COVID-19 & OBSTETRIC ANESTHESIA

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ARTICLE

Safety and efficacy of different anesthetic regimens for parturients with COVID-19 undergoing Cesarean delivery: a case series of 17 patients

By Chen et. al

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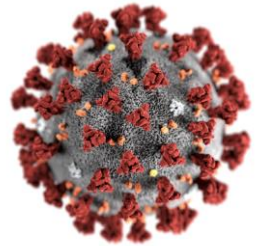
COVID-19: What we know…



- SARS-COV-2 virus since December 2019, leading to infectious disease known as COVID-19
- Originated in Wuhan, China
- Similar to the SARS- 2003
- Droplet + Contact → Main route of transmission
- Possible transmission via aerosols in closed environments when exposed to high concentrations

COVID-19 & PREGNANCY

- Pregnant ladies have depressed immunity

  => Theoretical higher risk of infection
- Vertical transmission not yet demonstrated in case series
- Manifestations of COVID-19 in pregnant ladies and fetuses not yet fully understood
- Renmin hospital of Wuhan University: Diagnostic & treatment center for pregnant women infected with SARS- CoV-2

PURPOSE

1. To assess the management and safety of epidural or general anesthesia for Cesarean delivery in parturients with coronavirus disease (COVID-19) and their newborns

2. To evaluate the standardized procedures for protecting medical staff.

Methods: Patients & Diagnosis

- Cases of pregnant women with COVID-19 admitted to Renmin hospital of Wuhan University from 30 January to 23 February 2020.
- The diagnosis of COVID-19 followed the diagnostic criteria established by the New Coronavirus Pneumonia Prevention and Control Program (sixth edition) issued by the National Health Commission of China.
- Nasal swab samples from high-risk pregnant women and their newborns were tested for SARS-CoV-2 virus using RT-PCR
- Chest computed tomography (CT) scans of all infected pregnant women were performed for signs of COVID-19: peripheral and/or sub-pleural ground-glass opacities

Methods: PPE

- PPE ***for all staff***: N95 masks, goggles, protective suits, disposable medical caps, and medical rubber gloves (BSL-3)

Methods: PPE

- A***nesthesiologist*** used a powered air-purifying respirator

Methods: Transfer

- Parturients were transferred between the isolation ward and the operating room by a negative pressure isolation transfer cabin that can carry one patient over a short distance
- Transported by staff wearing BSL-3 protective medical equipment
- Parturients also wore regular surgical masks throughout the process to reduce viral spread.

