

Stroke Care during the COVID-19 Pandemic; A Global Challenge

Acute Ischemic stroke (AIS) is one of the major causes of mortality and disability globally. Up to the present time, thrombolysis with intravenous (IV) recombinant tissue plasminogen activator (rtPA) is the only FDA-approved pharmacological treatment for AIS.^{1,2} Moreover; several randomized clinical trials have endorsed the benefits of endovascular treatment (EVT) with stent retrievers in strokes with large vessel occlusion by improving the overall functional outcome and reducing mortality.³ The benefits of IV rtPA and EVT in AIS are highly time-dependent and the American Stroke Association guidelines recommend treating the patients with AIS as quickly as possible.¹

The growing coronavirus disease 2019 (COVID-19) pandemic has posed major challenges on acute stroke care in several aspects. As the pandemic is rapidly evolving, there has been a rise in calls for social distancing, limiting unnecessary interactions and physical contacts, and even mandatory quarantine and isolation in many countries.⁴ While these measures have supported preventing the spread of SARS-CoV-2 infection, they might cause delays in symptom recognition of stroke in those who suffered, particularly in the elderly living alone or in assisted living facilities. The fact that acute ischemic stroke, in general, does not cause severe pain or a feeling of imminent concern, and such patients might become aphasic and not able to effectively communicate might further contribute to delayed stroke symptom recognition during the time of social isolation. Moreover, acute facial asymmetry, a potential sign of stroke, might not be rapidly recognized when one is wearing a facemask.⁵ Delays in recognition of stroke symptoms by both patients and their loved ones or caregiver may lead to significantly delayed seeking medical care and eventually not being eligible or delayed intervention.

Furthermore, delays in seeking medical care after experiencing acute neurological symptoms and subsequently delayed management with IV rtPA and/or EVT due to fear and concerns about going to a health care facility have been reported frequently during the pandemic. Such delays may lead to being ineligible for such effective treatments and consequently poor functional outcome. Kansagra and others has shown that the number of patients who underwent evaluation for stroke declined by 39% in the United States during the pandemic as compared with the pre-COVID-19 era, suggesting a significant drop in patients seeking acute stroke care.⁶ Similar rates of decline in stroke admissions have been reported from China and Spain.⁵ In addition, the need for testing stroke patients for SARS-CoV-2 infection or screening for COVID-19 symptoms upon arrival to the hospital and enforcing additional protective measures to promote infection control in the ambulance, emergency room, and neuro-interventional suite may cause further delays or being ineligible for treatment.⁷

Along with the impact of the COVID-19 pandemic on acute stroke care, neurological manifestations have been reported with SARS-CoV-2 infection in addition to the pulmonary symptoms. These symptoms range from mild headache, anosmia, and ageusia to more severe thrombotic complications such as cerebral venous sinus thrombosis and AIS, a finding reported in 1-3% of patients. Coagulopathy and vascular endothelial dysfunction have been widely reported as the consequences of SARS-CoV-2 infection and have been proposed as the underlying mechanism for AIS in patients with COVID-19.⁸ Additionally, the poor functional outcome has been reported in SARS-CoV-2 infected patients who suffered from AIS, partly due to delay in seeking medical care and subsequent delayed treatment for the reasons noted above. Both IV rtPA and EVT are highly effective treatments for AIS, but their benefits decline as the time to treatment increases.^{1,3}

To overcome the mentioned substantial challenges, the governments, health care officials and agencies, and health care facilities caring for stroke should adopt several general strategies while considering the existing differences in the health systems and cultural backgrounds among countries. One key point is to improve public awareness of stroke and how to recognize stroke symptoms by establishing effective and continuous educational programs worldwide during the pandemic. In these programs, it should be emphasized that the benefits of stroke treatments are extremely time-dependent and people should seek care immediately in the event of experiencing stroke symptoms, particularly during the pandemic. Given the physical distancing strategy in place, stroke self-awareness is even more critical during the pandemic and put such educational programs at a higher priority. Furthermore, frequent checking on families and friends who might be at high risk of stroke need further stressing.⁵

The other key point is to ensure safe and timely stroke treatment in the health care facilities caring for stroke patients while minimizing the risk of infection exposure for both health care workers and patients by adapting safe and efficient practices during the COVID-19 pandemic. The whole process of pre-hospital care,

admission to the emergency department, COVID-19 testing, acute stroke imaging, and IV rtPA administration and/or EVT should be streamlined so that it adds the least possible extra time. In our teaching hospitals at the University of Southern California, Los Angeles, CA, we consider EVT for AIS an “emergent” procedure and lacking appropriate COVID-19 testing; we consider all patients “COVID-19 positive” on arrival. We obtain a COVID-19 test at the earliest possible time after arrival to our hospitals to enable post-procedure arrangement. The patient will be then transferred to the radiology department for acute stroke imaging; and as soon as the need for EVT is confirmed, we electively intubate the patient in the emergency room or an intensive care unit (ICU) negative airflow room before arrival to the neuroangiography suite. After completion of the procedure and once admitted to the ICU, attempts are made to extubate the patient as soon as considered safe. Neuro-endovascular surgeons and neuroangiography suite personnel caring for the patients assume all of the EVT cases are “COVID-19 positive” and are supplied with N95 masks or equivalent respirators for each operation. Moreover, we use modified CDC-recommended personal protective equipment (PPE) for COVID-19, which includes handwashing, surgical mask, hair covering, eye protection, nonsterile contact gown, and gloves during the procedure. These adaptations have made a difference. Thus far, we have been fortunate and did not have any COVID-19 transmission to, or among, health care personnel or patients; at the same time, we have streamlined the process so that it adds little extra time to the procedure.

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