Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Letter to the Editor: Awake Craniotomy for Intracranial Gliomas During Coronavirus Disease 2019 Pandemic

INTRODUCTION

Awake craniotomy technique is the reference standard procedure to achieve the maximum safe resection in patients with an intracranial glioma. However, in the coronavirus disease 2019 (COVID-19) era, this technique has been considered of high risk because it involves management of the airway more than once (e.g., using the sleep—awake—sleep technique) and requires very close and direct contact between the neuropsychologist and patient during stimulation and a high number of technical personnel and hardware, such as monitoring and navigation equipment, within the operating room.[1-3]

The initial response to the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pandemic by most neurosurgical centers worldwide was to defer elective surgeries and classify which cases would constitute an emergency, postponing surgical treatment for a large group of patients. Patients with glioma who are candidates for awake craniotomy could have been included in the deferred group (mainly those with low-grade glioma), because they can maintain high function and will not present with acute, life-threatening neurological deterioration. However, we believe that when reopening programs, the current biosafety precautions must be maintained, because the risk of contagion will continue and could remain latent. Thus, strategies to allow neurosurgeons to safely offer patients awake craniotomy should be implemented.[4,5]

WORLD HEALTH ORGANIZATION GLIOMA GRADE

The glioma of patients who are candidate for awake surgery can be categorized according to the World Health Organization grade (low vs. high). The treatment consensus in the COVID-19 era for those with a high-grade glioma is to perform the surgery as soon as possible (preferably within 2 weeks of the diagnosis). For patients with a low-grade glioma, delayed surgery been recommended. However, for these group of patients, early surgical treatment is essential to achieve the supratotal resection that will lengthen the patient's disease-free period. Thus, deferring their surgery further could lead to an increase in their functional deficit and the patients could no longer be good candidates for direct brain mapping.

Therefore, we believe that, regardless of the glioma grade, patients who are candidates for awake craniotomy should undergo testing and isolation to confirm the absence of COVID-19 and allow them to undergo surgery as soon as possible.[4]

CANDIDATES FOR SURGERY AND COVID-19

Neurosurgical oncology teams will mainly encounter 5 types of patients: 1) patients without COVID-19; 2) asymptomatic patients with COVID-19; 3) patients with COVID-19 in the preclinical phase; 4) patients with mild symptoms of COVID-19; and 5) patients with severe symptoms of COVID-19. The first 3 types of patients, by definition, will initially present without symptoms. Thus, it is essential to implement detection strategies to ensure that patients scheduled to undergo to surgery will be patients without COVID-19.[6-8]

TESTING AND SELECTION OF CANDIDATE PATIENTS

Testing and isolation are key to the selection of patients for surgery during the COVID-19 pandemic. All patients who have met the conventional criteria for awake surgery must complete an epidemiological and clinical questionnaire and undergo reverse transcriptase polymerase chain reaction (RT-PCR) testing for SARS-CoV-2. If the test result is negative, the patient must remain isolated for 14 days at home. During this quarantine period, the anesthesia and neuropsychological evaluations should be performed using telemedicine. In addition, the patient should undergo daily monitoring of their neurological state to detect early deterioration and provide verification of quarantine compliance. Once the isolation period has been completed, the patient must return to the hospital. On admission, the patient should undergo computed tomography scanning and a serum total antibody SARS-CoV-2 test (if the serum test is not available, a new RT-PCR test must be performed). Using this protocol, the clinical, radiological, molecular, and serological screening recommendations can all be performed in the most timely manner.[5,9,10]

The period of isolation allows us to rule out any patient in the preclinical phase of COVID-19 infection (average, 5 days) who had had a negative RT-PCR test result. The use of antibody testing 14 days after the negative RT-PCR test result, in addition to patient self-isolation for those 14 days, will allow us to achieve the maximum reported diagnostic sensitivity for greater certainty that those patients who will undergo awake mapping will not be patients with COVID-19[9,11,12] (**Figure 1**).

AWAKE CRANIOTOMY FOR PATIENTS POSITIVE FOR SARS-CoV-2

Numerous problems can occur when performing awake craniotomy in patients with COVID-19. Some reports have suggested that of those patients who had undergone awake craniotomy, those who were positive for SARS-CoV-2 had the worst outcomes.[13] Also, if the sleep—awake—sleep technique is used, active management of the airway will be required twice, with 1 required with the entire team in the operating room. Other anesthetic techniques that could prevent this have been described, such as the full awake technique.[14-16] However, even with these cases, a minimal risk of failure will be present that could necessitate conversion to general anesthesia.[17] In addition, the risk of seizures occurring with electrical mapping is always present, which could result in the patient losing control, generating secretions and, therefore, aerosols.[16] Finally, awake craniotomy requires specialized hardware and the technical personnel to operate it. Also, the neuropsychologist must usually remain close to the patient, coordinating the application of the functional tasks and their interpretation. However, if the instructions for the functional tasks are provided monitored remotely through streaming transmission, the patient could experience anxiety.[1,18] Psychological assistance in such cases is vital.

