



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.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.

Delivery for respiratory compromise among pregnant women with coronavirus disease 2019



OBJECTIVE: Although rapid recourse to delivery after failed cardiopulmonary resuscitation has been shown to improve outcomes of pregnant patients experiencing cardiac arrest,^{1,2} it is not known whether delivery improves or compromises the outcome of patients with coronavirus disease 2019 (COVID-19) experiencing respiratory failure.^{3,4} This study aimed to evaluate the safety and utility of delivery of pregnant women with COVID-19 needing respiratory support.

STUDY DESIGN: This is a retrospective observational study of pregnant women diagnosed with COVID-19 via polymerase chain reaction who developed severe disease (defined per previous publications³). A subset of these cases was previously presented but without details on the effect of delivery on the disease.⁵ The study was exempted by the institutional review board.

RESULTS: Of 125 confirmed cases of COVID-19, 12 (9.6%) had severe disease (Table). Among the 12 patients, the condition of 3 patients improved after receiving transient respiratory support in the hospital, and they were discharged home (1 subsequently returned in preterm labor and gave birth by cesarean delivery 2 weeks later). Of the remaining 9 patients who continued to need respiratory support, 7 (77.8%) had iatrogenic preterm deliveries (6 by cesarean delivery) for maternal respiratory distress (needing increasing levels of respiratory support without improved oxygen saturation), 1 had an early term delivery because of premature rupture of membranes, and 1, at 30 weeks' gestation, was admitted to the intensive care unit with high-flow nasal cannula for 3 weeks.

Of the 8 patients delivering with maternal respiratory distress, 7 did not require intubation, and 1 was intubated for emergent cesarean delivery and remained on a ventilator for 19 days. Among the nonintubated, 4 had an improvement in oxygenation within 2 hours after delivery, 2 required less respiratory support, and 2 were taken completely off respiratory support. None of the other 3 patients required an increased level of respiratory support, and they were off of all support between 4 and 7 days after delivery.

CONCLUSION: Delivery did not worsen the respiratory status of women with persistent oxygen desaturation and the need for increasing respiratory support. Among women not

needing a ventilator, the return to normal respiratory status after delivery occurred within hours to days. However, the 1 patient who was intubated intraoperatively took longer to recover. It is possible that delivery may be less salutary when damage to the lungs is sufficient to warrant intubation. This series suggests that maternal respiratory distress should not be a contraindication to delivery.

As noted in a recent Society for Maternal-Fetal Medicine and Society for Obstetric Anesthesia and Perinatology guideline, it is not known whether uterine decompression improves respiratory status; we are unable to shed light on that issue.⁴ Although we saw no harm, we cannot be certain that delivery per se caused the improvement we observed or whether a similar outcome could have been achieved with ongoing respiratory support (although 1 of 3 patients managed conservatively remained on respiratory support for 3 weeks). In summary, although more data on the effects of delivery are needed, we have shown in a small series that women with COVID-19 requiring respiratory support fared well when they underwent delivery. ■

Rodney A. McLaren Jr, MD
Department of Obstetrics and Gynecology
Maimonides Medical Center
967 48 St.
Brooklyn, NY 11219
rmclaren624@gmail.com

Viktoriya London, MD
Fouad Atallah, MD
Sandra McCalla, MD
Shoshana Haberman, MD, PhD
Nelli Fisher, MD
Janet L. Stein, MD, MS
Department of Obstetrics and Gynecology
Maimonides Medical Center
Brooklyn, NY

Howard L. Minkoff, MD
Department of Obstetrics and Gynecology
Maimonides Medical Center
Brooklyn, NY
Department of Obstetrics and Gynecology
SUNY Downstate Medical Center
Brooklyn, NY

The authors report no conflict of interest.

This communication has been published in the middle of the COVID-19 pandemic and is available via expedited publication to assist patients and healthcare providers.

