Saudi J Kidney Dis Transpl 2021;32(2):559-563

Saudi Journal of Kidney Diseases and Transplantation

Case Report

Coronavirus Disease 2019 and Pregnancy-Related Acute Kidney Injury: Our Initial Experience of Six Cases

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ABSTRACT. Pregnancy is identified as one of the risk factors for increased severity of illness in severe acute respiratory syndrome novel coronavirus 2019 infection. The severity of illness may range from mild infection to severe multi-organ failure. Acute kidney injury (AKI) may occur in pregnant patients with coronavirus disease (COVID) either due to obstetric cause or due to severe COVID illness. We report six cases of COVID–pregnancy with AKI and their outcomes.

Introduction

Since the World Health Organization (WHO) declaration of the pandemic of severe acute respiratory syndrome novel coronavirus 2019 (SARS-nCoV-19)[1] on March 11, 2020, there has been a rapid rise in number of positive cases globally. Recent updates from the Centers for Disease Control (CDC) suggest that apart from preexisting comorbidities, older age, and immunosuppressed population, pregnancy is identified as a medical condition with increased risk of severe illness.[2] Recent reports also suggest that pregnancy may be associated with high rate of complications but low rate of mortality.[3] With the scarce literature available on coronavirus disease (COVID) in pregnancy, comprehensive understanding based on our future experience may teach us further in the management of COVID–pregnancy.

SARS-nCoV infection can range from asymptomatic (85%), mild–moderate (10%), to severe pneumonia (<5%).[4] The presence of severe infection may be associated with multi-organ failure. Certain criteria such as confusion, elevated urea, respiratory rate, and blood pressure (CURB) are used in COVID pregnant patients for hospitalization and as indicators for admission to intensive care unit (ICU).[5] It may be understood that in COVID-positive pregnancy, the presence of acute kidney injury (AKI) would be associated with worse outcome.

Our hospital, being a teaching hospital and a designated COVID hospital of the state, had about 9204 cases at the time of write-up. The

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number of COVID-positive pregnant patients admitted in obstetrics and gynecology was 292. The number of AKI cases admitted during the period was 28. There were six pregnancy-related AKIs (PRAKIs) during the three-month study period. Thus, COVID-positive PRAKI accounted for 0.06% of total positive admissions, 2.05% of total COVID-positive pregnancy admissions, and 21.4% of total COVID-positive AKI admissions.

We present six cases of AKI in COVID-positive pregnant patients and their outcomes. All patients had nasal swab positive for SARS-nCoV-19 on reverse transcription–polymerase chain reaction (Table 1).

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The authors obtained all appropriate consent forms from the patients for the publication of the cases.

The details of the cases are given in Tables 1 and 2.

Table 1. Characteristics of the study patients.

Patient	Clinical details of pregnancy	Clinical features of presentation	Investigation	Course during hospitalization	Outcome
Mrs. A	28 years, P1L1D1 Abruption-IUD at 34 weeks Non-oliguric	Fever, cough ×5 days SpO2: 95	Hb: 8 g/dL, TLC:15000 PLT: 1 lakh Creatinine: 2.7 mg/dL LFT:WNL CT chest: b/l GGO	HCQ, azithromycin, antibiotics	Discharged on day 16
Mrs. B	20 years, P1L1 Post emergency LSCS (36 weeks) day 8 of postoperative status	Breathlessness, altered sensorium SpO2: 94 on CPAP	Hb:12 g/dL TLC: 33000 PLT: 1 lakh Creatinine: 2.4 mg/dL Bilirubin: 5.3 mg/dL AST/ALT: 112/120 PT:12.5 CT chest: left upper zone consolidation CT brain: WNL	Mechanical ventilation, HCQ, azithromycin, antibiotics	Expired on day 3
Mrs. C	30 years, P3L3 36 weeks Post LSCS, central placenta previa PPH – S/P Hysterectomy	Breathlessness – 1 day	Hb: 8 g/dL, 5.2 g/dL TLC:6200 PLT: 2 lakhs Creatinine: 6.2->9.1->4.6->1.7 mg/dL LFT: normal PT: 13.5 s CT chest: b/l GGO	IV steroids, heparin, hemodialysis, antibiotics, azithromycin	Discharged on day 10 Baby: Negative for nasal swab
Mrs. D	22 years, P1L0D1 34 weeks Post LSCS Abruption-IUD Intraoperative hypotension	Breathlessness – 1 day Spo2 on CPAP: 94	Hb: 9 g/d TLC: 33000 PLT: 1.1 lakh Creatinine: 3.2 mg/dL Bicarbonate: 3.9 meq/L Bilirubin: 6.2 mg/dL AST:ALT: 128/156 Alk.phos: 1128 PT:22.5 s CT chest: b/l GGO	Mechanical ventilation, antibiotics, hemodialysis	Expired on day 4

Continuation of Table 1.

Mrs. E	28 years, P3L3A1 post LSCS admitted in the 6th week post-partum	Fever, cough, Breathlessness, oliguria	Hb: 9.6g/dL TLC: 15000 PLT: 90,000 Creatinine: 6.6 mg/dL Bilirubin: 3.8mg/dL ALT/AST: 88/94 CT chest: b/l GGO	IV steroids, hemodialysis, antibiotics, HCQ, azithromycin	Discharged on the 24th day
Mrs. F	21 years, P1L1D1 26 weeks, IUD Preeclampsia: 22nd week of gestation	Altered sensorium, Oligoanuria, breathlessness BP: 160/100 mm SpO2: 94 on O2 mask	Hb: 8.6 g/dL TLC: 18000 PLT: 60,000 Creatinine: 4 mg/dL LDH: >2000 Bilirubin: 16 AST/ALT: 1167/1082 PT: 28 s CT brain: PRES CT chest: b/l GGO	HCQ, azithromycin, antibiotics, hemodialysis, IV steroids	Sensorium recovered Continuing on dialysis support

Table 2. Coronavirus disease 2019 with mortality and acute kidney injury.

