



## Case Series

# The use of remdesivir among pregnant women and associated clinical outcomes in mother and the child

Saeid Marzban-Rad <sup>a</sup>, Masoumeh Ghafarzadeh <sup>b,\*</sup>, Sahar Bahmani <sup>c</sup>, Amenehsadat Kazemi <sup>d</sup>

<sup>a</sup> Department of Surgery, Imam-Reza Hospital, Aja University of Tehran Medical Sciences, Tehran, Iran

<sup>b</sup> Department of Obstetrics and Gynecology, School of Medicine, Lorestan University of Medical Sciences, Khorramabad, Iran

<sup>c</sup> Zist Takhmir Pharmaceutical Company, Tehran University of Medical Sciences, Tehran, Iran

<sup>d</sup> Department of Psychology, Faculty of Medical, Tehran Medical Sciences, Islamic Azad University, Tehran, Iran

## ARTICLE INFO

**Keywords:**  
 COVID-19  
 Remdesivir  
 Pregnant women  
 Anticoagulants

## ABSTRACT

**Introduction:** and importance: Management of COVID19 has imposed a global challenge for hospitals, clinicians and patients. The use of medicines to treat clinical symptoms are likely to have adverse effects. COVID19 during pregnancy can be additional challenge since the CT scan cannot be performed in pregnant women.

**Case presentation:** We reported the case series of use of remdesivir among 23 pregnant women. 5 of these women underwent cesarean section.

**Clinical discussion:** Anticoagulants and dexamethasone were also used to treat these patients.

**Conclusions:** However, consultancy with the experienced and specialized doctor and timely management and monitoring of the mother and baby is required for effective outcomes.

## 1. Introduction

Since the outbreak of novel coronavirus disease 2019 (COVID19), worldwide, the outcomes associated with the disease have been varied continuously. Unknown effects of disease on the pregnancy have made the management of COVID19 a complicated challenge, owing to adverse effects of other coronavirus infection severe acute respiratory syndrome and Middle Eastern Respiratory Syndrome on pregnancy [1–3].

Studies regarding COVID19 pneumonia in pregnant women are scarce. It still remains unclear if the clinical characteristics of the disease differ between pregnant and non-pregnant women [4]. Remdesivir has shown to improve the severity of the disease, however, is likely to be associated with adverse effects [5]. Other drugs like lopinavir-ritonavir, tocilizumab and azithromycin are also used for the treatment, along with anticoagulants and glucocorticoids [6,7]. However, treatment of COVID19 pregnant patients using these drugs require specialist care for side effects. Fetal care is also of a great concern at this stage, associated with reduced oxygen saturation and atypical clinical presentations in pregnant women. In this case series, we report cases of pregnant women with COVID19, along with its diagnosis and the management of the disease and associated complications.

## 2. Case report

A total of 23 pregnant patients from General Hospitals in Tehran were positive PCR positive for COVID19 were included. Based on their clinical symptoms, gestational age, initial clinical conditions, and the presence of diabetes, they underwent normal delivery or cesarean section.

## 3. Methods

Out of 23 pregnant and COVID19 positive patients, 17 were discharged after initial treatment and 6 delivered the babies (5 cesarean sections and 1 normal delivery). According to the general clinical and respiratory conditions of the patient, they were followed up for a month by specialized units of the hospital to further consultation with infection disease specialist, pulmonologist and gynecologist.

The patients who were discharged (17 patients) at different gestational ages, were subsequently followed up through regular visits. 3 patients underwent fluid and oxygen therapy for their medical condition and received dexamethasone injection and enoxaparin. One patient was presented with fetal distress and received interferon beta-1a (ReciGen). Others were treated with remdesivir, dexamethasone and enoxaparin. Due to drug allergy and sensitivity to remdesivir, cesarean was

\* Corresponding author. Department of Obstetrics and Gynecology, Lorestan University of Medical Sciences, Khorramabad, Iran.

E-mail address: [m.ghafarzadeh95@gmail.com](mailto:m.ghafarzadeh95@gmail.com) (M. Ghafarzadeh).

<https://doi.org/10.1016/j.amsu.2022.103681>

Received 9 March 2022; Received in revised form 20 April 2022; Accepted 25 April 2022

Available online 28 April 2022

2049-0801/© 2022 The Authors. Published by Elsevier Ltd on behalf of IJS Publishing Group Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

performed in patient 20. In patient no. 6, cesarean section was performed owing to patient's choice, patient 13 due to fetal descent and patient 2 because of fetal distress.

