LIMU
الجامعة الليبية الدولية

FACULTY OF APPLIED MEDICAL SCIENCES
كليـــة العلـــوم الطبيـــة التطبيـــقـيـة

Coronavirus

Covid-19 and stroke

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Objectives

- **Define stroke.**
- **Describe how COVID-19 infection leads to stroke.**
- **List the risk factors of stroke in COVID-19 infection.**
- **Outline an overall management plan for an acute stroke patient.**

Coronavirus Disease (COVID-19)

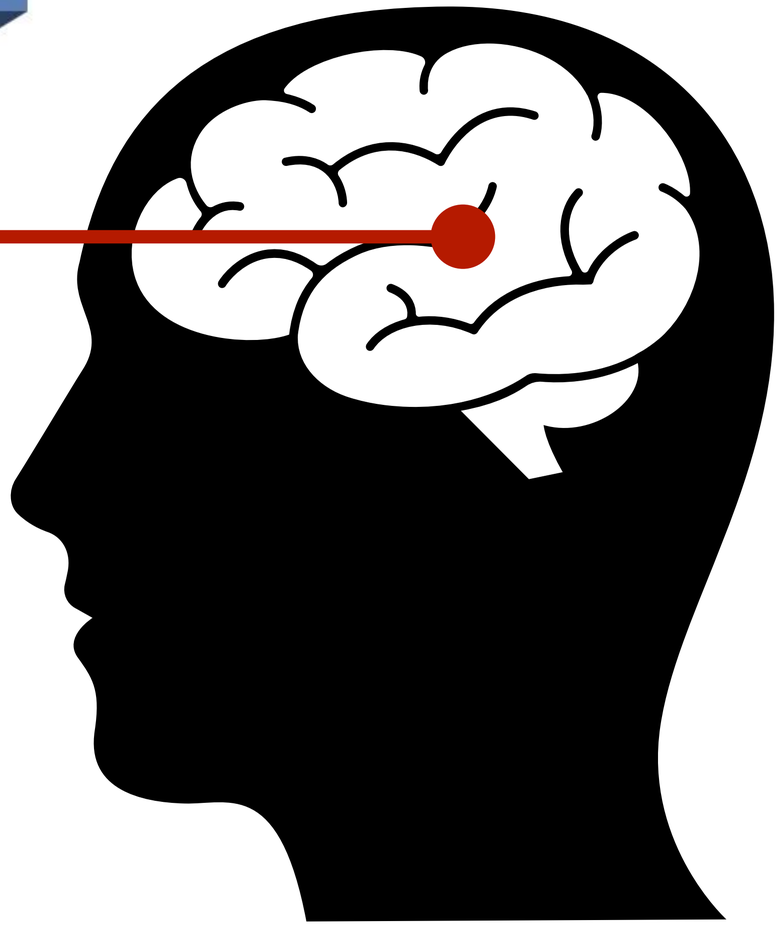
Severe acute respiratory syndrome coronavirus 2 (SARSCoV-2) that surfaced in China (Wuhan city) in late 2019.

Rapidly spread across the globe causing serious concerns and became a global pandemic.

The clinical presentations of COVID-19 range from an asymptomatic state to acute respiratory distress syndrome and multi-organ dysfunction.

Recent studies have linked (COVID-19) infection with an increased risk of ischemic stroke.

