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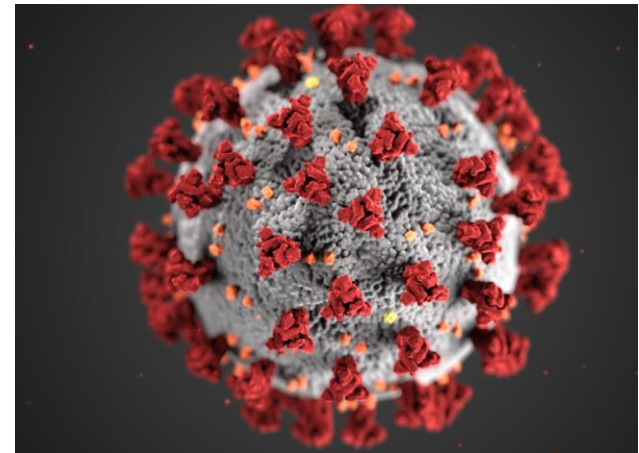
Covid-19 and Stroke

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What is COVID-19?



- At the end of 2019, a novel coronavirus was identified as the cause of a cluster of pneumonia cases in Wuhan China
- In February 2020, the World Health Organization designated the disease COVID-19, which stands for coronavirus disease 2019
- The virus that causes COVID-19 is designated severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)



What is COVID-19? (cont'd)



- COVID-19 is mainly recognized as a viral pneumonia, with a dry cough, high fever, shortness of breath and loss of taste and smell as its characteristic features.
- However, COVID-19 is not just a respiratory disease and can affect other organs, including the brain causing stroke.

What is stroke?



- The term stroke is used to describe a variety of conditions in which blood flow to part or all of the brain is reduced, resulting in tissue damage.
- Ischemic stroke: A blood clot is obstructing the flow of blood.
- Hemorrhagic Stroke: The blood vessel ruptures.

