Letter: Rongeurs, Neurosurgeons, and COVID-19: How Do We Protect Health Care Personnel During Neurosurgical Operations in the Midst of Aerosol-Generation From High-Speed Drills?

To the Editor:

A neurosurgical team, including 10 neurosurgical nurses and 4 other hospital staff, were infected with the novel coronavirus by a neurosurgical patient who was admitted for an elective trans-sphenoidal operation.[1,2] This neurosurgery patient initially had no symptoms or signs of respiratory tract infection before the operation and he only developed fever 3 d after the operation. He was subsequently diagnosed with coronavirus disease 2019 (COVID-19) 5 d after his trans-sphenoidal surgery. COVID-19 is an infectious disease that can be transmitted via droplets or aerosols to the respiratory tract. The viral load is high along the respiratory tract mucosa, including the nasal cavity, nasopharynx, and oropharynx.[3] The viral ribonucleic acid (RNA) can be detected in the sputum, saliva, as well as in the serum.[3-6] Medical staff is at high risk of exposure to the virus. It was reported that up to 29% of the initial cohort of the confirmed infected novel coronavirus cases were medical staff.[7] Up to date, 3.8% of the confirmed COVID-19 cases were health care personnel (HCP) and 14.8% of their conditions were severe or critical.[8] Overall, the mortality rate is around 4.1% (ranging from 0.25% to 8%).[9] At the same time, the majority (up to 81%) of the cases have only mild symptoms.[8] In fact, the majority of the patients had minimal or no symptoms during the incubation period in the first 3 to 6 d.[5] Yet these asymptomatic or "presymptomatic" contacts were reported to be able to transmit the virus.[10]

Aerosol-generating medical procedures (AGMP) are any procedures performed on patients that can produce aerosols of various sizes.[6] Hence, it is recommended that full personal protective equipment (PPE) should be worn during AGMP, such as intubation, for confirmed or suspected COVID-19. After intubation, the operating theater (OT) staff, including anesthetists, nurses, and other supporting staff, would usually take off some of their protective gear such as face shield, eye protection goggles, gloves, and long-sleeved waterproof gown. Some of them might also take off their masks with high filtration such as the particulate respirators.

For neurosurgery, one might overlook the aerosol-generating property of powered instruments such as the use of high-speed drills.[11] These are commonly used tools for craniotomy and other neurosurgical procedures. Bone scattering from temporal bone drilling can be up to 3.5 feet.[12] Powered instruments had been shown to generate blood-containing aerosols with a concentration of hemoglobin detected in the ambient air.[11] Viruses, including human immunodeficiency virus-1 (HIV-1), was demonstrated to be viable in the aerosols generated by surgical power instruments.[13]

For the neurosurgical operations requiring the dissection of the nasopharyngeal mucosa such as the trans-sphenoidal excision of pituitary tumor, the risk of "aerosolizing" the virus is very high with the use of high-speed drills in the nasal cavity. Nonurgent trans-sphenoidal operations should be suspended during this pandemic. For patients indicated for urgent or semiurgent trans-sphenoidal decompression, eye protection such as goggles should be worn by the neurosurgeons and the OT staff in view of the potential risks of transcorneal transmission. Nonpowered tools such as septum rongeur and Kerrison rongeur should be used to open the sphenoidal sinus and the sella floor instead of using high-speed drills.

The Wuhan Blood Center and blood banks in the Hubei province started to test blood donations for SARS-CoV-2 RNA on February 10.[4] As the novel coronaviral RNA can be present in the blood of confirmed or suspected asymptomatic contacts, these aerosols generated during neurosurgical procedures are potentially infectious. Hudson Brace and other hand drills can be used during emergency operations when the COVID-19 infection status was unknown and when the OT staff might not have full airborne PPE. For suspected COVID-19 cases requiring elective neurosurgical operations, COVID-19 infective status should be checked before the surgery. If the results are negative, then airborne precautions would not be required and the use of PPE can be rationalized. Overall, we recommend our fellow neurosurgeons and trainees to uphold the traditional craft of using hand drills and rongeur in order to minimize aerosol generation from the neurosurgical powered instruments during the COVID-19 pandemic.

Disclosures

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