

Exploring the unknown territories in the new normal world of COVID

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Abstract

It is now well known that the severe acute respiratory syndrome (SARS-CoV-2) originated in the Wuhan province of Hubei, China in 2019. Having spread across different countries of the world, this highly contagious disease has posed many challenges for the healthcare workers to work without endangering themselves and their patients' wellbeing. Several things are yet not clear about the virus and the presence or absence of the virus in the cerebrospinal fluid (CSF) is currently a debated topic. This article reports the perioperative management of two coronavirus disease-19 positive cases, one of whom was a pregnant patient. Their CSF samples, which were collected during the administration of spinal anesthesia, tested to be negative for viral reverse transcription polymerase chain reaction (RT-PCR) test. We wish to highlight from these cases, that during spinal anesthesia, CSF in mildly symptomatic COVID-19 cases probably does not pose a risk of transmission to the anesthesiologist. However, we suggest that due to the varied presentations of the virus, health care personnel, especially anesthesiologists have to be careful during the perioperative management of such cases.

Keywords: Anesthesia, cerebrospinal fluid, corona virus2, COVID-19, pregnancy, severe acute respiratory syndrome, spinal puncture

Introduction

The novel coronavirus disease (COVID)-19 continues to haunt the world in its various "avatars," meaning forms, with variable troublesome manifestations. The panic created by this

severe acute respiratory syndrome virus-2 (SARS-CoV-2) pandemic and the frequently emerging evidence has shattered the confidence of even the most confident clinician. Clinicians are now having doubts about the clinical spectrum of the disease itself and are struggling to choose appropriate

diagnostic and therapeutic interventions. The variable pathophysiology and the many mysteries related to various modes of definite transmission of the disease have left a lot of unanswered questions in relation to our understanding of the disease. The evolving guidelines of the World Health Organization (WHO), the Indian Council of Medical Research (ICMR), and other health authorities have further created a doubtful clinical scenario, leading to researches and surveys being undertaken every day. It is doubtful whether the results of these clinical studies will be of much help in the days to come; nevertheless, the medical fraternity is currently facing an uncertain situation with no definite treatment protocols, uncertainty of foolproof methods to protect themselves from the infection and the highly variable diagnostic and treatment regimens. The anesthesiologists and intensivists dealing with COVID-19 cases in the operation theatres (OT) and intensive care units (ICUs) are no exception to this situation. A lot has been discussed about the aerosol generation and possible prevention from getting infected during airway related procedures with numerous innovations getting published about it. However, we have up till now, not come across any major evidence-related studies or case reports in which the transmission of virus from the cerebrospinal fluid (CSF) to the health care worker has been documented. The extent of COVID-19 involvement in the central nervous system is not well established, and the presence or the absence of SARS-CoV-2 particles in the CSF is currently debatable.^[1]

We present here two mildly symptomatic COVID-19 positive cases who recently needed to be operated during their stay in our hospital which is a tertiary health care institute. Individual patient consent was obtained for the publication of these reports. Their CSF samples, which were collected during the administration of spinal anesthesia, tested to be negative for viral RT-PCR. The routine parameters of CSF were also normal. We wish to highlight from these cases, that during spinal anesthesia, CSF in mildly symptomatic COVID-19 cases probably does not pose a risk of transmission to the anesthesiologist unlike HIV, HBs Ag viruses.

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Clinical Scenario

The first patient was a healthy 30-year-old primi-gravida, who was diagnosed to be COVID positive at 37 weeks of pregnancy. She was shifted to our COVID care facility from a private hospital after her nasal swab tested positive by reverse transcription polymerase chain reaction (RT-PCR). She had only very mild symptoms of COVID. During her hospital stay, she went into labor on the 5th day of admission. The patient was transported from the ward to a dedicated COVID OT as per COVID protocols of our institution.^[2]

Though the instructions were given through telephone, a proper pre-anesthetic checkup was done in the OT itself. Considering previously published case reports,^[3,4] subarachnoid block was planned to decrease the chances of aerosol generation which may occur during general anesthesia and patient was well counseled for subarachnoid block. Just before administration of anesthesia, a sample of CSF was collected in a sterile container and the specimen was sent immediately for examination by RT-PCR method [Figure 1]. We used a 26G spinal needle to decrease the possibility of post-dural puncture headache, though we knew that the chances of missing out spinal block in a single prick were more due to wearing of the level 3 personal protection kit. The course of surgery was uneventful with no increased need for vasopressors. The nasopharyngeal swab of the newborn was also sent for RT-PCR test to rule out transmission to the newborn. Post-operatively, the RT-PCR report came out to be negative for the patient's CSF as well as in the newborn.

The second case was a young male, 28 year old, who was also admitted to our COVID care facility after being found to be positive by RT-PCR. During his stay in the hospital, he sustained injury to his right tendoachilles after he slipped in the wash-room. He was planned to be operated under spinal anesthesia. During preoperative investigations he was found to be HbsAg positive. Rests of the investigations were unremarkable except for a mild thrombocytopenia. After taking due precautions for COVID

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protection subarachnoid block was administered with a 26 G spinal needle. The CSF sample was taken for analysis before injecting the drug intrathecally. The patient was turned to prone position after establishing the desired anesthetic effect. The surgical period was uneventful and the patient was shifted to the COVID care unit for postoperative monitoring. The COVID RT-PCR came out to be negative for this patient also the next day.

