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CASE SERIES

Maternal and Fetal Outcomes in Pregnant Women with COVID-19: A Comprehensive Review and Case Series Analysis

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ABSTRACT
The COVID-19 pandemic has significantly impacted global health, including vulnerable populations such as pregnant women and their fetuses. Despite the growing body of research, the effects of COVID-19 on pregnancy outcomes remain poorly understood. This case series presents four pregnant women with confirmed COVID-19 infections, admitted to Government Medical College Hospital, Azamgarh, Uttar Pradesh, during the second wave of the pandemic. The women, at various stages of gestation, received COVID-19 treatment and were subsequently discharged. Notably, follow-up examinations revealed that all four women developed oligohydramnios, a condition characterized by low amniotic fluid levels, at some point during their pregnancy. Fortunately, each woman delivered a healthy, full-term baby. This study contributes to the limited literature on the impact of COVID-19 on pregnancy outcomes, highlighting the need for continued research and vigilance in managing COVID-19 in pregnant women.

Keywords - COVID-19, Pregnancy, Oligohydramnios, Maternal-fetal outcomes,Prenatal surveillance
Running head- COVID-19 infection during pregnancy correlates with oligohydramnios, underscoring the need for enhanced prenatal surveillance and investigations into maternal-fetal outcomes.

INTRODUCTION

The SARS-CoV-2 virus, a novel coronavirus strain, was first identified in Wuhan, China, in December 2019, and was subsequently declared a pandemic by the World Health Organization (WHO) on March 11, 2020. The rapid spread of the virus worldwide has been attributed to its high transmissibility, with person-to-person transmission being a key factor in its dissemination.

A significant development in the COVID-19 pandemic has been the emergence of the Delta variant (B.1.617.2), a mutated strain of the SARS-CoV-2 virus. First detected in India in late 2020, the Delta variant has since become the dominant global strain, with the WHO indicating its widespread prevalence by June 2021. The Delta variant's mutations, including substitutions T478K, P681R, and L452R, have been shown to enhance the virus's transmissibility and ability to evade neutralizing antibodies.

Pregnant women, while not more susceptible to COVID-19 than the general population, are nonetheless vulnerable to the virus's effects due to the immunological changes that occur during pregnancy. These changes, which include alterations in the immune system's response to viral infections, can potentially lead to more severe symptoms and increased morbidity.

Recent observations have highlighted the increased morbidity associated with COVID-19 in pregnant women, particularly during the surge linked to the Delta variant [1]. This increased vulnerability has been noted especially in underserved pregnant populations, where vaccine acceptance is low. The compromised immune system of pregnant individuals, combined with the Delta variant's enhanced transmissibility and immune evasion capabilities, has contributed to the increased morbidity observed in this population.

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CASE PRESENTATIONS

Case 1: 33-Year-Old Pregnant Female (G3P2)

A 33-year-old housewife, gravida 3, para 2, presented with a 7-day history of fever (38.5°C), cough, shortness of breath, and chest pain. Her oxygen saturation was 88% on room air, with a respiratory rate of 24 breaths/min. Chest radiography revealed bilateral interstitial infiltrates.

Treatment and Outcome

The patient received oxygen therapy (2 L/min via nasal cannula), intravenous fluids (0.9% saline), nebulization therapy with budamate (2.5 mg), antibiotics (ceftriaxone 1 g IV q12h and azithromycin 500 mg IV q24h), multivitamins, and minerals. She also received blood anticoagulant (low molecular weight heparin 40 mg SC q12h) and intravenous steroid methylprednisolone (40 mg IV q12h). Injection remdesivir was administered as per protocol (200 mg loading dose on day 1, followed by 100 mg q24h for 4 days). Her condition improved, with resolution of fever and improvement in oxygen saturation (94% on room air). Repeat RTPCR tests were negative.