TABLE
Characteristics and outcomes of pregnant women with severe COVID-19

Patient number	1	2	3	4	5	6	7	8	9	10	11	12
Age (y)	44	33	34	28	37	32	34	25	32	24	30	29
BMI (kg/m ²)	28.4	30.3	36.0	25.9	29.3	29.3	30.8	32.5	41.0	31.0	42.0	29.4
Medical history	None	None	Pregestational diabetes, hepatitis B	None	Gestational diabetes A2	None	Gestational diabetes A1	None	Chronic hypertension	None	None	None
Gestational age at initial symptom	29 ⁴	33 ⁴	35 ³	31 ⁰	28 ⁵	31 ⁵	37 ²	33 ⁰	26 ⁰	34 ⁶	26 ⁰	25 ³
Mode of delivery	Cesarean	Cesarean	Cesarean	Cesarean	Cesarean	Cesarean	Vaginal	Cesarean	—	Vaginal	—	—
Indication	Maternal respiratory distress	Maternal respiratory distress	Maternal respiratory distress	Maternal respiratory distress	Monochorionic diamniotic twins	Maternal respiratory distress	Early term PROM	Maternal respiratory distress	—	Maternal respiratory distress	—	—
Gestational age at delivery	31 ⁴	35 ³	36 ²	32 ⁴	31 ⁴	31 ⁶	37 ²	34 ⁴	—	35 ¹	—	—
Respiratory support	Nonrebreather	Simple nasal cannula	Mechanical ventilation	Nonrebreather	Simple nasal cannula	Simple nasal cannula	Simple nasal cannula	Simple nasal cannula	Simple nasal cannula	Simple nasal cannula	High-flow nasal cannula	Simple nasal cannula
ICU	No	No	Yes	No	No	No	No	No	No	No	Yes	No
LOS (d)	9	4	26	8	7	7	3	9	3	8	X	5
LOS after delivery (d)	7	4	26	5	4	4	3	8	—	5	—	—

BMI, body mass index; COVID-19, coronavirus disease 2019; ICU, intensive care unit; LOS, length of hospital stay; PROM, premature rupture of membranes; X, currently admitted for 15 days as of May 1, 2020.

Mclaren. Delivery for respiratory compromise among pregnant women with COVID-19. *Am J Obstet Gynecol* 2020.

REFERENCES

1. Society for Maternal-Fetal Medicine, Pacheco LD, Saade G, Hankins GD, Clark SL. Amniotic fluid embolism: diagnosis and management. *Am J Obstet Gynecol* 2016;215:B16–24.

2. Jeejeebhoy FM, Zelop CM, Lipman S, et al. Cardiac arrest in pregnancy: a scientific statement from the American Heart Association. *Circulation* 2015;132:1747–73.

3. Society for Maternal-Fetal Medicine. Management considerations for pregnant patients with COVID-19. Available at: https://s3.amazonaws.com/cdn.smfm.org/media/2334/SMFM_COVID_Management_of_COVID_pos_preg_patients_4-29-20_final.pdf. Accessed April 30, 2020.

4. Society for Maternal-Fetal Medicine, Society for Obstetric and Anesthesia and Perinatology. Labor and delivery COVID-19 considerations. Available at: https://s3.amazonaws.com/cdn.smfm.org/media/2327/SMFM-SOAP_COVID_LD_Considerations_-_revision_4-14-20_-_changes_highlighted.pdf. Accessed April 30, 2020.

5. London V, McLaren R Jr, Atallah F, et al. The relationship between status at presentation and outcomes among pregnant women with COVID-19. *Am J Perinatol* 2020. [Epub ahead of print].

© 2020 Elsevier Inc. All rights reserved. <https://doi.org/10.1016/j.ajog.2020.05.035>

Age-related difference in the rate of coronavirus disease 2019 mortality in women versus men



OBJECTIVE: Mortality by coronavirus disease 2019 (COVID-19) is lower in women than in men.¹ Mortality pertains mostly to aging, in which a protective effect of ovarian hormones is difficult to envision. However, speculation on the possible protective effect of estrogens is

being formulated. Currently, the epidemiologic evidence does not clearly indicate whether mortality of individuals with COVID-19 is affected differently between sexes with age. In this study, we investigated whether mortality is affected differently between sexes with age.

FIGURE

Excess death rate by COVID-19 of men and women of different ages



A, Excess death rate by COVID-19 of men and women stratified by age. The insert refers only to the age categories of 50 to 59 years. The interrupted line indicates the difference in death rate between men and women in each age category. **B**, Percentages of COVID-19—related death rate of women (W) vs men (M) (deaths in 100 infected women/deaths in 100 infected men \times 100) for each age category. Sample sizes of the age categories were as follows: 10 to 19 years, $n=1798$; 20 to 29 years, $n=7688$; 30 to 39 years, $n=11,643$; 40 to 49 years, $n=20,519$; 50 to 59 years, $n=29,794$; 60 to 69 years, $n=23,987$; 70 to 79 years, $n=25,674$; 80 to 89 years, $n=26,661$.

COVID-19, coronavirus disease 2019.

Cagnacci. Age-related difference in the rate of coronavirus disease 2019 mortality in women versus men. *Am J Obstet Gynecol* 2020.