Patient	Diagnosis: COVID direct cause/coexistence	Probable cause of AKI	Probable cause of death
A	COVID direct cause	Prerenal	Alive
B	COVID coexistence	Sepsis	Sepsis-MOSF
C	COVID coexistence	PPH, hypotension	Alive
D	COVID coexistence	Sepsis	Sepsis-MOSF
E	COVID direct cause	Sepsis	Alive
F	?COVID-HUS	Sepsis/COVID, HUS	Alive

Discussion

SARS-nCoV-19 was declared pandemic by the WHO on March 11, 2020. With the increasing number of cases globally, it poses a therapeutic, diagnostic, and preventive challenge to medical community. COVID-19 has caused a significant impact on health systems and societal outcomes. It is not clear whether COVID-19 would be associated with grave outcomes in pregnancy similar to the earlier viral respiratory pandemics in pregnancy. Its impact on maternal and fetal health outcomes is expected to have a delayed surgence compared to general population though management during pregnancy and certain measures of maternal–fetal management have been suggested.[6]

The present report describes small case series of six patients with COVID-19 infection and AKI during pregnancy/postpartum period in our group; AKI was observed in the 3rd trimester in 4/6, in the 2nd trimester in one patient, and in postpartum period in one patient.

Although COVID-19 infection during pregnancy has been reported, literature about PRAKI in COVID-19 is sparse.

Pregnancy, being an immunologically altered state, may be understood as a risk factor for COVID-19 infection with higher occurrence of mortality. In a recent review by CDC of pregnant and nonpregnant women, it was noted that pregnancy was associated with high risk of admission to ICU and mechanical ventilation, though the risk of mortality was the same between two groups.[2,6]

In our case series, all the patients developed symptoms one to eight days after obstetric intervention. It may be understood that COVID-19 patients got infected during hospitalization rather than the community source.

Among the presenting complaints, fever was present in 2/6 patients, breathlessness in 5/6, and altered sensorium in 2/6, of whom one patient had features suggestive of posterior reversible encephalopathy on computed tomography brain. Kidney com-plaints of oliguria/anuria was present in 2/6 patients. Admission hypoxemia was present in 5/6 patients.

Severe anemia was noted in a patient with PPH and it was mild to moderate in the remaining patients. Mild leukocytosis was observed in two patients; the counts normalized during hospitalization Thrombocytopenia was present in 5/6 patients. Transaminitis was present in 4/6 patients. Deranged coagulation parameters were noted in 2/6 patients. Hypoxia at admission was present in 5/6 patients. CURB score was calculated for all patients to assess the degree of severity of pneumonia. It was 3–4 in two patients. All six patients had radiological findings such as bilateral ground glass opacities and unilateral consolidation. Cause of ICU admission appeared to be sepsis causing acute respiratory distress syndrome (ARDS) and encephalopathy in 2/6, and hypoxemia probably related to COVID-19 in 4/6 patients COVID-related severe pneumonia was present in 1/6 patient and the remaining 5/6 had bilateral GGOs.

In the above series, it is clear that all patients had symptoms attributable to COVID-19 lung injury. In those with sepsis, sepsis-associated ARDS is also contributing for respiratory failure. AKI was AKIN I in 2/6 cases and was AKIN III in 4/6 patients. All four patients were given hemodialysis. AKI recovered in 3/6 patients, and one patient was dialysis dependent at the time of write-up (2 weeks duration).

The clinical presentation in the 6th-week postpartum period and the features of mild pneumonia in patient E suggests that the diagnosis may be COVID-related lung involvement. However, renal injury may not be related to COVID as mild COVID pneumonia is not known to be associated with multi-organ involvement. It may be understood that patient C had PPH causing anemia and AKI. COVID-19 causing PPH was reported in two patients with coagulopathy.[7] Our patient did not have deranged coagulation parameters, and PPH was attributed to local obstetric cause. Patient F had PIH during the 22nd week of gestation and had severe preeclampsia with target organ involvement and HELLP. In this case, whether HELLP was induced by PE or COVID-19 infection could

not be investigated. It was reported that COVID-19 can cause HELLP and simulate PE, the differentiation of which is based on ratio of angiogenic factors.[8]

Mortality was observed in two patients with sepsis and multi-organ involvement, one of whom had AKIN–I and the other patient, AKIN-III. Severe ARDS needing mechanical ventilation and transaminitis were observed in both the patients. Pregnancy loss was noted in three patients, abruption-intrauterine death in two patients (34–36 weeks), and preeclampsia-HELLP related in one patient. Successful pregnancy outcome was observed in two patients, and one patient presented in the 6th week postpartum. Of six patients, four underwent LSCS for different indications and one patient under-went termination with misoprostol (Mrs. F).

Limitations

All laboratory investigations could not be done as our center is a resource-poor setting.

Observations

The incidence of PRAKI among COVID-19 pregnancy admissions was 2.05%, among COVID admissions was 0.06%, and among AKI was 21%. All COVID-19 PRAKI patients were symptomatic with fever, cough, and/or breathlessness. COVID-19 can simulate preeclampsia-HELLP-like presentation. Sepsis with MOSF is the most common cause of mortality in PRAKI.

Conflict of interest: None declared.

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