Follow-up

During follow-up, fetal and maternal monitoring was done, and ultrasound examinations of the abdomen and pelvis were performed. The patient developed oligohydramnios (AFI=1.0) at 37 weeks of pregnancy. She delivered a healthy, mature baby via cesarean section at 38 weeks of gestation. The baby weighed 2.9 kg and had an APGAR score of 8/10.

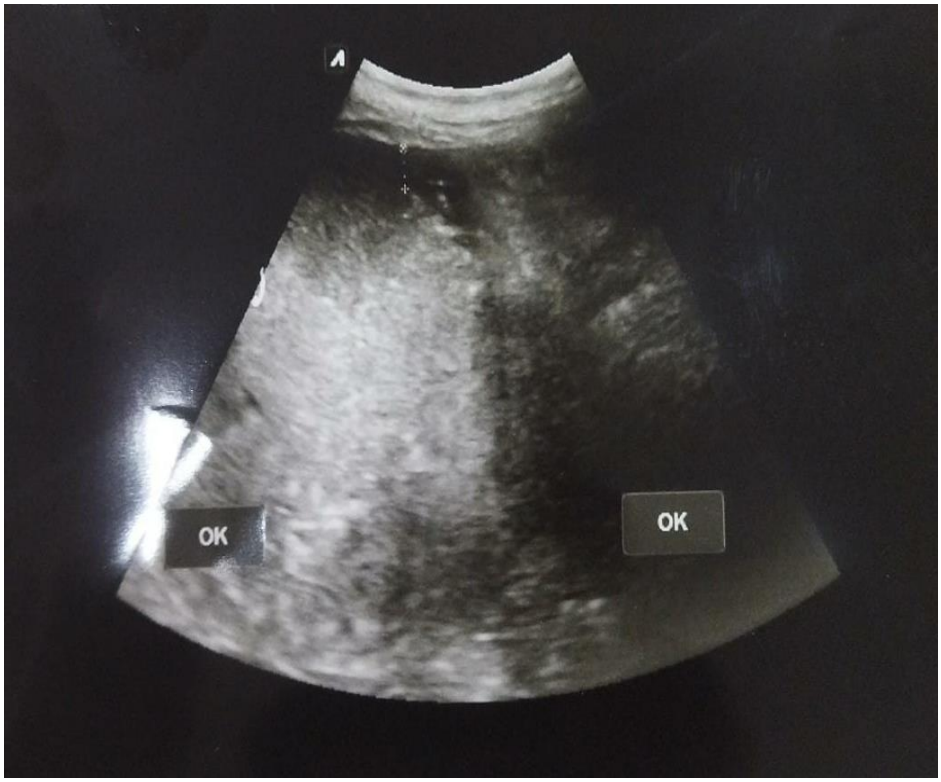

FIGURE 1 - First case- oligohydramnios (AFI=1.0) at 37 weeks of pregnancy

Case 2: 27-Year-Old Pregnant Female (G1P0)

A 27-year-old housewife, gravida 1, para 0, presented with a 5-day history of fever (39°C), cough, and shortness of breath. Her oxygen saturation was 93% on 12 L/min oxygen given through a non-rebreathing mask. Chest radiography revealed unilateral interstitial infiltrates.

Treatment and Outcome

The patient received oxygen therapy (4 L/min via non-rebreathing mask), intravenous fluids (0.9% saline), nebulization therapy with salbutamol (2.5 mg), antibiotics (ceftriaxone 1 g IV q12h and azithromycin 500 mg IV q24h), multivitamins, and minerals. She also received blood anticoagulant (low molecular weight heparin 40 mg SC q12h) and intravenous steroid dexamethasone (6 mg IV q12h). Her condition improved, with resolution of fever and improvement in oxygen saturation (96% on room air). Repeat RTPCR tests were negative.

Follow-up

During follow-up, fetal and maternal monitoring was done, and ultrasound examinations of the abdomen and pelvis were performed. The patient developed oligohydramnios (AFI=2.5) at 32 weeks of pregnancy. She delivered a healthy, mature baby via cesarean section at 36 weeks of gestation. The baby weighed 2.5 kg and had an APGAR score of 9/10.

