of COVID-19:

- Spike proteins located on the outer surface of the virus bind to angiotensin converting enzyme-2 (ACE2) receptors and prevents their function.
- This leads to an inflammatory immune response causing a hypercoagulable state
- Triggers a coagulation cascade.

Pathophysiology/Mechanisms Of DVT

- DVT is a type of venous thromboembolism: blood clot occurs in a vein
- Venous clots are created mostly due to fibrin
- Formed through coagulation cascade, which includes the extrinsic, intrinsic, and

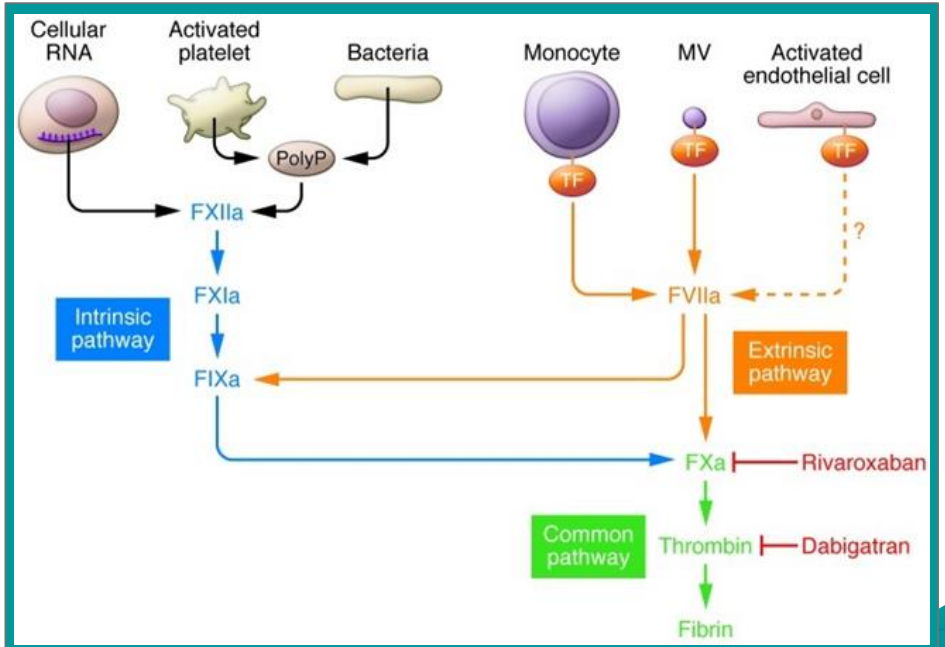

Figure 2: Coagulation Cascade

Risk Factors

Thrombosis

- Age
- Pregnancy
- Family history of clots
- Injury or surgery to veins
- Long periods of immobility
- Diabetes
- Obesity
- Hypoxia
- Hypertension

COVID-19

- Immunodeficiencies
- Old age
- Being a male
- Hypertension
- Diabetes
- Obesity
- Chronic lung diseases
- Heart, liver and kidney diseases
- Tumors
- Pregnancy

Overlaps in Risk Factors

- Age
- Pregnancy
- Diabetes
- Obesity
- Hypertension

Several of the COVID-19 risk factors overlap with DVT risk factors. Therefore, these increase the chance of both the conditions. This shows how many patients with COVID-19 are likely to also develop thrombosis and justifies the statistics regarding this.

Symptoms of COVID-19

- Fever
- Cough
- Shortness of breath
- Muscle pains
- Headache
- Nausea
- Chest pain

- Shortness of breath symptom → less oxygen rich blood → hypoxia: a risk factor of thrombosis
- Critical COVID-19 patients in the Intensive Care Unit (ICU) are less likely to move around → a significant risk factor of thrombosis is a lack of movement → those in the ICU with COVID-19 have a higher chance of developing blood clots compared to a healthy person due to this situation

Therapies

- Anticoagulant thromboprophylaxis is recommended for prevention of thrombosis in COVID-19 patients
- If there are no contraindications, low molecular weight heparin (LMWH) is more recommended than unfractionated heparin (UFH)
- UFH is more recommended than direct oral anticoagulants (DOACs)
- For hospitalized COVID-19 patients with DVT or PE, adjusted LMWH or UFH is most recommended.
- Outpatient COVID-19 patients are recommended to use apixaban, dabigatran, rivaroxaban or edoxaban, but DOACs are usually not a recommended therapy for COVID-19 patients.

Conclusion

- To conclude, there are several connections between COVID-19 and DVT in patients. Therefore, I believe there is a strong link between the surge in DVT cases and the COVID-19 pandemic.
- Some important things to consider in the future would be to further analyze more studies and statistics and look into other links between these conditions.
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