Unique identifying number is: researchregistry7725.

The methods were stated in line with the PROCESS guidelines [8].

#### 4. Results

Spinal and epidural anesthesia for cesarean section with positive PCR is specific. Consultation with gynecologist and infectious disease specialist is required. Increased IL-6 among pregnant women with serve COVID19, treatment with tocilizumab (acterma) is recommended. Regardless, of PCR results, among patients with decrease in SO<sub>2</sub>, remdesivir can be effective. However, these patients should be monitored for drug reaction and allergies.

Additionally, anticoagulant treatment with enoxaparin with heparin is also necessary. Measurement of FBS, HBA1C and IL-6 in these patients is necessary and in case of sensitivity to it, positive PCR and concomitant treatment with dexamethasone, and endocrinologist consultation is required. Positive PCR, pregnancy along with hypertension and gestational diabetes also require critical attention. It is essential to consult a gynecologist and start anticoagulant therapy. Positive PCR at postpartum also require precise management and patients should be treated with remdesivir and drug hypersensitivity requires management. We recommend hypersensitivity testing prior to the injection of the drug. We also monitored blood glucose levels of all the patients and

**Table 1**  
Characteristics of the patients.

Age	Gestational age	Type of delivery	Duration of hospitalization (day)
38	38	Cesarean	3
31	32	Cesarean	13
32	37	natural childbirth	6
41	24	Continuation of pregnancy	7
39	32	Continuation of pregnancy	9
32	28	Continuation of pregnancy	6
36	30	Continuation of pregnancy	6
38	27	Continuation of pregnancy	6
34	31	Continuation of pregnancy	6
32	34	Continuation of pregnancy	6
34	35	Continuation of pregnancy	6
44	12	Continuation of pregnancy	6
30	38	Cesarean	2
37	23	Continuation of pregnancy	3
30	28	Continuation of pregnancy	7
29	36	Continuation of pregnancy	7
41	12	Continuation of pregnancy	3
34	25	Continuation of pregnancy	4
34	18	Cesarean	2
40	31	Continuation of pregnancy	4
27	18	Continuation of pregnancy	5
30	33	Continuation of pregnancy	6
34	33	Continuation of pregnancy	4

enoxaparin to control vascular complications such as vasculitis. For patients requiring cesarean section, enoxaparin was replaced with heparin (Table 1).

#### 5. Discussion

Owing to limitation regarding the using of CT scan among pregnant women in early pregnancy, considering the reduction in oxygen saturation and positive COVID19 PCR, the use of remdesivir should be considered, following the consultation with gynecologist and infectious disease specialist.

Maldarelli, Savage [9] reported a case of a pregnant woman in the third trimester of her pregnancy, presented with COVID19. Despite, requiring intensive care unit admission and drop in her SpO<sub>2</sub>, treatment of remdesivir was seen effective. She was discharged in a healthy condition and had uncomplicated vaginal delivery later. Other cohort studies have also reported the safe use of remdesivir during pregnancy and at postpartum. Patients were followed up for 28 days to evaluate the efficacy of the drug. It was seen that use of remdesivir reduced the requirement of oxygen, with 90% women being discharged and 93% being extubated [10]. In a case report, Jacobson, Antony [6] showed that COVID19 during pregnancy can be effectively managed by the use of dexamethasone, remdesivir and convalescent plasma, lung protective ventilator settings (in case of severe respiratory distress) and prone position for better ventilation. Furthermore, in a case of a 35-year-old pregnant women at 22 weeks of gestation presented with elevated IL-6, the use of tocilizumab with remdesivir has shown effective outcomes too. The woman was discharged with 9 days of treatment and recovery [11].

In case of poor prognosis of COVID19 in these patients, presented with severe respiratory distress and further drop in SpO<sub>2</sub>, emergency preterm delivery via cesarean section under spinal can be considered. PCR is required in newborns and in case of positive, IgM and IgG test at 4 weeks later should be performed. Those presented with symptoms of pneumonia and sepsis, non-specific treatment similar to the treatment of sepsis caused by pneumonia such as water regulation, electrolyte and ventilation can be examined. Breastfeeding of hospitalized mothers with positive PCR and moderate clinical symptoms can be assessed by providing them safety recommendations like the use of mask and gloves and the assistance of nursing staff.