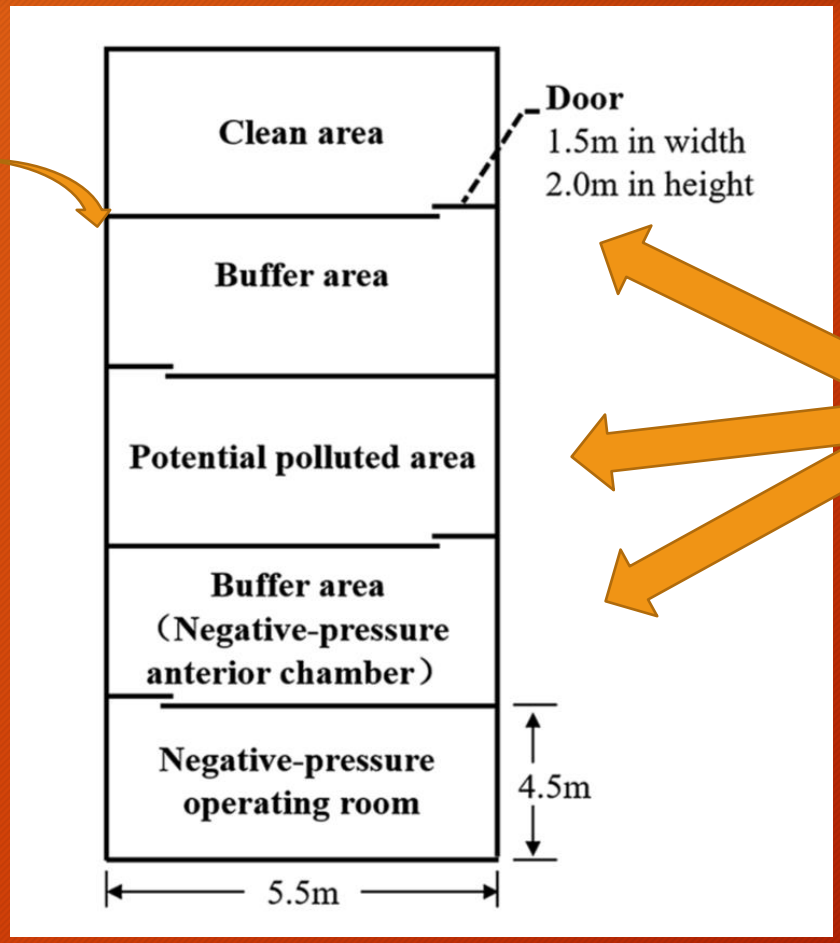
Methods: OR

- Negative pressure operating rooms were used for Cesarean delivery of parturients with COVID-19.
- Medical personnel entered and exited the operating room in strict accordance with the principles of:
    - Clean area
    - Contaminated pollution area
    - Two buffer zones

Methods: OR

ENTRY

PPE DONNING



PPE DOFFING

EXIT

Methods: Pre-operative Anesthesia

- The anesthesia informed consent was signed in the isolation ward or operating room to avoid the possibility of virus spread.
- Routine monitoring was performed after the patient entered the operating room.
- First choice: Continuous epidural anesthesia or CSE
- General anesthesia was an option for cases emergencies, or for contraindications to epidural or CSE techniques

Methods: Epidural Anesthesia

- The L3–4 or L2–3 interspace was selected as the epidural puncture site.
- 2% lidocaine was used as both the test dose and loading dose
- 0.75% ropivacaine was used for maintenance of epidural anesthesia.
- A sensory and motor block plane from T6–T8 segments to S4–5 was maintained during Cesarean delivery

Methods: General Anesthesia

- Preoxygenation was rapidly accomplished with four maximal capacity breaths with 100% oxygen.
- Rapid inhalation induction of general anesthesia consisted of 8% sevoflurane in 100% oxygen
- Followed by intravenous injections of lidocaine, remifentanil and succinylcholine choline to ensure optimal intubating conditions.
- Sevoflurane was used to maintain anesthesia before delivery, with sufentanil and an infusion of propofol used to maintain anesthesia after delivery.

Methods: Data

- Data recorded:
  - method of delivery
  - ASA physical status score
  - Arterial blood gases
  - Operation time
  - Estimated blood loss
  - Postoperative visual analogue score (VAS) for pain
  - Maternal complications and outcomes were also recorded

Methods: Post-Delivery

- After delivery, the newborns' oral cavity, nose, and face were wiped and cleaned immediately with a sterile towel
- The newborns were then transferred to a radiant warmer bed in a cordoned-off area in the operating room
- The Apgar score was assessed
- Newborns were sent to the NICU and no further contact with infected mothers was allowed.
- A blood gas from the newborn was measured in NICU.
- A SARS-CoV-2 RT-PCR viral test (nasal swab) for neonates was performed twice, first on the day after delivery and then again on the day before discharged.
- Neonatal mortality, severe asphyxia, NICU length of stay, and other clinical outcomes were also recorded.

Demographic Data

Table 1 Demographic data (n = 17)

	Epidural anesthesia (n = 14)	General anesthesia (n = 3)
Age, yr	29.5 (3.1)	28.7 (1.6)
Height, cm	160.3 (2.4)	161.0 (1.7)
Weight, kg	65.6 (3.4)	65.7 (2.89)
Gestational age		
< 37 weeks, n (%)	3 (21)	0
≥ 37 weeks, n (%)	11 (79)	3 (100)
Coexisting disorders	8 (57)	0
Anemia, n (%)	5 (36)	0
Hypertension, n (%)	1 (7)	0
Diabetes, n (%)	2 (14)	0

