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MEDICAL NEWS **TIP HABERİ**

ACUTE ISCHEMIC STROKE TREATMENT IN COVID-19 PANDEMIA: EXPERT OPINION

COVID-19 PANDEMİSİNDE AKUT İSKEMİK İNME TEDAVİSİ: UZMAN GÖRÜŞÜ

Mehmet Akif TOPCUOGLU[1], Ethem Murat ARSAVA[1], Atilla Ozcan OZDEMIR[2]

[1]Hacettepe University, Faculty of Medicine, Department of Neurology, Ankara, TURKEY
[2]Eskişehir Osmangazi University, Faculty of Medicine, Department of Neurology, Eskisehir, TURKEY

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INTRODUCTION

We are writing up this letter of opinion in the period when the coronavirus disease 2019 (Corona Virus Disease 2019; COVID-19) pandemic poses a serious threat throughout the world, including our country. In pandemic days, our concentration and facilities appear to shift from other diseases, including acute stroke treatment, to corona virus infections. However, neither the frequency of acute stroke decreased nor the results and treatment changed. For this reason, acute ischemic stroke as well as other emergency and critical conditions will continue to be treated in this period.

DOES COVID-19 CAUSE STROKE?

According to the current information, COVID-19 viremia does not appear to be a "direct" cause of ischemic stroke. But as in other infection processes, it can trigger ischemic stroke through different pathophysiological mechanisms (1,2). 1,2Up to 6%, in other words, an increased incidence of stroke has been reported in patients with COVID-19. It may be immediately considered that the incidence may have increased due to the fact that the patients affected from coronavirus were mostly in the older age group in addition to the presence of multiple comorbidities. On the other hand, the risk of stroke may be increased by the participation of multiple organ failure and coagulopathy similar to those in sepsis, diffuse intravascular coagulation or cardiac affection in the process as a result of severe pneumonia and acute severe respiratory failure syndrome progressing and reaching a difficult-to-control level due to the novel coronavirus leading to COVID-19 [Severe Acute Respiratory Syndrome coronavirus; SARS-CoV-2]. In milder COVID cases, the potential of coagulopathy to increase both hemorrhagic and ischemic stroke is emphasized (3). In brief, there is such a risk but the opportunity to investigate it in detail could not have been obtained obtained so far. In addition, it should be kept in mind that SARS-CoV-2 is a virus with a potential for neurotropism (4,5).

On the other hand, it has been stated in the series from China that about one third of the patients have neurological symptoms in COVID pandemic (6). In fact, these symptoms precede pulmonary findings in some of the patients. Although there are major differences between the series in terms of the neurological manifestation and the approximate incidence, they are as follows: dizziness [20%], headache [15%], muscle damage [10%], anosmia [5%], dysgeusia [6%] and encephalopathy [3%].

Address for Correspondence: Prof. Mehmet Akif Topcuoglu MD, Hacettepe University Faculty of Medicine, Department of Neurology, 06100, Sıhhiye, Ankara, Turkey
Phone: +90 312 305 18 06 **E-mail:** matopcuoglu@yahoo.com
ORCID IDs: Mehmet Akif Topcuoglu 0000-0002-7267-1431, Ethem Murat Arsava 0000-0002-6527-4139, Atilla Ozcan Ozdemir 0000-0002-9864-6904
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Neurological symptomatology increases as the severity of infection increases. However, some patients may have neurological findings without an evident infectious symptom (6). As is, some of these symptoms may have been addressed as a stroke mimic in cases where an adequate medical history could not be taken. In this period, maximum attention is essential in the differential diagnosis of stroke. Emergency medicine and infectious disease specialists should always remember that SARS-CoV-2 has such an atypical presentation. Each patient presenting with these complaints is a potential COVID patient and requires to be treated accordingly (3).

HOW SHOULD THE INITIAL ASSESSMENT OF AN ACUTE STROKE PATIENT BE?

In acute stroke patients, medical history cannot often be adequately taken in terms of the risk and presence of COVID-19. Therefore, every patient should be considered potentially infected with SARS-CoV-2, and should be properly examined with full personal protective equipment until this infection is ruled out (7-9). If this basic condition cannot be met in the institution, it is necessary and recommended that the physician who is contact with the patient under appropriate conditions [this will often be an emergency medicine specialist] do [in-house] telemedical consultation (7).

Apart from that, a stroke patient is evaluated in accordance with the current guidelines and regulations. Pandemic does not, and should not, lead to any change or flexibility in acute stroke management and quality metrics (7,10,11).

CREATING A TREATMENT PLAN IN ACUTE STROKE

The principles of administering acute ischemic stroke treatment do not change in patients infected with SARS-CoV-2 or suspected of having infection. However, special measures must be taken for the pandemic period. These are summarized in table.

In acute ischemic stroke, the team that will administer IV tPA must use full personal protective equipment and employ maximum compliance with contact safety rules (9,12).

If the acute ischemic stroke patient will be intubated for procedural purpose, this must be performed within the framework of pandemic rules.8 It is a must that this procedure is not left to the angiography suite or neurology units, and it is carried out by the most experienced specialists in negative pressure environments and in full compliance with pandemic conditions (11). Low-dose thoracic CT and SARS-CoV-2 PCR test should be performed for each patient to be treated interventionally. The PCR test result will of course be obtained later, but this is critical for the decision of where to transfer the patient after this procedure.

Thoracic CT shows the signs of the novel corona infection with a very high sensitivity [> 95%] (13). Although specificity is also important for starting the procedure, in case of suspicion, the patient is treated as COVID-19 positive.