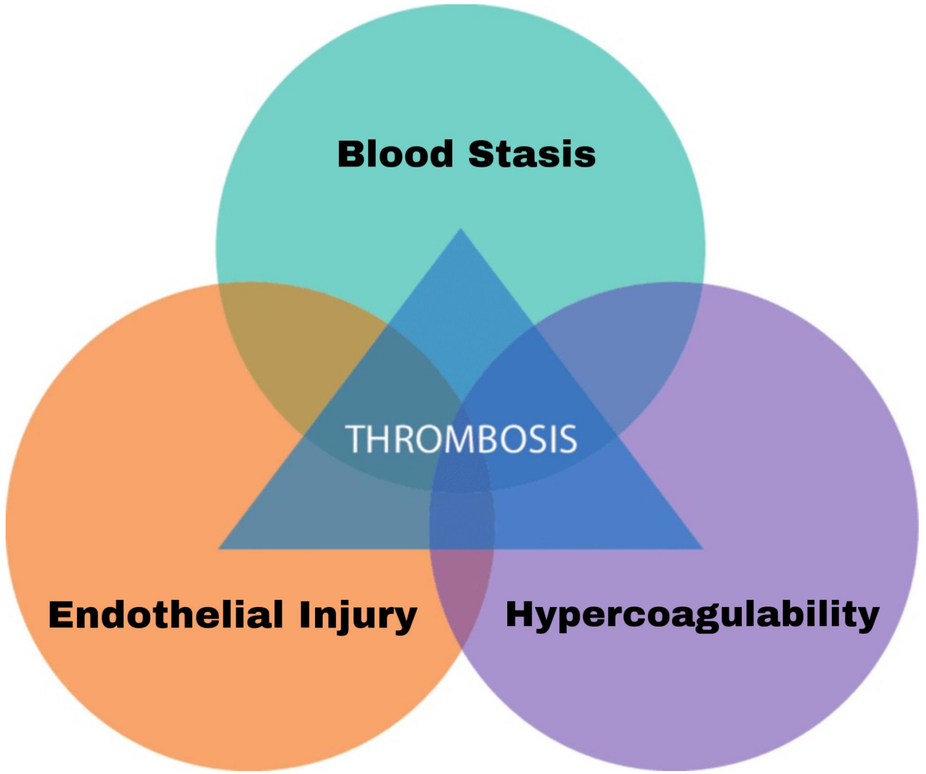
Stroke



A stroke is a brain attack, occurs when a blood vessel that carries oxygen and nutrients to the brain is either blocked by a clot or bursts (ruptures).

How COVID-19 infection leads to stroke

- **Virchow's triad**



1- Endothelial injury

- Severe endothelial injury and associated disruption of cellular membranes in COVID-19 occur via the virus entrance to endothelial cells of vessels which leads to the loss of the fibrinolytic function of the endothelial cells.

2- Blood stasis

- Thrombus formation aided by cytokine storm due to severe COVID-19 and coagulopathy because of a systemic inflammation response toward infection may complicate COVID-19 and cause stroke.

3- Hyper-coagulability

- Caused by hyperviscosity that occurs during infection with SARS-CoV-2 through the rise in cellular components such as fibrinogen and immunoglobulins.

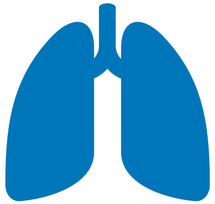
Other mechanisms

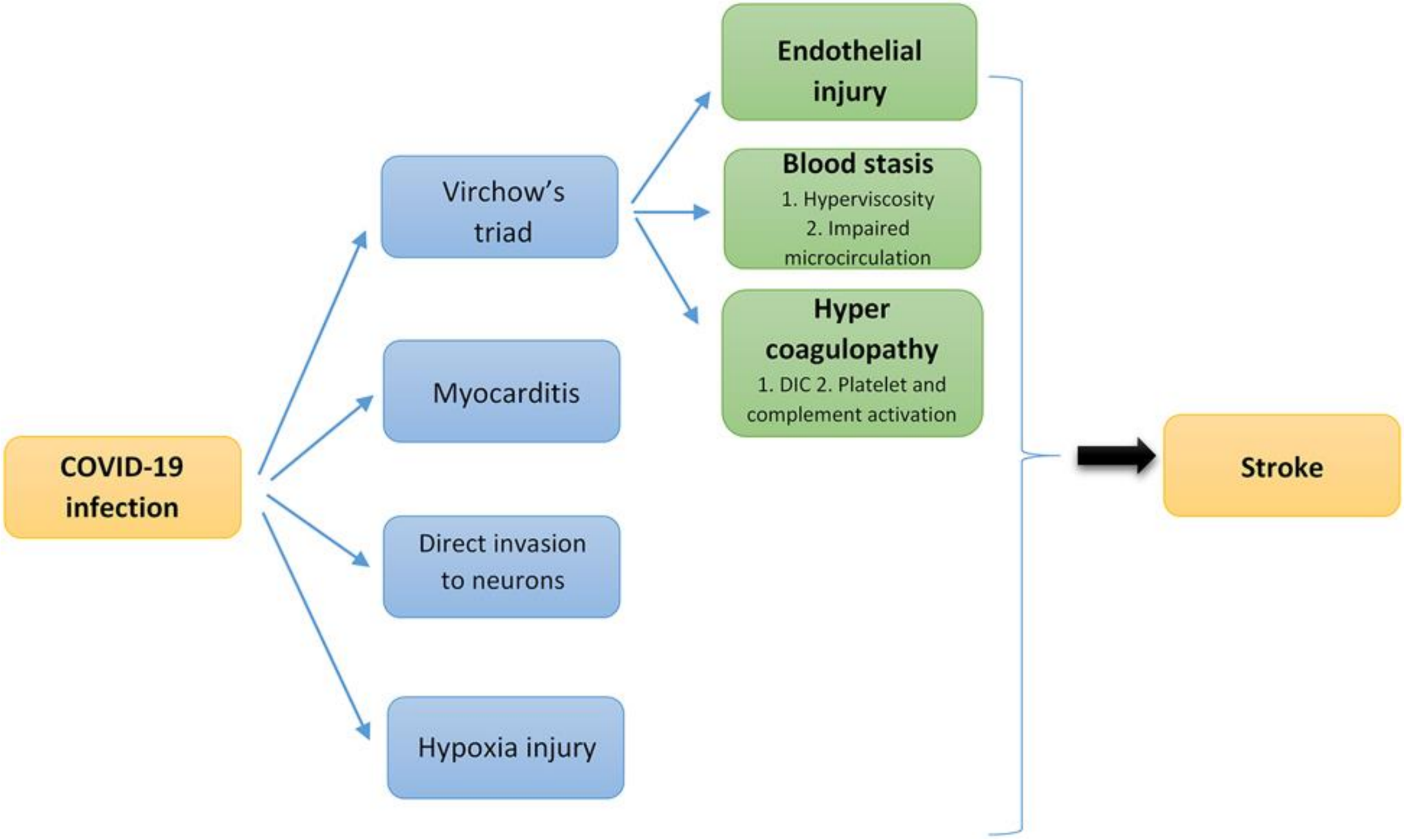
- **Viral myocarditis:**
  - **COVID- 19 can affect the myocardium and cause myocardial injury**
  - **Increase Troponin (TnT) and D-dimer levels.**
  - **Higher incidence of acute coagulopathy.**