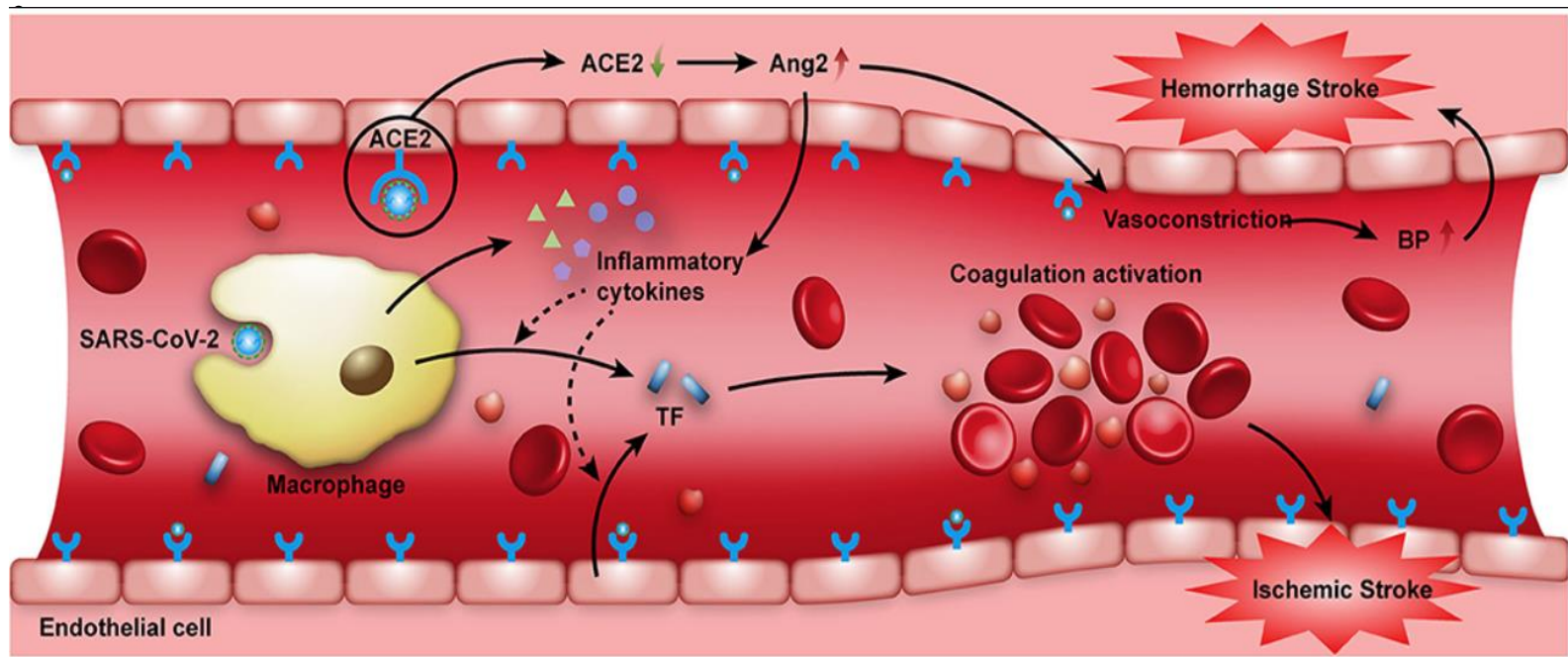


Mechanism of stroke in Covid-19 Patients

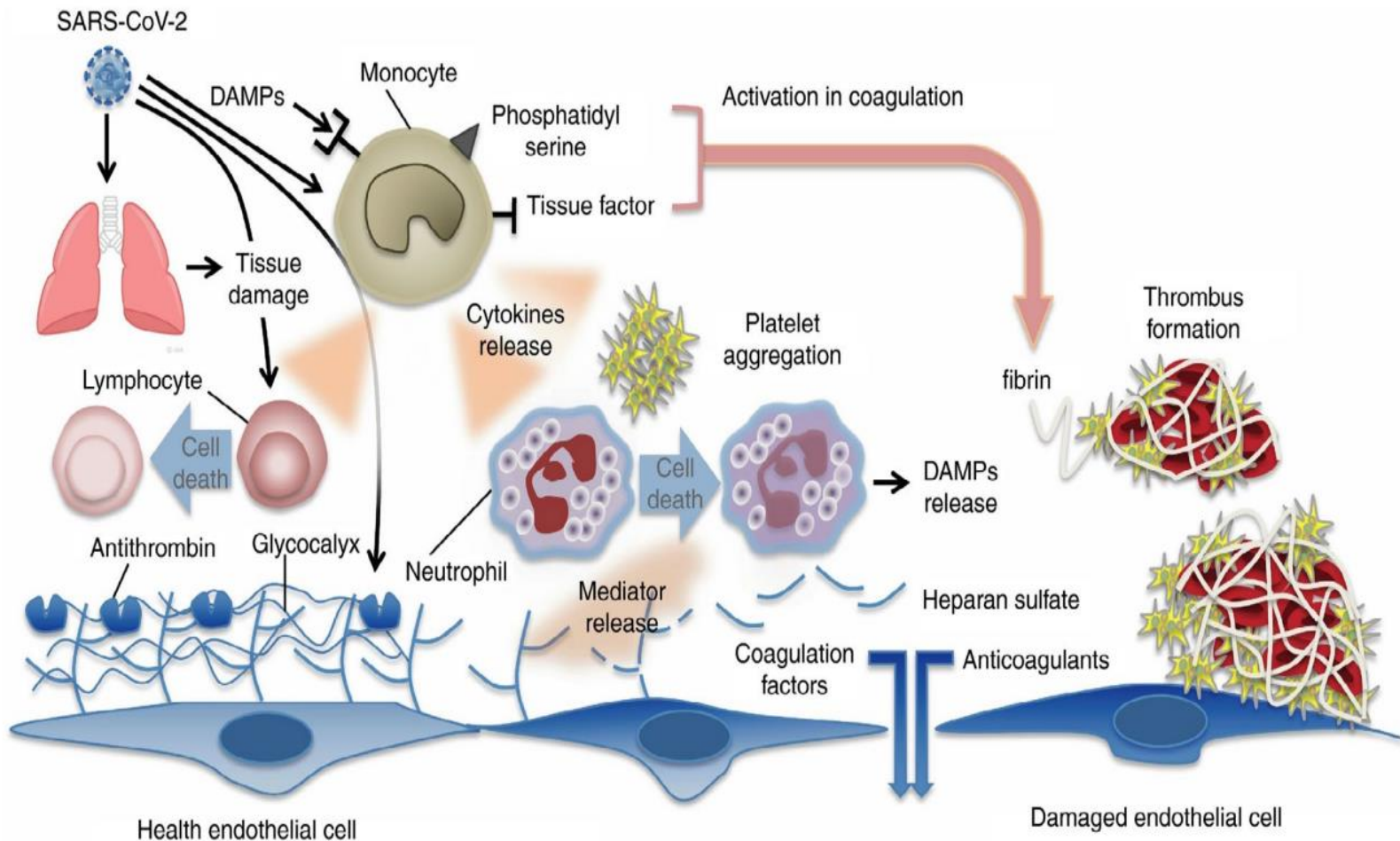


- COVID-19 may provoke the onset of an ischemic stroke through a variety of thrombotic and inflammatory mechanisms
- The hyper-reactive immune response leads to an exaggerated inflammatory reaction in COVID-19 patients.
