



Letter to Editor

Cerebral Vascular Disease in patients with COVID-19: Preliminary report in 3 Latin American cities

Enfermedad Vascular Cerebral en pacientes con COVID-19: Informe preliminar en 3 ciudades de América Latina

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Dear Editor

Cases of a novel viral respiratory illness, corona virus disease (COVID-19), caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), were first reported in Wuhan (Hubei, China) in December, 2019^[1]. Although COVID-19 is primarily a respiratory illness, neurological manifestations have been reported in hospitalized patients and stroke has been observed in 0.9 to 5% of total cases^[2,3].

Stroke care systems has been affected in several ways leading to a prolongation in care seeking times and a reduction in reperfusion treatments^[4]. There are few studies examining the health effects of stroke and COVID-19 patients in Latin American countries and it is necessary to evaluate stroke care in this countries during the pandemic, where organized transportation, proper triage, and timely access to reperfusion treatments have been lacking^[5].

We have conducted a study to describe cerebrovascular disease (ischemic and hemorrhagic) in patients with COVID-19 admitted to reference hospitals in three Latin American cities and determinate factors associated with mortality. Data collection began March 1, 2020 and ended June 30, 2020. The last cases were followed up until August 10, 2020. The eligibility criteria included admitted patients with cerebrovascular events and COVID-19. All patients admitted to the institutions were clinically screened for COVID-19 and respiratory sample was obtained depending on clinical suspicious and confirmed with reverse transcription polymerase chain reaction (RT-PCR) or rapid test. We considered rapid test as confirmatory since we are in third world countries where we often lack resources. The study was approved by the ethics committee of each institution.

51 patients presented a cerebrovascular event, with an incidence of 2.18% (IC 95% 0.13-4.22). 86.3% were ischemic strokes and 13% presented hemorrhagic

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DECLARATIONS

Ethics approval and consent to participate
The study was approved by the ethics committee of each institution in May 2020. The ethics committees were: Research Ethics Committee for COVID-19 of the Health Social Security - EsSalud in Peru; Teaching and research department of the National oncology institute "Juan Tanca Marengo" in Ecuador and Research Ethics Committee of the Unión Médica del Norte Clinic in Dominican Republic.

CONSENT FOR PUBLICATION

Not applicable, because we obtained the information from electronic clinical records and patients were not intervined.

AVAILABILITY OF DATA AND MATERIAL

The datasets generated and analyzed during the current study are available in a supplementary file.

COMPETING INTERESTS

The authors have no competing interest.

FUNDING

No funding was received for this study and no sponsors were involved in this study.

AUTHORS' CONTRIBUTIONS

MGG pioneered the idea of the research, revised the data, participated in its design and drafted the manuscript. FR pioneered the idea of the research, revised the data, participated in its design and coordination, and performed the statistical analysis. MAV, DG, MSR, LRK, CR revised the data, participated in its design and coordination, and drafted the manuscript. All authors have read and approved the manuscript.



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PEER REVIEW

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strokes. The median age of patients exhibiting cerebrovascular event was 69 years old (range of 46 to 90). 22% of the patients were under 60 years and 60% were women. 49% of the patients had RT-PCR laboratory-confirmed tests of COVID-19. High blood pressure was the most common antecedent occurring in 56% of patients. The most commonly used medications were antihypertensive and antiarrhythmic drugs which were used by 47% and 11% of patients, respectively.

In regards to COVID symptoms, 47% of patients presented dyspnea, 33% had general malaise, 31% had a cough and 22% had fever. 4% of patients did not present any respiratory symptoms. The average length of hospital stay was 17 days (range of 0-54 days). 46.67% of patients required admission to the ICU. Of the 51 patients, 25.5% of patients received high flow oxygen and required pronation. 43.1% of patients required endotracheal intubation. 19.6% of patients required tracheostomy. 41.1% of intubated patients required ventilation for an average of 15 days. 31% of patients required the use of vasopressors. Neurological (42.22%) and septic (40%) complications were most frequently presented by the patients.

13% of patients had a National Institute of Health Stroke Scale (NIHSS) less than 4, 33.33% had NIHSS scores between 5 and 16 and 30.77% patients had scores between 17 and 25. 15% of patients sought medical attention within 6 hours of symptom onset, 62% sought attention after 6 hours, 13% sought attention after 72 hours and 9% sought attention between 48 and 72 hours. There has been a reduction in reports of minor strokes and TIAs, suggesting that patients with mild symptoms may not seek care^[6].

In regards to ischemic stroke, 71% of patients presented a compromise of the middle cerebral artery and 17% presented a compromise of the basilar vertebral territory. Only 2% presented hemorrhagic transformation. In our study, none of the patients received reperfusion treatment (endovenous thrombolysis or mechanical thrombectomy), despite being admitted to public and private referral hospitals. It is reported that intravenous thrombolysis and thrombectomy reperfusion treatments have declined during the pandemic^[7]. About 20% of the patients had functional independence (modified Rankin scale: mRS 0-2) and 44% of the patients presented significant dependency (mRS 3 to 5). 36% of the 51 patients died (95% CI 34.29% -48.07%). 33% of the ischemic stroke and 50% of the patients with hemorrhagic strokes died.

PaO2/ FIO2 (201.1 ± 83 versus 289.9 ± 133%; p = 0.024) and fibrinogen (164 ± 233 versus 293 ± 209 g / L; p = 0.045) levels were lower in deceased patients. Levels of serum ferritin (1554 ± 1432 versus 619 ± 426 ng / ml; p = 0.011) and C-reactive protein: CRP (142 ± 107 versus 61.6 ± 93 mg / dL; p= 0.007) were clearly elevated in non-survivors compared to survivors throughout the clinical course and increased as severity of illness increased (Table 1).