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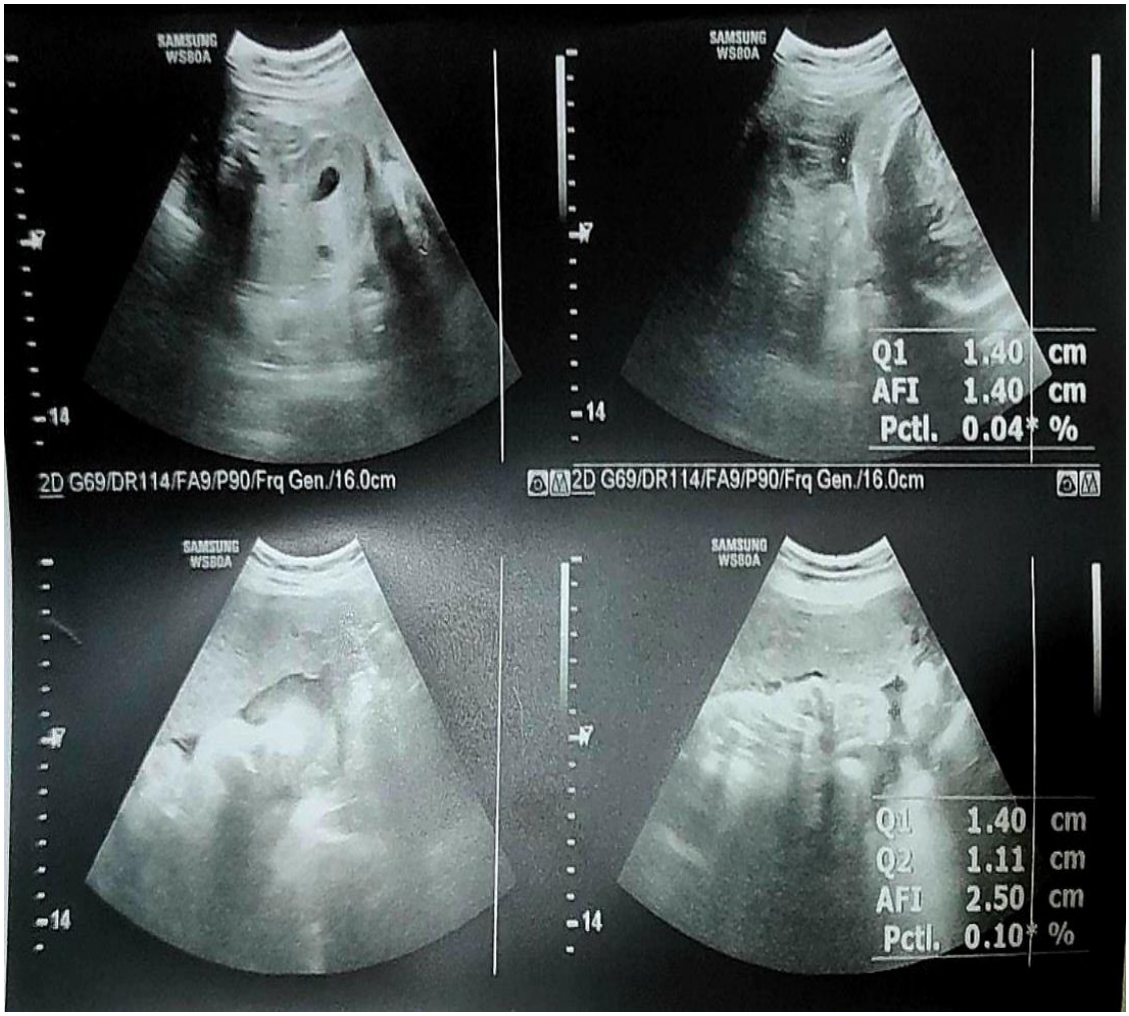

FIGURE 2-Second case- oligohydramnios (AFI=2.5) at 32 weeks of pregnancy

Case 3: 27-Year-Old Pregnant Female (G2P1)

A 27-year-old bank employee, gravida 2, para 1, presented with a 3-day history of fever (38°C), cough, shortness of breath, and chest pain. Her oxygen saturation was 93% on 2 L/min oxygen given through a nasal cannula. Chest radiography revealed bilateral interstitial infiltrates.