- The hyperinflammatory state is called “cytokine storm” or “cytokine release syndrome (CRS)”

Mechanism of Stroke in Covid-19 patients (cont'd)



Mechanism of stroke in Covid-19 patients (cont'd)



Mechanism of stroke in Covid-19 patients (cont'd)



- A shutdown and impairment of the fibrinolytic system, which degrades and removes clots in the bloodstream, have been reported in Covid-19 patients.
- The clots can thus become stuck in the blood vessel and restrict the flow of blood to the brain, causing a stroke.

Risk Factors for Stroke



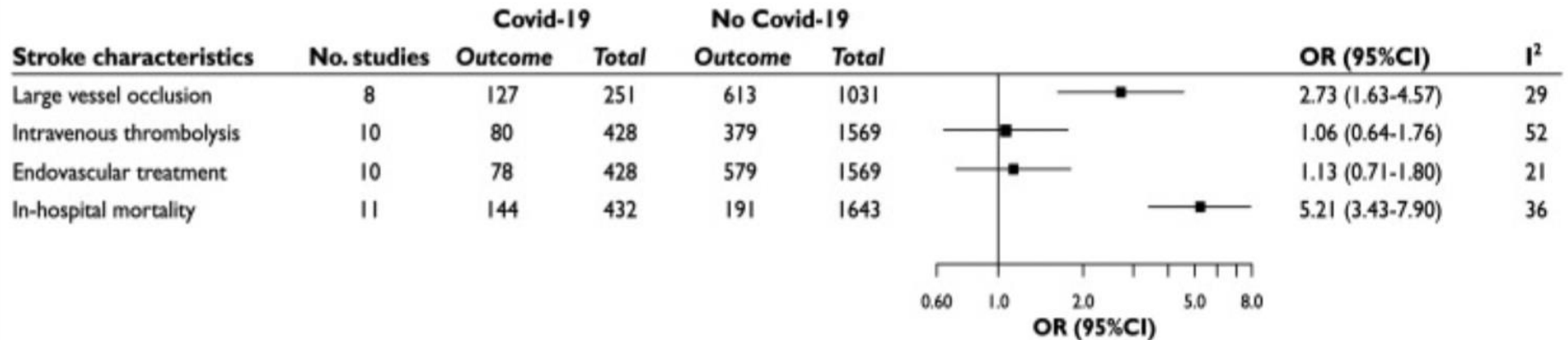
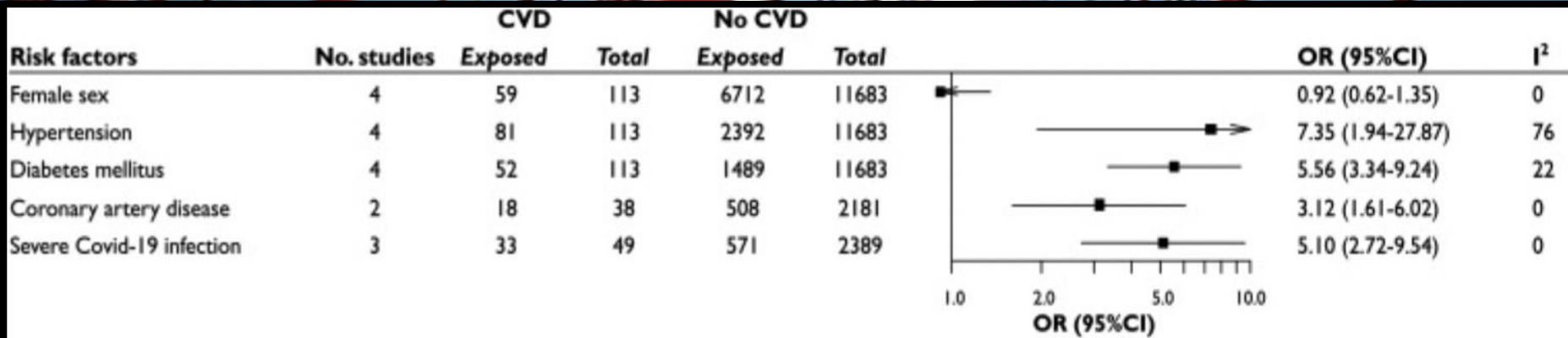
Major stroke risk factors include:

