



Acute stroke care during the COVID-19 pandemic: difficult, but not impossible!

Sofia Maldonado Slootjes¹ · Frank Hammer² · Jonathan Leempoel¹ · André Peeters¹

Received: 8 May 2020 / Accepted: 29 June 2020
© Belgian Neurological Society 2020

Keywords Stroke · COVID-19 · Coronavirus · Carotid T occlusion · Code stroke

Amid the coronavirus disease 2019 (COVID-19) pandemic, neurologists have been confronted with unprecedented situations, among which acute stroke management in COVID-19 patients. To the best of our knowledge, this is the first report of protected code stroke in Belgium.

A 74-year-old patient, while hospitalized for a COVID-19 pneumonia, experienced sudden-onset left-sided hemiplegia and aphasia. Two hours after symptom onset, an in-hospital code stroke was activated. A neurologist in personal protection equipment (PPE) consisting of mask, goggles, gown and gloves [1], evaluated the patient and documented a National Institutes of Health Stroke Scale (NIHSS) of 16, rapidly deteriorating to 25. Neuroimaging in the COVID-19 section of the radiology department showed no abnormality on the non-contrast computed tomography (NCCT) of the brain but CT angiography revealed a right carotid T occlusion. Intravenous thrombolysis with alteplase was administered within 3 h of symptom onset. The patient was then promptly transferred to the interventional radiology suite dedicated to COVID-19 patients to undergo endovascular thrombectomy (EVT). EVT by thrombus aspiration was performed under general anesthesia, using a Cello 9F balloon guide catheter for proximal flow control and a Sofia 6F catheter for distal aspiration. Complete recanalization of the carotid artery (modified treatment in cerebral ischemia (mTICI) grade 3) by first-pass thrombus aspiration was achieved 4 h and 30 min after symptom onset (Fig. 1). The patient was closely monitored in a COVID-19 Intensive Care unit. The

neurological symptoms resolved as reflected by a NIHSS of 1 at 72 h after symptom onset.

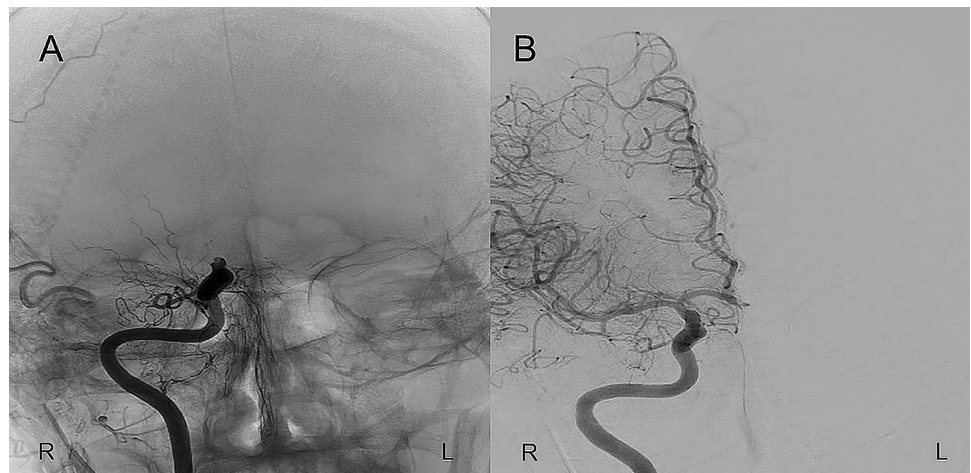
In a health care system overwhelmed by COVID-19 patients, acute stroke management represents a major challenge. Awareness of stroke symptoms may be reduced, patients are experiencing fear of hospitals and stay at home, although they require urgent medical attention, while in-hospital logistical pathways have changed. For instance, PPE regulations have been implemented to reduce nosocomial infection rate, which has been reported to be as high as 41.3% [2]. However necessary, they may prove to be time-consuming in a code stroke setting. Despite these difficulties, successful outcome may be achieved, such as in our case. Since cerebrovascular disease has been observed in 5.9% of COVID-19 patients [3], this situation will not be infrequent. The implementation of protected code stroke is, therefore, essential [1, 4, 5]. Treating patients early after symptom onset remains the cornerstone of stroke management and stroke physicians should continue to pursue this goal during the COVID-19 pandemic.

✉ André Peeters
andre.peeters@uclouvain.be

¹ Department of Neurology, Cliniques universitaires Saint-Luc, Avenue Hippocrate 10, 1200 Brussels, Belgium

² Department of Radiology, Cliniques universitaires Saint-Luc, Avenue Hippocrate 10, 1200 Brussels, Belgium

Fig. 1 **a** Persistent right carotid T occlusion despite initiation of intravenous alteplase, with no visualization of the middle and anterior cerebral arteries. **b** Complete recanalization of the right carotid artery (mTICI grade 3) after first-pass thrombus aspiration



Acknowledgements The authors wish to thank Prof. Robin Lemmens (Department of Neurology, University Hospitals Leuven, Leuven, Belgium) for critical revision of the manuscript.

Author contributions Sofia Maldonado Slootjes drafted the manuscript. All authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Funding None.

Compliance with ethical standards

Conflicts of interest The authors declare that they have no conflict of interest.

Ethical approval This article does not contain any studies with human participants (or animals) by any of the authors.

Consent for publication Patient consent was obtained.

References:

1. Khosravani H, Rajendram P, Notario L, Chapman MG, Menon BK (2020) Protected code stroke. Hyperacute stroke management during the coronavirus disease 2019 (COVID-19) pandemic. *Stroke*. <https://doi.org/10.1161/STROKEAHA.120.029838> (**Epub 1**)
2. Wang D, Hu B, Hu C, Zhu F, Liu X, Zhang J, Wang B, Xiang H, Cheng Z, Xiong Y, Zhao Y, Li Y, Wang X, Peng Z (2020) Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus-infected pneumonia in Wuhan, China. *JAMA* 323:1061–1069. <https://doi.org/10.1001/jama.2020.1585>
3. Li Y, Wang M, Zhou Y, Chang J, Xian Y, Mao L, Hong C, Chen S, Wang Y, Bo H (2020) Acute cerebrovascular disease following COVID-19: a single center, retrospective, observational study. *Lancet*. <https://doi.org/10.2139/ssrn.3550025> (**Epub 13**)
4. Baracchini C, Pieroni A, Viaro F, Cianci V, Cattelan AM, Tiberio I, Munari M, Causin F (2020) Acute stroke management pathway during Coronavirus-19 pandemic. *Neurol Sci*. <https://doi.org/10.1007/s10072-020-04375-9> (**Epub 09**)
5. Smith MS, Bonomo J, Knight WA IV, Prestigiacomo CJ, Richards CT, Ramser E, Adeoye O, Bertsch S, Shirani P, Vagal A, Fichtenbaum CJ, Housholder A, Khatri P, Kleindorfer DO, Broderick JP, Grossman AW (2020) Endovascular therapy for patients with acute ischemic stroke during the COVID-19 pandemic. Proposed Algorithm *Stroke* 51:00. <https://doi.org/10.1161/STROKEAHA.120.029863>

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.