CONCLUSIONS

Even in the scenario of community circulation of SARS-CoV-2, those patients with an intracranial glioma who have met the criteria for awake craniotomy should undergo surgery as long as the presence of COVID-19 disease has been ruled out using validated methods such as those outlined in our letter.

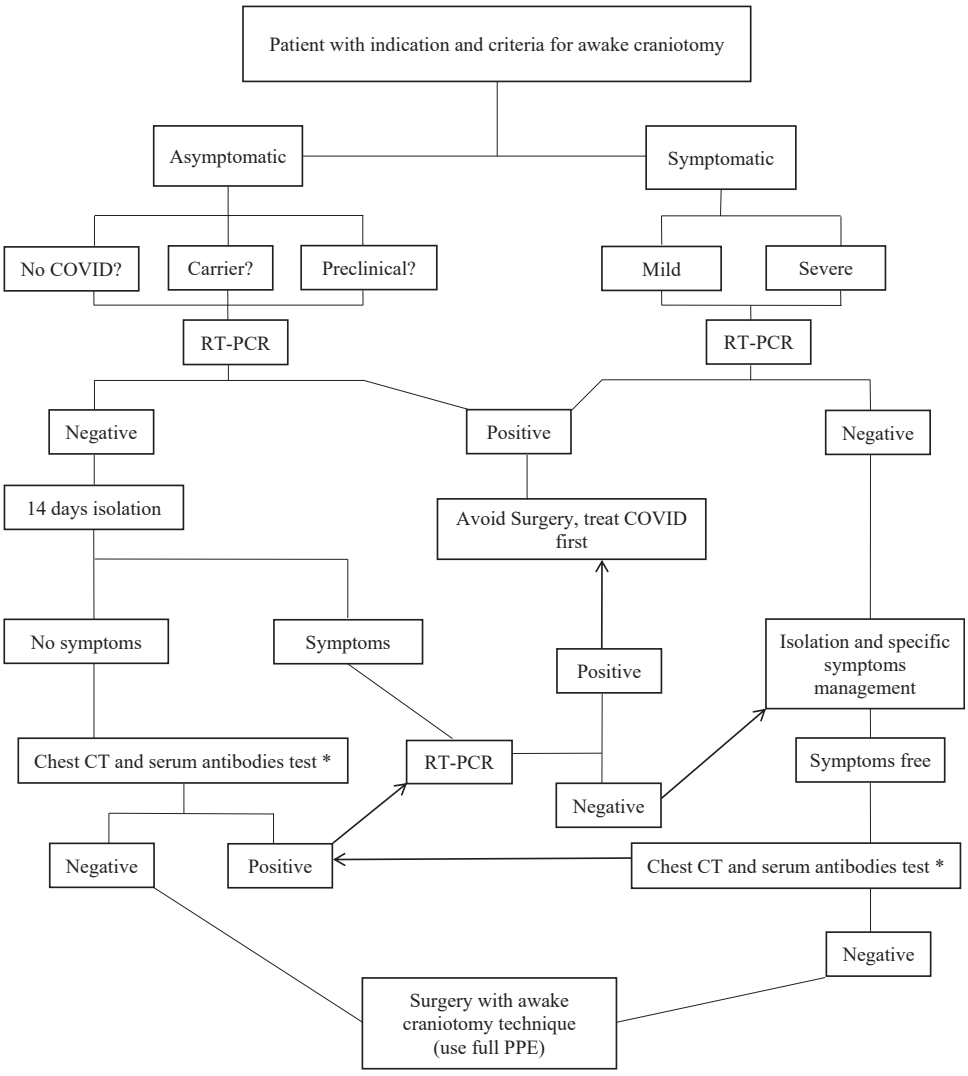

Figure 1. Testing and evaluation process to rule out coronavirus disease 2019 (COVID) in a patient who is a candidate for awake craniotomy. *If serum antibody tests are not available, reverse transcriptase polymerase chain reaction (RT-PCR) should be repeated. CT, computed tomography; PPE, personal protective equipment.

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