- Diabetes
- Heart disease
- High blood pressure
- Hyperlipidemia
- Obesity
- Brain aneurysms or arteriovenous malformations
- Certain medical conditions like sickle cell disease, vasculitis and other bleeding disorders

Other risk factors for stroke are:

- Lack of physical activity
- Smoking
- Alcohol and illegal drug use

Risk Factors for Acute CVD in patients with COVID-19



Characteristics of COVID-19 Patients Developing Stroke



- Risk of stroke is more than twice as high for COVID-19 patients as compared to non COVID-19 patients
- Risk of stroke may vary according to the severity of COVID-19.
 - Patients with mild illness: risk <1 percent
 - Patients in intensive care: risk as high as 6 percent
- Strokes may occur several weeks after a COVID-19 diagnosis

Characteristics of COVID-19 Patients Developing Stroke



- Although stroke is usually seen in older population, in patients with COVID19, even the younger patients developed stroke as a complication. One study showed a greater risk of stroke in 65-74 year olds than in patients ages 85 and older
- In older patients, a greatest risk of stroke was observed during first three days after COVID-19 diagnosis
- There were no differences in stroke risk related to sex, or race and ethnicity.

Outcome of Stroke in COVID-19 Patients



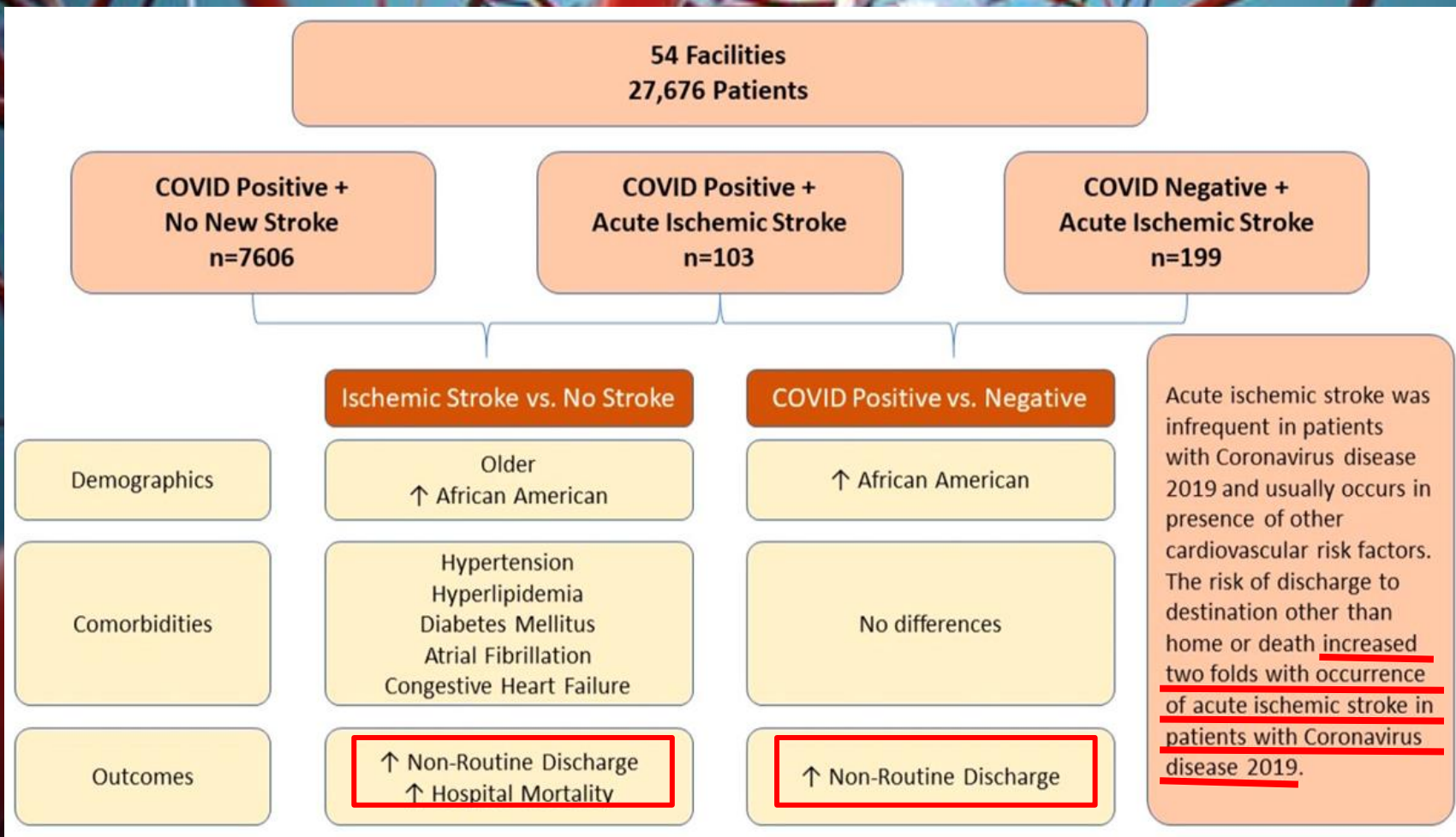
Variable	N of valid studies	N of events	Pooled values
Discharge outcomes			
In-hospital death	44	521/1655	31.5 [27.3; 36.0]
Discharged home	30	379/1315	19.1 [13.2; 26.8]
Discharged to rehabilitation	25	228/744	25.7 [18.9; 33.8]
Not discharged at time of publication	20	170/901	11.1 [4.7; 23.8]

Outcome of Stroke in COVID-19 Patients



- In a study, in-hospital mortality among 160 patients with COVID-19 and stroke was 34 percent
 - Reflects greater stroke severity and greater comorbidity from respiratory and other systemic complications of COVID-19
- Patients recovering from a severe COVID-19 infection with stroke suffered from fatigue, dyspnea, memory impairment, and myalgias

Outcome of Stroke in COVID-19 Patients



Clinical Implications



- Clinicians should be vigilant for signs and symptoms of stroke in individuals with COVID-19 to ensure appropriate clinical interventions
- Special attention should be paid in intubated or sedated patients, in whom awareness of potential neurological signs is important