- **Depletion of ACE2:**
  - **ACE2 is the main receptor of SARS-CoV-2.**
  - **plays an important role in the virus entry into the cell to cause infection.**
  - **ACE2 depletion leads to a rise in ACE1 and angiotensin II and vasodilation, neuroinflammation, oxidative stress, and thrombotic response that can promote stroke.**

- **Hypoxia injury:**
  - **Lung tissue cell injuries.**
  - **Diffuse alveolar and interstitial inflammatory exudation.**
  - **Edema.**
  - **Formation of transparent membranes due to virus entrance.**

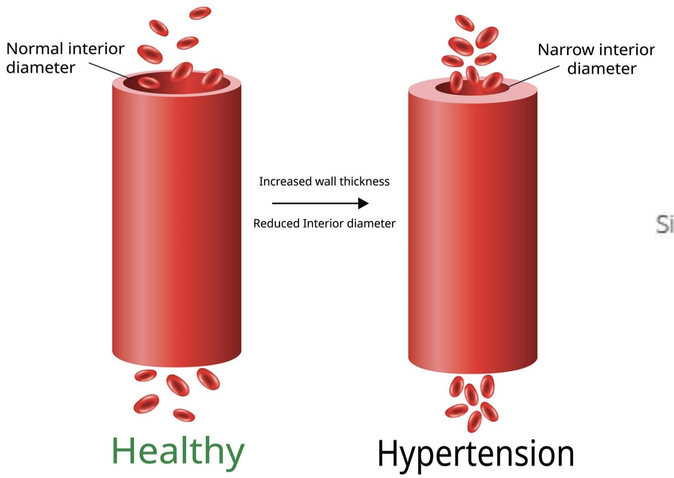
Result in hypoxia in CNS and stroke formation



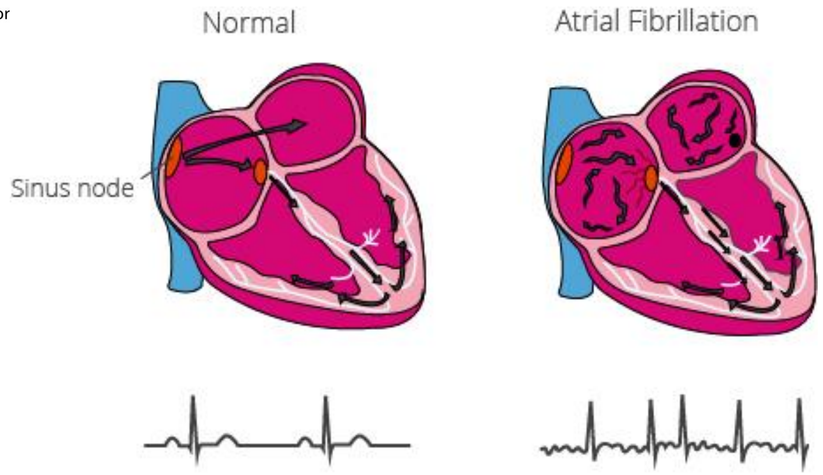

COVID-19 infection
Virchow's triad
Myocarditis
Direct invasion to neurons
Hypoxia injury
Endothelial injury
Blood stasis
1. Hyperviscosity
2. Impaired microcirculation
Hyper coagulopathy
1. DIC 2. Platelet and complement activation
Stroke