83%

17%

Comorbidities

Clinical Data

	Epidural anesthesia (n = 14)	General anesthesia (n = 3)
Epidemiological exposure to SARS-CoV-2, n (%)	3 (21)	0
Signs and symptoms		
Fever, n (%)	4 (29)	0
Cough, n (%)	4 (29)	0
Fatigue, n (%)	1 (7)	0
Chest distress, n (%)	2 (14)	0
Dyspnea, n (%)	1 (7)	0
Diarrhea, n (%)	1 (7)	0
Laboratory characteristics		
Leukocyte count, $\times 10^9 \cdot L^{-1}$	9.1 (3.6)	12.7 (6.2)
Leukocytosis ($> 10 \times 10^9 \cdot L^{-1}$), n (%)	4 (28.6)	2 (66.7)
Lymphocyte count, $\times 10^9 \cdot L^{-1}$)	1.1 (0.3)	1.34 (0.3)
Lymphopenia ($< 1.0 \times 10^9 \cdot L^{-1}$), n (%)	5 (35.7)	0
CRP concentration, $mg \cdot L^{-1}$	30.3 (8.1)	24.1 (21.5)
Elevated concentrations of CRP ($> 10\ mg \cdot L^{-1}$), n (%)	6 (42.9)	1 (33.3)
ALT concentration, $U \cdot L^{-1}$	18.9 (5.4)	22.3 (12.1)
AST concentration, $U \cdot L^{-1}$	21.4 (8.9)	25.3 (14.6)
BUN concentration, mM	3.0 (0.7)	4.0 (0.8)
SCr concentration, μM	41.7 (7.4)	51 (7.6)
CT evidence of pneumonia, n (%)	14 (100)	3 (100)

Most common S & S

100% had CT-evidence

Nine of the parturients did not have typical symptoms such as fever and cough; instead they only showed abnormalities on the chest CT scan.

Anesthesia & Surgical Data

	Epidural anesthesia (n = 14)	General anesthesia (n = 3)
Method of delivery		
Elective Cesarean delivery, n (%)	14 (100)	0
Emergency Cesarean delivery, n (%)	0	3 (100)
ASA physical status		
I, n (%)	0	0
II, n (%)	13 (93)	3 (100)
III, n (%)	1(7)	0
IV, n (%)	0	0
V, n (%)	0	0

All patients were ASA 2-3

Anesthesia & Surgical Data

	Epidural anesthesia (n = 14)	General anesthesia (n = 3)
Duration of operation, min	68 (13)	80 (20)
Blood loss, mL	307 (92)	300 (100)
Postoperative VAS	2 [1–4]	3 [2–4]
Occurrence of complications		
Hypotension, n (%)	12 (86)	0
Post-Cesarean delivery length of stay, day	10 (4)	8 (3)
Clinical outcomes		
Discharge from hospital, n (%)	12 (86)	2 (67)
Recovered, n (%)	12 (86)	2 (67)
Recovered, n (%)	12 (86)	2 (67)

Incidence of hypotension
Higher in epidural group

14 patients recovered + discharged from hospital after 6 to 13 days.
Others are still recovering as of 01/03

Neonatal Data

	Epidural anesthesia (n = 14)	General anesthesia (n = 3)
Neonatal death, n (%)	0	0
Severe neonatal asphyxia, n (%)	0	0
Apgar score		
1 min	9 [8–9]	9 [7–9]
5 min	10 [9–10]	10 [9–10]
10 min	10 [9–10]	10 [9–10]
Birth weight, g	3,280 (330)	2,780 (180)
Low-birth weight (< 2,500 g), n (%)	0	0
Neonatal acidosis (umbilical artery pH < 7.2), n (%)	0	0
Arterial blood gas		
pH	7.36 (0.06)	7.35 (0.05)
PaO_2, mmHg	69 (16)	77 (3)
$PaCO_2$, mmHg	35 (7)	40 (4)
HCO_3, $mmol \cdot L^{-1}$	19.9 (2.2)	21.2 (0. 5)
Hb, $g \cdot L^{-1}$	182.1 (8.2)	171.7 (11.6)
SARS-CoV-2 positive, n (%)	0	0
Duration of neonate ICU, hr	13 (6)	16 (2)
Clinical outcomes		
Discharge from hospital, n (%)	14 (100)	3 (100)
In the hospital, n (%)	0	0