Table 1. Descriptive variables and Laboratory of patients with COVID-19 and Stroke admitted to reference hospitals in three Latin American cities.**

Mean (±SD)	Death n=21	Alive n=30	p (T-student)
Age (years)	72.1 ±10	67.8 ±11	0.18
Hospitalization days (days)	15.9 ±10	17.7 ±16	0.65
Time onset of symptoms (hours)	27.6 ±25	27.2 ±17	0.96
PaO2/ FIO2 (%)	201.1 ±83	289.9 ±133	0.024
Intubation days	9.3 ±10	5.8 ±10	0.26
Leucocytes (u/uL)	11751 ±5774	11530 ±6376	0.9
Neutrophils (u/uL)	9392 ±5575	7907 ±4619	0.31
Lymphocytes (u/uL)	1436 ±645	2169 ±1910	0.059
Platelets (u/uL)	260.6 ±115.	256.8 ±145.	0.92
PT (seconds)	11.0 ±7	24.3 ±36	0.057
PTT (seconds)	40.1 ±77	50.4 ±67	0.62
D-Dimer (ng/ml)	1520 ±3688	435 ±1170	0.14
Fibrinogen (g/L)	164 ±233	293 ±209	0.045
Ferritin (ng/ml)	1554 ±1432	619 ±426	0.011
CRP (mg/dL)	142 ±107	61.6 ±93	0.007
Procalcitonin (ng/ml)	0.61 ±1.2	4.3 ±15.9	0.291

SD: standard deviation; PaO2: arterial oxygen pressure; FIO2: inspired oxygen fraction; u/ul: units per milliliter; ng/ml: Nanograms per milliliter; g/l: grams per liter; PT: Prothrombin time; PTT: Partial thromboplastin time; CRP: C-reactive protein.

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This study found high rates of mortality and disability in patients with stroke and COVID-19 from reference hospitals in 3 Latin American cities. During the pandemic, there has been a prolongation of arrival times of stroke patients to emergency rooms. Mortality in patients with both COVID-19 and cerebrovascular events is associated with the presence of inflammatory parameters.

It is important to mentioned that cardiovascular diseases represented a great public health problem with an increased

in morbidity and mortality in the last years [8]. In low- and middle-income countries, including Latin American countries, stroke is the second leading cause of death and disability before the time of COVID-19^[9,10]. Urgent public education is necessary to reduce the impact of the pandemic in Latin American countries.

BIBLIOGRAPHIC REFERENCES

1. Wu F, Zhao S, Yu B, Chen Y-M, Wang W, Song Z-G, et al. A new coronavirus associated with human respiratory disease in China. *Nature*. 2020; 579(7798):265-269. doi: 10.1038/s41586-020-2008-3.
2. Li Y, Li M, Wang M, Zhou Y, Zhou J, Xian Y, et al. Acute cerebrovascular disease following COVID-19: a single center, retrospective, observational study. *Stroke Vasc Neurol*. 2020;5(3):279-84. doi: 10.1136/svn-2020-000431.
3. Yaghi S, Ishida K, Torres J, Grory BM, Raz E, Humbert K, et al. SARS-CoV-2 and Stroke in a New York Healthcare System. 2020;51(7):2002-11. doi: 10.1161/STROKEAHA.120.030335.
4. Zhao J, Rudd A, Liu R. Challenges and potential solutions of stroke care during the coronavirus disease 2019 (Covid-19) outbreak. *Stroke*. 2020; 51(5): 1356 - 1357. doi: 10.1161/STROKEAHA.120.029701.
5. Leira EC, Russman AN, Biller J, Brown DL, Bushnell CD, Caso V, et al. Preserving stroke care during the COVID-19 pandemic: Potential issues and solutions. *Neurology*. 2020;95(3):124-33. doi: 10.1212/WNL.00000000000009713.
6. Diegoli H, Magalhães PSC, Martins SCO, Moro CHC, França PHC, Safanelli J, et al. Decrease in Hospital Admissions for Transient Ischemic Attack, Mild, and Moderate Stroke During the COVID-19 Era. *Stroke*. 2020;51(8):2315-21. doi: 10.1161/STROKEAHA.120.030481.
7. Nogueira RG, Qureshi MM, Abdalkader M, Martins SO, Yamagami H, Qiu Z, et al. Global Impact of COVID-19 on Stroke Care and IV Thrombolysis. *Neurology*. 2021;96(23):e2824-38. doi: 10.1212/WNL.0000000000001885.
8. Öunpuu S, Anand S, Yusuf S. The impending global epidemic of cardiovascular diseases. *European Heart Journal*. 2000;21(11):880-3. doi: 10.1053/euhj.1999.1880.
9. Feigin VL, Stark BA, Johnson CO, Roth GA, Bisignano C, Abady GG, et al. Global, regional, and national burden of stroke and its risk factors, 1990-2019: a systematic analysis for the Global Burden of Disease Study 2019. *Lancet Neurol*. 2021;20(10):795-820. doi: 10.1016/S1474-4422(21)00252-0.
10. Martins SCO, Sacks C, Hacke W, Brainin M, Figueiredo F de A, Pontes-Neto OM, et al. Priorities to reduce the burden of stroke in Latin American countries. *Lancet Neurol*. 2019;18(7):674-83. doi: 10.1016/S1474-4422(19)30068-7.