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In Defense of Our Patients: Indirect Negative Neurological Consequences of SARS-CoV-2 in the New York Epicenter

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Dear Editor,

New York has become the epicenter in the United States for the coronavirus disease 2019 (COVID-19) pandemic with approximately 202,829 infected, 52,697 hospitalized, and 17,055 confirmed deaths as of June 5, 2020.¹⁵ The large influx of critically ill patients resulted in widespread policy and practice changes to counter this new resource-limited setting. All elective surgeries were cancelled. Urgent cases required approval and were limited significantly, resulting in primarily emergency cases.

Neurosurgery and neurology represent smaller niche subspecialties, making up less than 1% of all physicians.² As facilities prepared to accommodate the influx of COVID-19 patients, neurosurgeons were called on to care for non-neurosurgical patients.³ Specialty services have had to adapt to decreased staff availability with a need to remain available for specialty specific emergencies. The triaging of neurosurgical cases into elective, urgent, and emergent is not straightforward, necessitating consideration of disease acuity, patient age, comorbidities, and prognosis with the inpatient-related risks of the coronavirus pandemic.^{1,8,9,11,12}

Abbreviations: COVID-19, coronavirus disease 2019; CT, computed tomography; ED, emergency department; ICU, intensive care unit; NIHSS, National Institutes of Health Stroke Scale

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In ischemic and hemorrhagic stroke care, rapid care remains paramount and the ability to deliver timely efficacious care must be balanced with the risk of infectious exposure to the clinical staff.¹⁰ This has led to amendments to the protocolized triage and management plans for patients with suspected stroke. Patients with dominant hemisphere occlusions, high National Institutes of Health Stroke Scale scores (NIHSS), low Glasgow Coma Scale scores, or posterior circulation strokes are recommended to be considered for prophylactic intubation.^{4,7}

There have been fewer admissions for common emergencies such as heart attack and stroke, largely believed to be due to patient fears about in-hospital acquisition of the virus.^{5,13,14} As patients avoid coming to the hospital, there has been a 6-fold increase in at home deaths in New York City, many of which are likely non-COVID-19 related.⁶ Herein we present several case examples of neurological patients who suffered unintended indirect negative consequences from the pandemic that were not due to an active COVID-19 infection.

Case 1

A 50-year-old female was evaluated in an outpatient clinic for an incidental unruptured 1cm basilar artery aneurysm (Fig. 1a). After discussion about the rupture risk of the aneurysm and the risks and benefits of treatment, a mutual decision was agreed upon to defer treatment for a few weeks during the peak of the pandemic. Unfortunately, she presented to the emergency department (ED) one week later with a worst headache of life and subarachnoid hemorrhage due to rupture of the basilar artery aneurysm (Fig. 1b). She required emergent ventriculostomy, coil embolization of the aneurysm, and intra-arterial therapy for vasospasm during her 21 day hospitalization.

Case 2

A 40-year-old male with poorly controlled hypertension developed left sided weakness while following the stay-at-home executive orders and was reluctant to seek medical attention. His weakness progressed to full hemiplegia and he was found down four days later by his family members. Imaging revealed a large right sided intraparenchymal hemorrhage, likely secondary to hypertension (Fig. 1c). The patient also had rhabdomyolysis and renal failure. He required an emergent decompressive hemicraniectomy.

Case 3

A 53-year-old male had several weeks of headaches and two episodes of transient weakness concerning for seizure

or transient ischemic attack. He was unable to obtain cranial imaging as many outpatient imaging centers were closed and because his imaging was not deemed a high priority. He was then found down unresponsive by his family at home. Cranial imaging revealed a hemorrhagic tumor causing significant mass effect and the patient underwent an emergent craniotomy (Fig. 1d). The pathology was consistent with glioblastoma, WHO grade IV.

Case 4

A 67-year-old female presented to the ED as a stroke code with one day of right arm weakness and slurred speech with a NIHSS of 7. She did not seek medical attention upon



Fig. 1. A right vertebral artery digital subtraction angiogram showing a 1cm basilar artery apex aneurysm (a) and an axial non-contrast computed tomography (CT) scan showing diffuse subarachnoid hemorrhage in the basal cisterns (b) for case 1. A CT scan of case 2 showing a large right sided intraparenchymal hemorrhage with significant mass effect, cerebral edema, effacement of the right lateral ventricle, midline shift, and intraventricular hemorrhage (c). A CT scan of case 3 showing a right frontal hemorrhagic tumor with associated mass effect and midline shift (d).

symptom onset to avoid risk of coronavirus exposure. A computed tomography angiogram revealed an occlusion in a left M2 branch with a completed infarct. Unfortunately, she was out of the tPA and thrombectomy windows. Her NIHSS did not improve at discharge.

These cases serve to highlight the unintended toll on patients that should be accounted for when analyzing the overall burden from the pandemic as many patients not infected by COVID-19 have been indirectly and negatively affected. We urge patients to seek the necessary medical attention as the appropriate care will be provided regardless of COVID-19 status. In most, if not all hospitals, patients with confirmed SARS-CoV-2 are treated in isolation rooms, which are oftentimes in remote wings of the hospital. Hospital staff are commonly tested for active infection as well as antibodies, and are required to don proper personal protective equipment at all times in order to prevent nosocomial transmission of the virus. A recent study in Belgium found that 197 of 3056 hospital employees tested positive for SARS-CoV-2 IgG antibodies, however neither being directly involved in clinical care nor working in a COVID-19 unit increased the odds of being seropositive, though having a suspected COVID-19 household contact did.¹⁶ Additionally, recent study suggests that contamination of general wards with the virus is as low as 3%.¹⁷ This supports the notion that patients should not worry about seeking prompt care for serious, treatable, and time-sensitive conditions such as stroke. With the COVID-19 curve flattening in New York, we now are planning for the recovery phases of the pandemic and the gradual reopening of non-emergent aspects of the health system.

Declaration of Competing Interest

All authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.

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Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. For this type of study, formal consent is not required.

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