Several pregnancy and maternal-related parameter were not evaluated in our study such as history of miscarriage, preeclampsia and intra-uterine growth restriction. Randomized control trials are therefore required in this area.

#### 6. Conclusion

The risk of using CT scan to confirm COVID19, especially in the first six months of pregnancy, versus the use of remdesivir, without CT findings, that can lead nausea, dizziness, and itching can be a challenging decision. It is also associated with high costs of treatment for private patients who do not have medical insurance. The large number of patients at the beginning of each phase of the disease is associated with a shortage of normal and special beds. Other limitation faced by patients and clinicians include invalidity of the drugs, unknown pregnancy, hesitance in the use of remdesivir by the doctors and occurrence of vasculitis. Severity in COVID19 is likely to call-in the need for premature delivery, therefore, patients should be closely monitored for the worsening clinical symptoms and fetal health.

#### Ethical approval

All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

**Sources of funding**

No funding was secured for this study.

**Author contributions**

Dr. Saeid Marzban-Rad: conceptualized and designed the study, drafted the initial manuscript, and reviewed and revised the manuscript.

Dr. Sahar Bahmani and Dr. Amenehsadat Kazemi: Designed the data collection instruments, collected data, carried out the initial analyses, and reviewed and revised the manuscript.

Dr. Masoumeh Ghafarzadeh: Coordinated and supervised data collection, and critically reviewed the manuscript for important intellectual content.

**Registrationse**

1. Name of the registry: N/a
2. Unique Identifying number or registration ID: N/A
3. Hyperlink to the registration (must be publicly accessible): N/A

**Guarantor**

Saeid Marzban-Rad.

**Provenance and peer review**

Not commissioned, externally peer-reviewed.

**Declaration of competing interest**

The authors deny any conflict of interest in any terms or by any

means during the study.

**Appendix A. Supplementary data**

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.amsu.2022.103681>.

**References**

- [1] E.A.N. Wastnedge, et al., Pregnancy and COVID-19, *Physiol. Rev.* 101 (1) (2021) 303–318.
- [2] R. Vaziri-Harami, P. Delkash, Can l-carnitine reduce post-COVID-19 fatigue? *Ann Med Surg (Lond)* 73 (2022) 103145.
- [3] M. Ahmadinejad, et al., Using new technique in sigmoid volvulus surgery in patients affected by COVID19, *Annals of Medicine and Surgery* 70 (2021), 102789.
- [4] D. Liu, et al., Pregnancy and perinatal outcomes of women with coronavirus disease (COVID-19) pneumonia: a preliminary analysis, *Am. J. Roentgenol.* 215 (1) (2020) 127–132.
- [5] J.H. Beigel, et al., Remdesivir for the treatment of Covid-19 — final report, *N. Engl. J. Med.* 383 (19) (2020) 1813–1826.
- [6] J. Jacobson, et al., Use of dexamethasone, remdesivir, convalescent plasma and prone positioning in the treatment of severe COVID-19 infection in pregnancy: a case report, *Case Reports in Women's Health* 29 (2021) e00273.
- [7] R. Alizadeh, Z. Aghsaeifard, Does COVID19 activates previous chronic pain? A case series, *Ann Med Surg (Lond)* 61 (2021) 169–171.
- [8] R.A. Agha, et al., The PROCESS 2020 guideline: updating Consensus preferred reporting of CasE Series in surgery (PROCESS) guidelines, *Int. J. Surg.* 84 (2020) 231–235.
- [9] G.A. Maldarelli, et al., Remdesivir treatment for severe COVID-19 in third-trimester pregnancy: case report and management discussion, *Open Forum Infect. Dis.* 7 (9) (2020).
- [10] R.M. Burwick, et al., Compassionate Use of Remdesivir in Pregnant Women with Severe Covid-19, *Clinical infectious diseases : an official publication of the Infectious Diseases Society of America*, 2020, p. ciaa1466.
- [11] M. Naqvi, et al., Tocilizumab and remdesivir in a pregnant patient with coronavirus disease 2019 (COVID-19), *Obstet. Gynecol.* 136 (5) (2020).