Cerebrovascular manifestations of Covid-19

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Covid-19

- A novel coronavirus
- Resembling SARS-Co in many ways, specially they shared the same receptor, angio-tension converting enzyme-2
- Typical manifestations: fever, cough, diarrhea, fatigue
- Neurological manifestations: (36.4%)

1.CNS(dizziness, headache, impaired consciousness, acute cerebrovascular

disease, ataxia, seizure)

2.PNS (taste/smell impairment, vision impairment, nerve pain)

3.Skeletal muscular injury

Pathophysiology

Neuroinvasion and neurovirulence

- Access may be achieved via two main routes: hematogenous or transneuronal through the olfactory bulb
- hematogenous route involves directly infecting the blood–brain barrier (BBB) or access via a Trojan such as leukocytes

ACE2 receptor and angiotensin (1–7) (ANG (1–7)

- ACE2 is a carboxypeptidase that converts angiotensin I into ANG (1–7), which is an essential component of the renin–angiotensin system
- ANG (1–7) : synthesized in endothelial cells and has a downstream effect stimulates the release of prostaglandin and nitric oxide, enhances the metabolic actions of brady kinin, and inhibits smooth muscle cell growth
- binding of SARSCoV-2 to the ACE2 receptor may inhibit its downstream effect via pathway down regulation or cell lysis, ultimately decreasing ANG (1–7) synthesis counteract neuroprotective properties and blood pressure auto-regulation (increase in sympathetic activity)

Hypercoagulable state

- hypercoagulable state causes by the virus-induced cytokine storm
- critically ill COVID-19 patients had increased proinflammatory cytokines, including IL-2 and TNF-a4, which can up-regulate the coagulation system.
- In a recent Dutch study, there was a 31% incidence of thrombotic complications in patients with COVID-19 admitted to the ICU, mainly consisting of acute pulmonary embolism, deep vein thrombosis, ischemic stroke, myocardial infarction, and systemic arterial embolism

Features of Covid-19 associated ischemic stroke

- large vessel occlusion
- multiterritory infarcts
- Venous thromboembolism
- raised inflammatory markers
- antiphospholipid antibody production
- a younger age of presentation
- concurrent severe systemic inflammation with organ failure
- reported incidence of stroke in COVID-19 hospitalized patients is 0.9–2%, with an increased incidence in the young

Features of Covid-19 associated hemorrhagic stroke

- Relatively young with a mean age of 52.2 years (range 41 – 64 years with morbidity mortality generally increases with advancing age
- lobar predominance (Lobar ICH occurs in 15 – 30% of conventional cases, and is predominantly associated with an underlying vascular abnormality)
- having evidence of a period of prolonged inflammation, as demonstrated firstly by markedly raised D-Dimer values and secondly by severe end organ damage

Risk factors for ischemic stroke

- Older age
- Black
- Higher frequency of HTN
- Diabetes
- Hyperlipidemia
- Arterial fibrillation
- Congestive heart failure
- Organ failure
- More severe symptoms, less response to TPA

Risk factors for intra-cerebral hemorrhage

- Older age
- Caucasian race
- Respiratory failure requiring mechanical ventilation
- Anticoagulation

Take home message

- Clinicians should have a low threshold for suspicion and investigation particularly those younger individuals receiving organ support beyond two weeks of their COVID-19 illness, who are also being treated with anticoagulants
- Acute ischemic stroke patients with suspected COVID-19 have to be evaluated under the assumption that they have COVID-19


THANK YOU FOR
YOUR ATTENTION