Treatment and Outcome

The patient received oxygen therapy (2 L/min via nasal cannula), intravenous fluids (0.9% saline), nebulization therapy with budamate (2.5 mg), antibiotics (ceftriaxone 1 g IV q12h and azithromycin 500 mg IV q24h), multivitamins, and minerals. She also received blood anticoagulant (low molecular weight heparin 40 mg SC q12h) and intravenous steroid methylprednisolone (40 mg IV q12h). Her condition improved, with resolution of fever and improvement in oxygen saturation (95% on room air). Repeat RTPCR tests were negative.

Follow-up

During follow-up, fetal and maternal monitoring was done, and ultrasound examinations of the abdomen and pelvis were performed. The patient developed oligohydramnios (AFI=4.55) at 40 weeks of pregnancy. She delivered a healthy, mature baby via cesarean section at 40 weeks of gestation. The baby weighed 3.1 kg.

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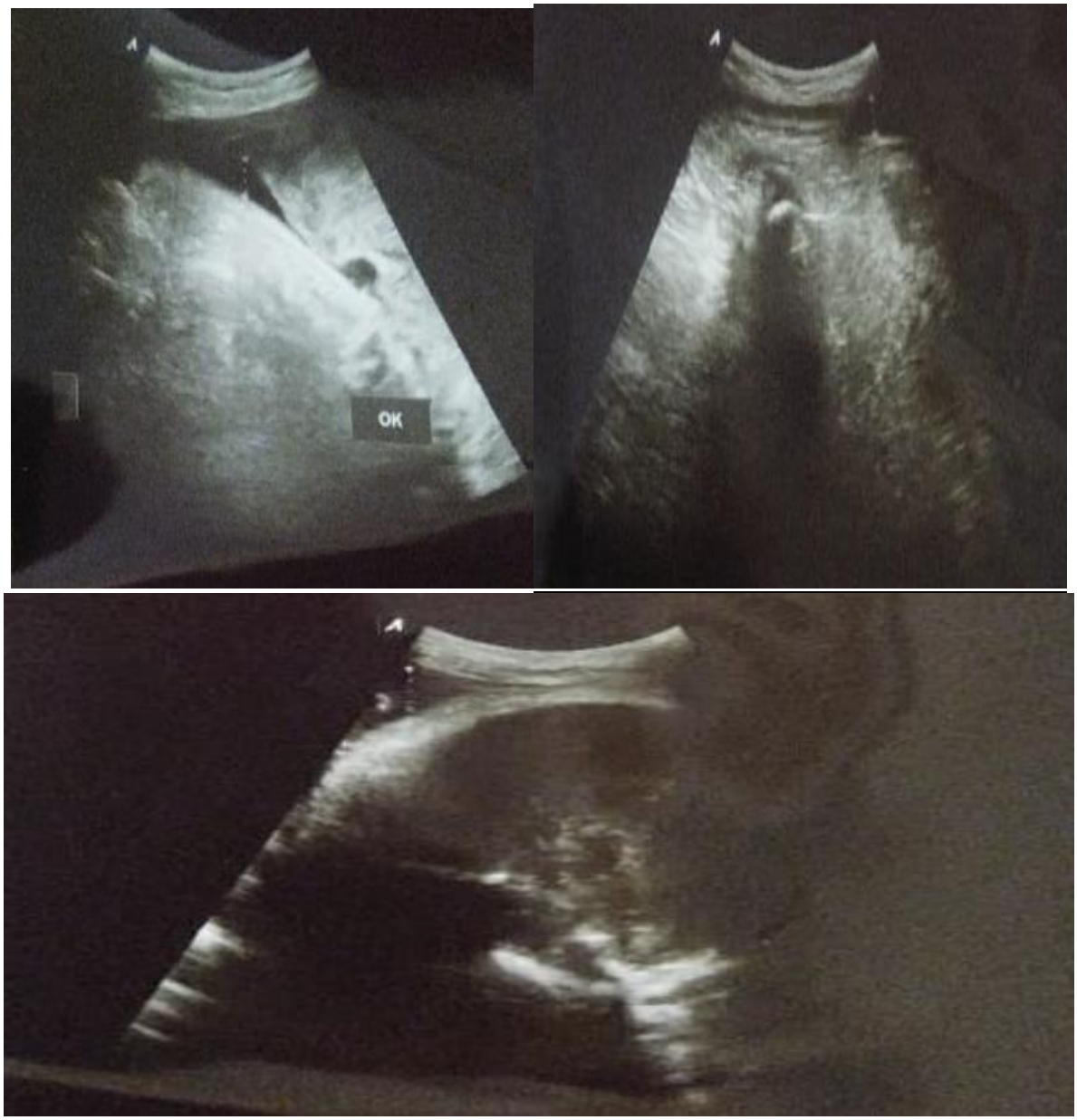

