

Neuraxial Procedures in COVID-19–Positive Parturients: A Review of Current Reports

To the Editor

Coronavirus Disease 2019 (COVID-19) in pregnancy presents a unique challenge given the limited data on anesthetic management. Other viral diseases, such as H1N1 influenza and severe acute respiratory syndrome (SARS), have been associated with severe respiratory compromise in pregnancy. Because anesthesiologists must take into account the risk of meningitis or encephalitis associated with neuraxial procedures in the setting of untreated viremia, we reviewed publications reporting outcomes in COVID-19–positive pregnant women in the current pandemic in an attempt to address this concern.

A literature search for all articles reporting confirmed COVID-19 infection at the time of delivery revealed 4 publications reporting 14 cases admitted between January 20, 2020 and February 6, 2020. In reports with no information about neuraxial use, authors were contacted via e-mail to gather that

information (13 of 14). There were no reported neurologic sequelae after neuraxial procedures in any of these cases.^{1–4} Case details are reported in the Table. Thirteen patients (93%) underwent cesarean delivery; 6 (43%) were preterm (<37 weeks of gestation). Fever was present in 10 (71%) patients and 2 (14%) patients were treated with antiviral medication before the neuraxial procedure. Computed tomography or chest X-ray evidence of pneumonia was reported in all patients before delivery. Clinical severity in symptoms was not always reported, but ranged from resolution of respiratory symptoms to noninvasive ventilation at the time of cesarean delivery. White blood cell (WBC) count levels were not elevated in 13 (86%) patients. One patient presented with a WBC count of $8.7 \times 10^6/L$ and received daily methylprednisolone for inflammation. Her WBC count subsequently increased to $22.9 \times 10^6/L$.¹ Thrombocytopenia was reported in 2 pregnant patients without preeclampsia with the nadir being platelet counts of 81,000 and $91,000 \times 10^6/L$, respectively.^{1,2} A case series of 138 COVID-19–positive nonpregnant patients reported about one-third of patients had thrombocytopenia ($<150,000 \times 10^6/L$) regardless of severity of illness.⁵

Assessing whether a parturient with COVID-19 is suitable for neuraxial procedures should focus on

Table. Case Report and Case Series Clinical Details

Article	n	Age (y)	Gestational Age	Mode of Delivery	Type of Neuraxial Procedure	Fever Before Neuraxial Procedure	White Blood Cell Count ($10^9/L$)	Platelet Count ($10^6/L$)	Respiratory Status at Time of Delivery	Antiviral Medication Before Neuraxial Procedure
Chen et al ³	9	26–40	36 0/7 wk to 39 4/7 wk	Cesarean delivery	9 (100%) Epidural ^a	7 (78%)	5.07–10.61	NR	CT evidence of pneumonia 9 (100%); clinical details NR	No
Li et al ¹	1	30	35 wk	Cesarean delivery	Epidural ^b	No	8.7 at presentation, peak of 22.9 after steroids for inflammation	At admission: 96,000; day of delivery: 92,000; by hospital day 5: 141,000	Resolved, chest X-ray showed bilateral scattered patchy infiltrates	Yes
Liu et al ²	3	30–34	37–40 wk	2 cesarean delivery, 1 vaginal delivery	3 (100%) Epidural ^c	2 (67%)	NR	At admission: patient 1 81,000; patient 2 152,000; patient 3 NR; day of delivery: NR for any patient	Worsening CT evidence of pneumonia in 2 (67%), clinical details NR	No
Wang et al ⁴	1	28	30 wk	Cesarean delivery	CSE	Prior intermittent fevers for 1 wk	10.60	NR	5 L O ₂ on admission; before delivery was on maximal noninvasive ventilation ^d	Yes

Abbreviations: CSE, combined spinal epidural; CT, computed tomography; NR, not reported; O₂, oxygen.

^aPer Yuanzhen Zhang, MD, e-mail communication, March 14, 2020. Department of Gynaecology and Obstetrics, Zhongnan Hospital of Wuhan University.

^bPer Jifang Sheng, MD, e-mail communication, March 5, 2020. Department of Clinical Laboratory, First Affiliated Hospital, College of Medicine, Zhejiang University.

^cPer Qianli Wang, PhD, e-mail communication, March 14, 2020. School of Public Health, Fudan University.

^dPatient was on noninvasive ventilation, not mechanical ventilation (Xingua Shen MD, e-mail communication, March 13, 2020. Department of Critical Care Medicine, Affiliated Infectious Hospital of Soochow University).

the risks of general anesthesia compared with neuraxial anesthesia. Labor epidural procedures should also be considered as a means to avoid general anesthesia because the in-situ catheter allows extension for cesarean delivery anesthesia should an urgent cesarean delivery be needed. In general, the risk of causing meningitis or encephalitis is extremely low with neuraxial procedures, even in infected patients. Febrile patients with altered mental status commonly undergo diagnostic lumbar punctures. It is thought that patients who subsequently developed meningitis following lumbar puncture were early in the progression of the disease (before cerebrospinal fluid [CSF] evidence of disease) or the meningitis was due to the pathogenic nature of the specific bacteria rather than seeding of the bacteria in the subarachnoid space.⁶ COVID-19 patients with hypoxia and concomitant physiologically decreased functional residual capacity from pregnancy will be likely to become more hypoxic, develop further atelectasis with intubation and mechanical ventilation, and possibly require postoperative critical care admission. Before performing a neuraxial procedure in these patients, it would be advisable to review a recent platelet count given that one-third of patients with COVID-19 infection have been reported to have thrombocytopenia compared with 7%–12% of patients during pregnancy alone.⁷ In pregnant women, a platelet count of $70,000 \times 10^6/L$ has a low risk for spinal epidural hematoma, and lower levels should be considered in cases such as these with a high risk for respiratory compromise with general anesthesia.⁸ Although 2 of the 14 cases were reported to have received antiviral treatment before the neuraxial procedure, there is no currently accepted antiviral medication known to be effective for COVID-19, according to the Centers for Disease Control and Prevention. In conclusion, we believe the real risk of general anesthesia outweighs the theoretical risk of causing meningitis/encephalitis

by performing neuraxial procedures, and we therefore recommend performing neuraxial procedures in parturients with COVID-19 unless otherwise contraindicated.

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