



COVID-19 and Diagnosing Brain Death: An Ambiguity

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Cite this article as: Kapoor I, Prabhakar H, Mahajan C. COVID-19 and Diagnosing Brain Death: An Ambiguity. Turk J Anaesthesiol Reanim 2020; 48(5): 436-7.

We read with great interest an article by Yakar et al. (1), where authors have described brain death determination and organ donation process in a 61 year old lady pre diagnosed with cerebrovascular disease during coronavirus disease (COVID-19) pandemic. COVID-19 has created a medical crisis worldwide. Its symptomology has been varied, ranging from common respiratory symptoms to uncommon neurological features which include headache, light headedness, hallucination, seizure, and meningitis. Mao et al. (2) in their study observed that 5.7% of patients with severe coronavirus infection developed cerebrovascular disease later in the course of illness (2). They also observed that 36.7% of patients with severe infection who were old and with co-morbidities had neurological manifestation. In another study by Li et al. (3), the incidence of stroke in COVID-19 patients was about 5% with a median age of 71.6 years.

The authors in this case report have mentioned doing real time polymerase chain reaction (RT-PCR) test to exclude COVID-19 only after 12th postoperative hour when the patient was accepted as potential brain dead. Before that she was transferred to computed tomography scan room and also underwent external ventricular drainage surgery. During this pandemic, the diagnostic test for COVID-19 should have been done before these procedures, since though the patient's test report was negative later on, she could have infected many healthcare personals had she been infected. Looking at the higher percentage of stroke in these patients, COVID-19 can't be ruled out simply. Again the authors did not describe the steps of apnea test performed in this patient. Whether they performed modified apnea test or usual apnea test? One should have RT-laboratory report before performing apnea test during this pandemic. The authors did not mention the time at which they got the result of first RT-PCR test. If the patient is COVID-19 negative, the usual apnea test can be performed to confirm brain death. Concern arises if the patient is COVID-19 positive. Since disconnecting ventilator from patient during apnea test make the health care provider (HCP) a very high risk candidate for acquiring viral infection, it would be prudent not to perform the apnea test in these patients. In that case ancillary tests like Transcranial Doppler Test (TCD) or electroencephalography (EEG), where risk of virus transmission is very less compared to apnea test can be considered. On TCD, an oscillatory pattern is suggestive of cerebral circulatory arrest and on EEG, absence of electrical activity is considered as a sign of brain death (4, 5). In institutes where TCD or EEG are not available, one can perform modified apnea test by using high frequency particulate air (HEPA) filter attached to patient's endotracheal tube before disconnecting the ventilator.

Literature is still lacking to provide any information whether patients with COVID-19 infection can be taken up for organ donation if prerequisites are met for performing brain death test? Probably not!

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Author's Reply

Re: COVID-19 and Diagnosing Brain Death: An Ambiguity

Cite this article as: Yakar MN, İstan P, Gürkök MÇ, Yıldız D, Yaka E, Gökmen AN. Re: COVID-19 and Diagnosing Brain Death: An Ambiguity. Turk J Anaesthesiol Reanim 2020; DOI: 10.5152/TJAR.2020.310820.

Dear Editor,

We are pleased that our case report about managing the first organ donation process in Turkey in the COVID-19 pandemic has been read and interpreted with interest in the academic field (1). Early recognition of patients with COVID-19 is essential to prevent transmission to healthcare professionals and patients.

Neurological manifestations of COVID-19 are various. Although ischemic stroke is much more common, COVID-19 may also be diagnosed in patients with haemorrhagic stroke (2). In the era of the COVID-19 pandemic, all patients admitted to the emergency department owing to any complaint have the potential to be in the asymptomatic period of COVID-19 regardless of clinical presentation (3). Our patient had a history of cerebrovascular aneurysms. Neurological examination showed the elevated intracranial pressure findings and strengthened the diagnosis of a possible haemorrhagic stroke. In this condition, the main issue was to decide whether to wait for the COVID-19 exclusion in the patient, wherein delaying the operation would result in severe morbidity or death.

The patient applied to our hospital on 22nd March 2020, after 11 days from Turkey's first COVID-19 case. On those days, the last COVID-19 guide had been published on 11th March 2020 by the Ministry of Health. According to this guide, the indications to perform RT-PCR tests were listed as usual symptoms of the disease, but stroke did not (4). As mentioned in the text, our patient did not have any symptoms or contact history in the last 14 days. Moreover, the Ministry of Health policy was to perform all real-time polymerase chain reaction (RT-PCR) tests in one center. If we had waited for the test result, the operation would be delayed approximately 16 hours. On the other hand, the RT-PCR test may result in false-negative as high as 30% (5). The patient's transportation processes were carried out following the guideline of our center, directing the in-hospital transfer of confirmed or suspected COVID-19 cases safely. Throughout the patient's transportation to the emergency radiology unit, operation theatre, and intensive care unit, a transport ventilator was provided for respiratory support. We placed heat and moisture exchanger (HME) filter between the intubation tube and respiratory circuit. Additionally, as a secondary barrier to prevent the

transmission, we placed a viral filter between the respiratory circuit and ventilator. When required, the respiratory circuit disconnected after temporary pausing of the ventilation and the clamping of the tube. The HME filter was kept in the intubation tube when the breathing circuit was disconnected. All healthcare professionals associated with these procedures wore personal protective equipment (PPE) such as cap, glasses, FFP3 mask, and waterproof overalls.

The apnea test was performed approximately one day later from the RT-PCR test resulted. The patient was followed-up in an isolated room in the intensive care unit. Thus, during the apnea test, we did not need to attach a HEPA filter to the patient's intubation tube, but staff in charge wore the PPE.

It is clear how to diagnose brain death and manage an organ donation process, but the literature about COVID-19 is still expanding with new findings. Thus, reviewing the literature to stay updated before this kind of procedures contributes to the process positively.

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DOI: 10.5152/TJAR.2020.310820

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