Clinical Implications



- A systematic review and meta-analysis showed that even though the majority of strokes occurred after a few days of COVID-19 symptoms onset, the neurological symptoms represented the reason of hospital admission in more than one-third of people with COVID-19 and stroke.
- These patients might have mild respiratory symptoms or be completely asymptomatic. Clinical suspicion for underlying COVID19 infection should be high in these patients

Treatment of Stroke in COVID-19



- The basic principles of management of stroke remain the same in COVID19 patients with stroke
- For eligible patients with acute ischemic stroke, intravenous thrombolysis with rTPA is first-line therapy, provided that treatment is initiated within 4.5 hours of symptom onset
- Mechanical thrombectomy is indicated for patients with acute ischemic stroke due to a large artery occlusion in the anterior circulation who can be treated within 24 hours of symptom onset

Prevention



- Prevention of COVID19 infection and illness represent the most effective means for disease/morbidity prevention
 - Includes appropriate vaccination or boosting coupled with isolation precautions and minimizing exposure risks
- COVID-19 vaccination (including boosters) is best way to reduce the risk of COVID-19 infection and to prevent severe disease or death, especially among people with cardiovascular disease or other medical conditions.

Conclusions



- Although COVID-19 infection primarily results in respiratory disease, patients may also have cerebrovascular complications like stroke
- Ischemic stroke is the most common cerebrovascular complications in COVID19 patients
- Pathogenesis of stroke in individuals with COVID-19 seems to be a combination of vascular risk factors and immune responses to the virus

Conclusions (cont'd)



- Although older patients with risk factors like diabetes, obesity, hypertension are more likely to suffer from stroke, even younger patients with COVID19 can have stroke
- Hence clinicians need to be looking for symptoms and signs of stroke in COVID19 patients
- The basic principles of management of stroke remain the same in COVID19 patients with stroke and include the use of intravenous thrombolysis and mechanical thrombectomy

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References



1. Perry RJ, Smith CJ, Roffe C on behalf of the SETICOS collaborators, *et al*/Characteristics and outcomes of COVID-19 associated stroke: a UK multicentre case-control study *Journal of Neurology, Neurosurgery & Psychiatry* 2021;**92**:242-248.
2. Nannoni S, de Groot R, Bell S, Markus HS. Stroke in COVID-19: A systematic review and meta-analysis. *Int J Stroke*. 2021 Feb;16(2):137-149. doi: 10.1177/1747493020972922. Epub 2020 Nov 11. PMID: 33103610; PMCID: PMC7859578.
3. Adnan I. Qureshi, MD, William I. Baskett, BS, Wei Huang, MA, Daniel Shyu, BS, Danny Myers, PhD, Murugesan Raju, PhD, Iryna Lobanova, MD, M. Fareed K. Suri, MD, S. Hasan Naqvi, MD, Brandi R. French, MD, Farhan Siddiq, MD, Camilo R. Gomez, MD, Chi-Ren Shyu, PhD

References



4. Zakeri A, Jadhav AP, Sullenger BA, *et al* Ischemic stroke in COVID-19-positive patients: an overview of SARS-CoV-2 and thrombotic mechanisms for the neurointerventionalist *Journal of NeuroInterventional Surgery* 2021; **13**:202-206.
5. Wang, Zilan & Yanbo, Yang & Liang, Xiaolong & Gao, Bixi & Liu, Meirong & Li, Wen & Chen, Zhouqing & Wang, Zhong. (2020). COVID-19 Associated Ischemic Stroke and Hemorrhagic Stroke: Incidence, Potential Pathological Mechanism, and Management. *Frontiers in Neurology*. 11. 571996.
6. "Ischemic Strokes (Clots)." *Www.stroke.org*, <https://www.stroke.org/en/about-stroke/types-of-stroke/ischemic-stroke-clots>.

10.3389/fneur.2020.571996.