Risk factors of stroke in COVID-19 infection

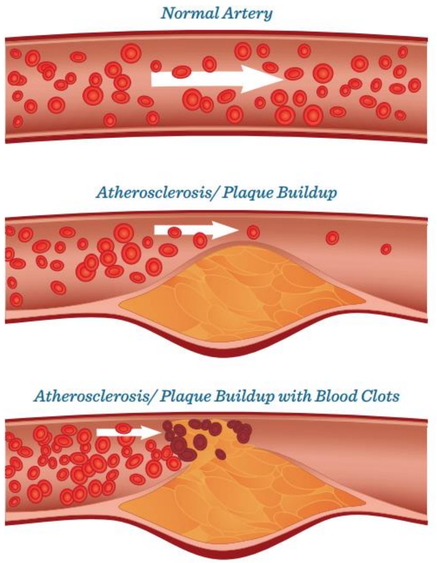
Hypertension



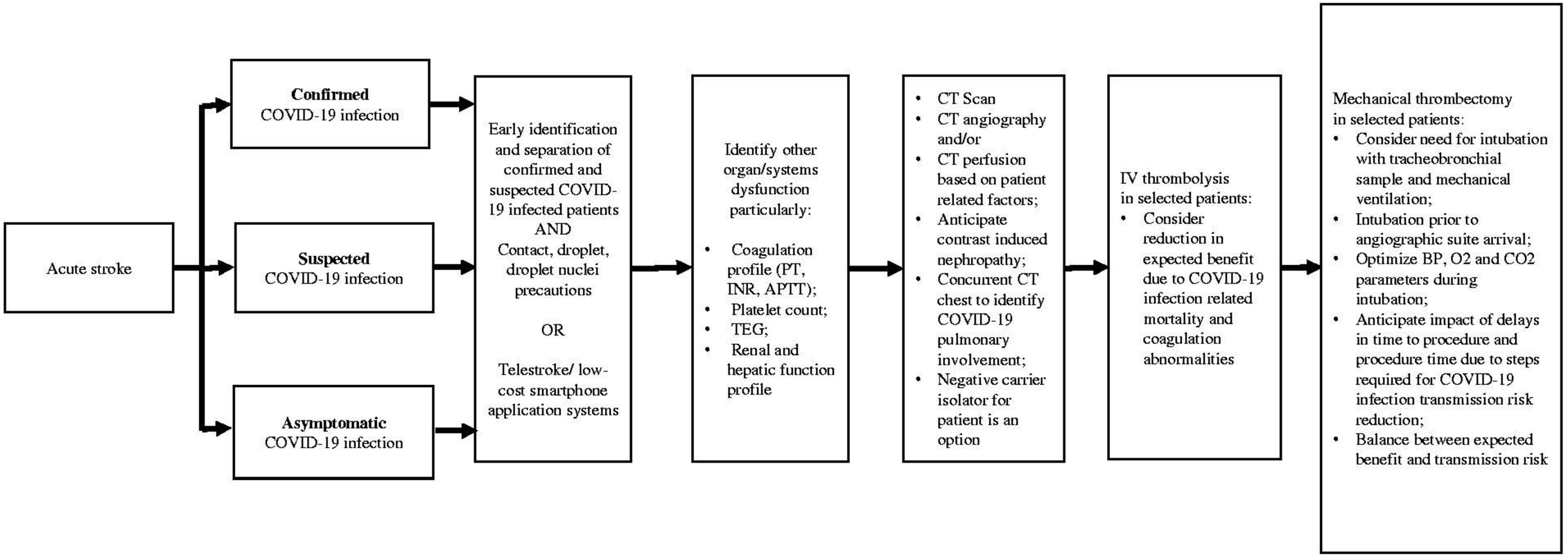
Atrial fibrillation



Atherosclerosis



Overall management plan



Reference

- Muralidar, Shibi et al. “The emergence of COVID-19 as a global pandemic: Understanding the epidemiology, immune response and potential therapeutic targets of SARS-CoV-2.” Biochimie vol. 179 (2020): 85-100. doi:10.1016/j.biochi.2020.09.018

- Sadeghmousavi, Shaghayegh, and Nima Rezaei. “COVID-19 infection and stroke risk.” Reviews in the neurosciences vol. 32,3 341-349. 24 Dec. 2020, doi:10.1515/revneuro-2020-0066

- Qureshi, Adnan I et al. “Management of acute ischemic stroke in patients with COVID-19 infection: Report of an international panel.” International journal of stroke : official journal of the International Stroke Society vol. 15,5 (2020): 540-554. doi:10.1177/1747493020923234


Thank
you!