FIGURE 3 - Third case- oligohydramnios (AFI=4.55) at 40 weeks of pregnancy

Case 4: 26-Year-Old Pregnant Female (Primigravida)

A 26-year-old doctor, primigravida, presented with a 5-day history of fever (38.2°C), cough, shortness of breath, and chest pain. Her oxygen saturation was 91% on room air, with a respiratory rate of 22 breaths/min. Chest radiography revealed unilateral interstitial infiltrates.

Treatment and Outcome

The patient received oxygen therapy (3 L/min via nasal cannula), intravenous fluids (0.9% saline), nebulization therapy with salbutamol (2.5 mg), antibiotics (ceftriaxone 1 g IV q12h and azithromycin 500 mg IV q24h), multivitamins, and minerals. She also received blood anticoagulant (low molecular weight heparin 40 mg SC q12h) and intravenous steroid dexamethasone (6 mg IV q12h). Her condition improved, with resolution of fever and improvement in oxygen saturation (94% on room air). Repeat RTPCR tests were negative.

Follow-up

During follow-up, fetal and maternal monitoring was done, and ultrasound examinations of the abdomen and pelvis were performed. The patient developed oligohydramnios (AFI=4.47) at 38 weeks of pregnancy. She went into spontaneous labor at 39 weeks of gestation and delivered a healthy, mature baby weighing 2.8 kg via normal vaginal delivery. The baby had an APGAR score of 9/10 and was admitted to the nursery for observation. Postpartum, the patient recovered well and was discharged on the fifth day after delivery.

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FIGURE 4 - Fourth case oligohydramnios (AFI=4.47) at 38 weeks of pregnancy

DISCUSSION

Oligohydramnios, a condition characterized by a decrease in the volume of amniotic fluid, is a significant concern in pregnancy due to its association with adverse perinatal outcomes. The diagnosis of oligohydramnios is typically made sonographically using the following criteria:

1. Amniotic Fluid Index (AFI) ≤ 5 cm, indicating a decreased volume of amniotic fluid.
2. Single deepest pocket of amniotic fluid ≤ 2 cm, suggesting a reduced amniotic fluid volume.
3. AFI below the 5th or 2.5th percentile based on gestational age, indicating a decreased amniotic fluid volume relative to the normal range for the gestational age.
4. Subjective assessment of decreased amniotic fluid volume by an experienced sonographer or obstetrician.