POST-ACUTE TREATMENT PERIOD

If acute ischemic stroke patients will directly be transferred to the stroke unit or neurointensive care unit after undergoing systemic thrombolytic therapy or interventional procedure, these units must have full competence in terms of COVID-19. If this condition is not fully met, patients are kept in other units where these conditions are met until COVID-19 is ruled out, and transferred to the aforesaid units after the test[s] come back negative and the infection is ruled out.

Patients who have a good condition and no evident findings in favor of COVID infection on Thoracic CT, and whose PCR study is negative, are not required to be followed up in the intensive care for 24 hours. These patients can be followed up in other neurology units (14).

Patients who cannot be extubated or require to be followed up in the neurological intensive care unit due to their neurological status are transferred to the competent units where they are initially admitted, then to neuro-intensive care units after the CT and PCR results are determined to be negative for COVID, and they are followed up there.

Patients with uncertain condition cannot be extubated in the angiography suite, stroke unit or neurointensive care units. During the endovascular treatment in angiography suites, physicians should use their personal protective equipment considering the patient as a COVID-19 patient. The ventilation system of the angio suite must be checked and prepared as in the operating room.

Table. Recommended modifications acute ischemic stroke diagnosis and treatment algorithms in pandemic (9,12,16-18).

	Potential stroke case	
Stage-1	**The following questions are asked for infection control screening.** □ Does the patient have fever, cough, chest pain, shortness of breath, headache, myalgia, nausea/vomiting, diarrhea or other infectious symptoms? □ Is there a history of close contact with the person with the symptoms or diagnosis of infection [contact to any extent described in the Ministry of Health guide]? □ Is the travel history of the patient or people contacted positive? □ Is there a suspicion of inadequate compliance with the COVID-19 pandemic rules? □ Has s/he visited any pandemic hospital for any reason within the last 14 days?	**If the response to at least one of these questions is "YES", THE PROTECTED STROKE PROTOCOL is followed.**
Stage-2	**If all of the questions in Stage-1 are negative, the following questions are asked.** □ Is there a problem of adequacy or reliability in the history taken from the patient [or his relative]? □ Are there any conditions that disrupt communication such as aphasia or loss of consciousness? □ Are the history and findings consistent with non-stroke diseases?	**If the response to at least one of these questions is "YES", THE PROTECTED STROKE PROTOCOL is followed.**
	Protected stroke protocol	
	Is there aerosolization [contamination of air with (micro) droplets] or the risk of aerosolization? If there is vomiting, cough, sneezing, secretion, oropharyngeal or nasal aspiration requirement or performance, nebulization, placement of naso/oro-enteric tube or feeding tube, intubation, non-invasive mechanical ventilation, cardiopulmonary resuscitation etc. [including possibility] or in similar cases, there is a risk of aerosolization. Of these procedues, only those absolutely required should be performed. □ Personal protective equipment is worn appropriately if there is no risk of aerosolization. Long-sleeve operating room gown, surgical mask, large glasses, bonnet, visor and gloves are minimum. If there is a risk of aerosolization, appropriate personal protective equipment is used. This includes the addition of N95 mask and long gloves. Surgical mask is worn on the N95 mask. □ Complete compliance with the hand hygiene protocol [timing and technique] is essential. □ A surgical mask must be worn by every patient who is not intubated. The mask is not removed during examinations and transfers. □ If the patient's consciousness is declining and there is neurological indication, high oxygen [FiO2> 0.5], CPAP, BIPAP, HFOT or ambu may be required during the procedures, the emergency/intensive care specialist is notified before going to the examination and early intubation is performed. Having to intubate under suboptimal conditions poses a serious risk.	
	Protected stroke protocol - Post-treatment	
	□ Patients administered IV tPA [Thoracic CT is "non-COVID" and clinically eligible patients] are admitted to the stroke unit or neurology ward when COVID-19 PCR comes back negative. □ Patients administered IV tPA [Thoracic CT is "non-COVID" and patients requiring clinical intensive care] are transferred to the neurointensive care unit when COVID-19 PCR comes back negative. □ Patients who underwent thrombectomy [Patients with "non-COVID" thoracic CT and negative PCR] are admitted to the neurointensive care unit. □ In cases where there is no aerosolization protection in the stroke unit and neurointensive care unit, patients can only be admitted to these units when the presence of COVID-19 is ruled out. In this respect, Thoracic CT and PCR are sufficient and triage of positive patients the to COVID units and of negative patients to the neurology units is appropriate.	

THE RISK OF COVID-19 INFECTION IN A STROKE PATIENT

Infections such as aspiration pneumonia or urinary tract infection or elevated fever due to other causes are very common after the hospitalization of the stroke patient. In such cases, SARS-CoV-2 infection should also be rapidly ruled out (7).

CONCLUSION

The protocol of acute stroke management should be modified during the COVID-19 pandemic. This modification should not mean a noncompliance with evidence-based practice and quality metrics. If patients are suspected of infection before the procedures, sampling is performed for PCR. Thoracic CT is performed in every patient who will be hospitalized. The patient is admitted to the neurology units only when COVID-19 is "safely" ruled out. Otherwise, the patient should be admitted to the COVID-19 units and wards. Treatment should be maintained in detached environments of the emergency rooms or other units until the results come out. In the event of COVID-19 risk, suspicion or presence, the process is carried out according to the most up-to-date guidelines of the Ministry of Health of the Republic of Turkey (15,16). The methods suggested here are in full compliance with these current guidelines. However, the exper opinions presented may vary depending on the developments.

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Ethics

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