Review Article

Prone Positioning in Pregnant Patients with COVID-19– Related ARDS: A Case Series

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Abstract

Objectives: To describe the clinical profile and outcomes of pregnant women with COVID-19–related ARDS who underwent prone positioning in a tertiary referral center.

Design: Retrospective observational study.

Setting: Tertiary university hospital in southern Brazil.

Patients: Pregnant women ≥18 years admitted to the ICU with confirmed COVID-19 and managed with prone positioning (2020–2021).

Measurements and Main Results: Seven patients were included. Mean age was 27.4 ± 3.8 years, mean gestational age 29.1 ± 3.8 weeks, mean BMI 33.1 ± 4.6 kg/m², and mean SAPS III 52.7 ± 10.1. Three (42.9%) had diabetes, two (28.6%) hypertension, and one (14.3%) was a smoker. Six (87.5%) required vasopressors, and one (14.3%) received inhaled nitric oxide. Proning sessions ranged from 1 to 7. Four patients (57.1%) developed stage 1–2 pressure injuries, all of which resolved. No major adverse events (accidental extubation, ocular injury, or brachial plexus injury) were reported. Three patients (42.9%) died. All neonates were delivered alive.

Conclusions: Prone positioning was feasible and did not result in major maternal complications in pregnant women with COVID-19–related ARDS, including in the second and third trimesters. Larger studies are needed to confirm maternal and fetal safety.

INTRODUCTION

Acute respiratory distress syndrome (ARDS) is a severe complication of COVID-19, with mortality rates approaching 40% despite optimized intensive care [1]. Prone positioning is one of the few interventions shown to reduce mortality in ARDS by improving oxygenation and ventilation–perfusion matching [2-4].

Pregnancy was initially not recognized as a high-risk condition for COVID-19, but subsequent data demonstrated higher rates of ICU admission, mechanical ventilation, ECMO use, preterm delivery, and maternal mortality compared with non-pregnant women [5-8]. Physiological adaptations of pregnancy-including reduced functional residual capacity, increased oxygen consumption, and decreased tolerance to hypoxemia—further increase vulnerability to respiratory failure [9,10].

Historically, prone positioning was considered contraindicated in pregnancy, particularly in the second and third trimesters, due to concerns about uterine compression and impaired uteroplacental blood flow [11,12]. During the COVID-19 pandemic, however, proning was used as a rescue strategy in critically ill pregnant women [13-15]. This study aimed to describe the clinical characteristics and outcomes of pregnant patients with COVID-19–related ARDS managed with prone positioning.

METHODS

This retrospective observational study was conducted in a tertiary public university hospital in southern Brazil. We included all pregnant women ≥18 years with confirmed COVID-19 admitted to the ICU and treated with prone positioning between 2020 and 2021. Patients with incomplete medical records were excluded.

Data collected included demographics, comorbidities, gestational age, severity scores (SAPS III), ventilatory support, use of vasopressors and adjunctive therapies, number of proning sessions, and complications. Outcomes assessed were ICU length of stay, duration of mechanical ventilation, and hospital mortality.

Data were extracted from electronic medical records using a structured instrument. Continuous variables were expressed as mean ± SD or median (interquartile range), and categorical variables as absolute numbers and percentages.

This study was approved by the institutional research ethics committee (CAAE 56740921800005327).

RESULTS

Seven patients were included. Mean age was 27.4 ± 3.8 years, mean gestational age 29.1 ± 3.8 weeks, mean BMI 33.1 ± 4.6 kg/m^2, and mean SAPS III 52.7 ± 10.1. Three patients (42.9%) had diabetes, two (28.6%) hypertension, and one (14.3%) was a smoker.

Six patients (87.5%) required vasopressors; one (14.3%) received inhaled nitric oxide. No patient underwent renal replacement therapy or ECMO. The number of proning sessions ranged from 1 to 7 (two patients one session, one patient three sessions, two patients four sessions, one patient six sessions, one patient seven sessions).

Four patients (57.1%) developed pressure injuries (stage 1–2), which resolved within 7 days. No accidental extubations, corneal injuries, or brachial plexus injuries were observed. Three patients (42.9%) died, including one in the second trimester and two in the third. All neonates were delivered alive, but neonatal outcomes were not tracked.

DISCUSSION

This series demonstrates that prone positioning is feasible in pregnant patients with COVID-19–related ARDS, even in later trimesters. Historically considered contraindicated, pregnancy is now regarded as a relative contraindication, with proning recommended when clinically indicated and performed with appropriate precautions [11-13].

No major maternal complications occurred in this cohort, supporting the safety of the intervention when conducted by experienced teams with structured checklists [15]. Mild pressure injuries were common, consistent with risk factors such as elevated BMI, vasopressor use, and critical illness [16]. Mortality remained high (42.9%), likely reflecting disease severity rather than the intervention itself [17,18].

These findings align with emerging evidence suggesting that prone positioning can be an effective rescue therapy in pregnant women with severe ARDS [6,7,13]. Limitations include the small sample size, retrospective design, and lack of neonatal follow-up.

CONCLUSIONS

Prone positioning was feasible and did not result in major complications in pregnant women with COVID-19 related ARDS, including those in the second and third trimesters. This strategy should be considered in selected patients when hypoxemia is refractory to conventional measures. Larger prospective studies are needed to confirm maternal and fetal safety.

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