Discussion

Our clinical experience with these cases helped us to suggest only that the possibility of transmission of SARS-CoV-2 to health care personnel during lumbar puncture and spinal anesthesia may be considered to be negligible in asymptomatic or mildly symptomatic COVID-positive patients.

Many viral infections can cause serious damage to the structure and function of the nervous system; SARS-CoV-2 is no exception to this and this has been confirmed by some authors.^[5] Some of the proposed mechanisms for nervous system damage include but not limited to direct invasion of the nervous system, blood circulation pathway with a release of cytokines leading to an increased permeability of the blood brain barrier (BBB), thus promoting viral entry into the brain, invasion of the central nervous system (CNS) from the periphery through neural pathways, hypoxic injury, immune-mediated injury, and the targeting of ACE2 receptors.^[6] Whether these neurological changes are taking place in asymptomatic and mildly symptomatic patients is still not known.

The presence of SARS-CoV-2 in the CSF is said to depend on the severity of the systemic disease and the degree of nervous tissue tropism.^[11] The CSF of two patients with COVID-19 and neurological complications including subarachnoid hemorrhage and ischemic stroke was repeatedly reported to have been negative by some authors on real-time PCR analysis.^[11] Our cases highlight the fact that patients with mild/absent COVID symptoms and without CNS symptoms may not pose a risk of transmitting SARS-CoV-2 infection through CSF unless COVID or some other bacterial infection disrupt the BBB. Nevertheless, cases of meningitis and encephalitis associated with SARS-CoV-2 have been reported.^[7,8] Two case reports from China and Japan have shown CSF samples to be positive for RT-PCR analysis in COVID patients with signs of meningitis, thus showing that the virus can cross the BBB.^[7,9] In the case reported by Moriguchi *et al.*, the specific SARS-CoV-2 RNA was not detected in the nasopharyngeal swab but was detected in the CSF of the patient.^[7] The authors of this case report have warned that SARS-CoV-2 has a neuro-invasive potential and we cannot



Figure 1: Showing aseptic collection of CSF sample before administration of drug

exclude SARS-CoV-2 infection of the CNS even if the patient's RT-PCR test is negative for the nasopharyngeal swab.^[7] Some authors have suggested that CSF analysis at the time of surgery may be taken as an objective measure of CNS involvement and COVID infectivity through CSF. A knowledge of the presence or absence of the virus in the CSF can help in taking appropriate safety precautions during invasive procedures like subarachnoid block; However, we need to keep in mind that 2.7% anesthesiologists with level 3 personal protective equipment (PPEs) have been reported

to have developed PCR conformed COVID-19 infection when administering spinal anesthesia to mildly symptomatic COVID positive parturients.^[10]

Spinal anesthesia was uneventful in our pregnant patient; nevertheless, several published case reports and case series have reported the safe use of spinal, epidural and general anesthesia for the parturient with COVID-19.^[3,4,11] The incidence of hypotension has been reported to be excessive during epidural anesthesia;^[11] but we did not observe hypotension. For severely ill parturients, it has been suggested that general anesthesia with endotracheal intubation should be administered.^[3]

We followed the guidelines for COVID-19 patients in our cases; but still feared the risk of transmission of the virus through CSF. Our clinical experience with the first case, that is, the pregnant patient raises many issues. Though she was planned for elective LSCS for obstetrical indications, she lost her chance of normal delivery. If we had delayed delivery till she became COVID negative, would the risk of spread have reduced? Had she gone into labor only after her stipulated quarantine, would the same precautions have to be applied to her as any other COVID negative patient? Pre-COVID era has taught us to take all universal precautions whenever taking up HIV/HCV/HBsAg cases for elective or emergency surgeries. We anticipate that in the near future, many treated COVID patients will be coming to undergo elective or emergency surgeries. Guidelines for these cases are still not formulated completely as we are still in a state of shock from the clinical disaster posed by the present pandemic. However, we are confident that the clinical data that is fast emerging which will be helpful in understanding the disease better and in formulating appropriate protective strategies and policies in the future.

Conclusion

Although the report of the absence of SARS-CoV-2 in the CSF of two patients with asymptomatic to mildly symptomatic COVID-19 disease may not be a definite or an ample proof of lesser risk of infection from CSF; but we suggest that due to the varied presentations, health care personnel especially anesthesiologists have to be careful during the perioperative management of such cases. Though many institutions and academic societies have been coming out with guidelines regarding precautions to be taken during handling of COVID-19 positive cases, still many health care personnel are getting infected. This leaves us thinking- are these precautions sufficient to protect the health care worker from contracting the disease? COVID-19 has forced us to

explore the unknown diagnostic and therapeutic territories and in coming days possible solutions to still many unanswered questions may probably lead us to victory over this highly infective virus.

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Conflicts of interest

There are no conflicts of interest.

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