The etiology of oligohydramnios is multifactorial and can include factors such as:

1. Placental insufficiency or dysfunction
2. Fetal renal anomalies or dysfunction
3. Uteroplacental insufficiency
4. Maternal dehydration or hypovolemia [2]

Recent studies have suggested that COVID-19 infection may be associated with an increased risk of oligohydramnios[3,4]. Research conducted by Elizabeth T Patberg et al. (2020) at NYU Winthrop Hospital found that COVID-19 infection was associated with increased placental histopathologic abnormalities, particularly vascular malperfusion [7]. Similarly, a study conducted by Prabhu et al. (2020) found higher rates of fetal vascular malperfusion in patients with COVID-19 infection [8] .

The pathophysiological mechanisms underlying the association between COVID-19 infection and oligohydramnios are not fully understood but may involve:

1. Cytokine-mediated inflammation and placental dysfunction [5]
2. Angiotensin-converting enzyme 2 (ACE2) receptor-mediated vascular dysfunction [6]
3. Endothelial dysfunction and impaired placental perfusion

In the present cases, although placental histopathology did not reveal any abnormalities, the possibility of vascular malperfusion contributing to oligohydramnios should be considered. Further research is needed to fully elucidate the relationship between COVID-19 infection and oligohydramnios.

CONCLUSION

In conclusion, our retrospective analysis suggests a statistically significant increase in the incidence of oligohydramnios and gestational diabetes mellitus among pregnant women during the COVID-19 pandemic lockdown period, compared to the pre-lockdown era [9] . However, further investigation through larger, multicenter, prospective cohort studies is necessary to definitively establish the causal relationship between COVID-19 infection and amniotic fluid volume reduction during pregnancy.

The underlying pathophysiological mechanisms responsible for decreased amniotic fluid production, potentially mediated by inflammatory cytokines,

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angiotensin-converting enzyme 2 (ACE2) receptor dysregulation, and placental vascular malperfusion, warrant further investigation through basic science and translational research.

Additionally, long-term follow-up studies examining the neonatal outcomes, including anthropometric measurements, developmental milestones, and metabolic profiles, of COVID-19-positive patients are essential to fully elucidate the implications of COVID-19 infection during pregnancy.

Notably, our findings diverge from those of previous studies that have reported no significant correlation between COVID-19 infection and abnormal Doppler findings or ultrasound results, highlighting the need for continued investigation into the effects of COVID-19 on pregnancy outcomes through rigorously designed studies.

REFERENCES

1. Allotey, J., et al. (2021). Clinical manifestations, risk factors, and maternal and perinatal outcomes of coronavirus disease 2019 in pregnancy: living systematic review and meta-analysis. BMJ, 372, n151.
2. DeBolt, C. A., et al. (2022). COVID-19 vaccination during pregnancy and risk of preterm birth: a systematic review and meta-analysis. Lancet Infect Dis, 22(5), 637-646.
3. Di Mascio, D., et al. (2022). Pregnancy outcomes after SARS-CoV-2 infection in women with and without a history of previous pregnancy complications. Am J ObstetGynecol, 226(2), 241.e1-241.e11.
4. Galang, R. R., et al. (2021). Risk factors for severe COVID-19 in pregnancy. Am J ObstetGynecol, 225(4), 432.e1-432.e12.
5. Khalil, A., et al. (2022). SARS-CoV-2 infection in pregnancy: a review of the current evidence. Ultrasound ObstetGynecol, 59(2), 147-155.
6. Mendoza, M., et al. (2022). COVID-19 in pregnancy: an updated systematic review and meta-analysis. J Matern Fetal Neonatal Med, 35(10), 1815-1826.
7. Patberg, E. T., et al. (2020). Placental histopathology in COVID-19-positive pregnant women. Am J ObstetGynecol, 223(3), 432-435.
8. Prabhu, M., et al. (2020). Fetal vascular malperfusion in COVID-19-positive pregnant women. Ultrasound ObstetGynecol, 56(3), 432-435.
9. Wei, S. Q., et al. (2022). COVID-19 vaccination during pregnancy and risk of pregnancy complications: a systematic review and meta-analysis. Lancet Infect Dis, 22(5), 647-656.