Same APGAR score

All SARS-CoV-2 RT-PCR tests were negative.
All 17 neonates were eventually discharged from hospital.
No difference between Epidural & General groups

Discussion

- All those patients presented with ground-glass opacities on chest CT scans and laboratory- confirmed SARS-CoV-2 positivity.
- Epidural or general anesthesia: safe and effective for surgical patients.
- Careful patient transfer along with medical staff effective biosafety precautions.
- 9/17 patients had only mild symptoms or were asymptomatic. Only positive PCR + ground glass opacities on CT scan

Discussion

- SARS-CoV-2 virus has not been detected in amniotic fluid, cord blood, or breast milk of pregnant women infected with SARS-CoV (Chen et al.)

- In this study no neonates were positive for SARS-CoV-2

No Vertical transmission??

Discussion

- Possible involvement of other organs: e.g kidney, testicles. Risk of placental involvement not yet determined + risk of vaginal transmission is not yet determined

→ Elective C-section. But no data available yet to support this.

- COVID-19 causes quick detrioration of lung function (main target organ) → timing of delivery is crucial

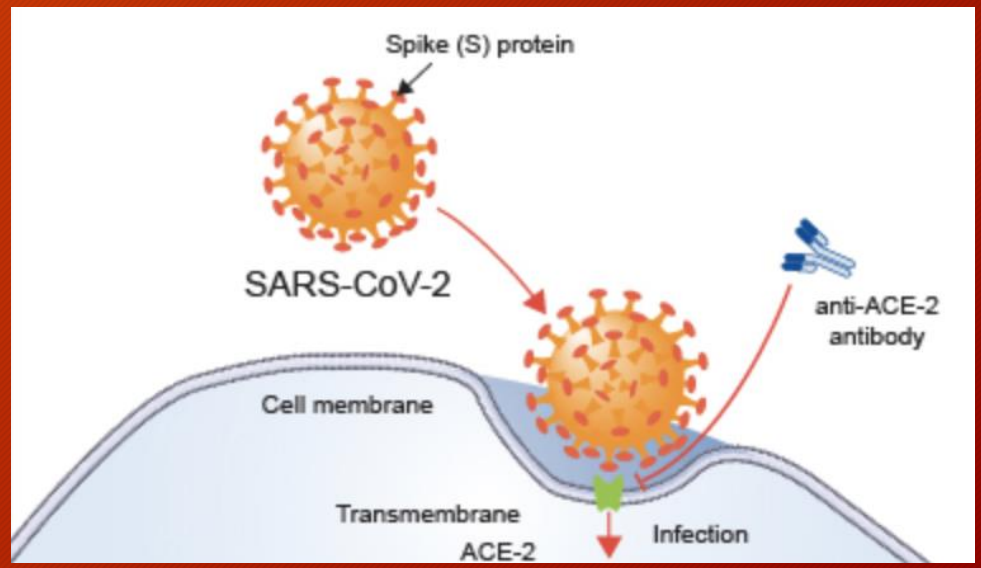
Discussion

- Neuraxial anesthesia is preferred:
  1. Mitigates any potential deterioration in lung function
  2. Protects staff from aerosols generated during airway manipulation in GA

- The onset time of sensory and motor block, the degree of motor block, the height of sensation, and the quality of anesthesia appeared to be the same as those of non-infected pregnant women.

Discussion

- 86% of patients with epidural => hypotension (higher than normal)
- SARS-CoV-2 can bind with the angiotensin-converting enzyme II (ACE2) receptor (entry receptor) => important effects on the circulatory system
- General anesthesia is safe for parturient and healthcare staff if appropriate precautions are taken.



Take-Home Messages

- Pregnant ladies might not show typical COVID-19 symtoms
- Epidural Anesthesia is safe and preferred over GA
- High risk of hypotension refractory to fluids, and LL decubitus
- Vertical transmission not yet confirmed
- Proper donning and doffing of PPE necessary

THANK YOU