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Case Report **OPEN ACCESS**

The pregnancy journey of a patient with end-stage renal disease on hemodialysis: A case study

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ABSTRACT

Pregnancy in patients with end-stage renal disease (ESRD) is considered a very high-risk and is not recommended as it might cause fatal consequences for both the mother and the fetus. Even though chronic kidney disease affects the physiological components of fertility, decreasing the possibility of spontaneous conceptions, unwanted pregnancies still happen, and a small percentage of women with ESRD become pregnant. All women with kidney disease should have access to specialists in renal disease and pregnancy who can support, care for, and monitor them during their pregnancy. We reported a case of a 37-year-old primigravida who has ESRD on hemodialysis. The pregnancy journey was uneasy, but eventually she successfully passed through it. The most challenging issues to treat and manage throughout this pregnancy are anemia, the risks of eclampsia, and uncontrolled hypertension. The management of this patient requires multidisciplinary and shared care monitoring by the nephrologist, obstetrician, and primary care doctor.

Keywords: pregnancy, end-stage renal disease, hemodialysis

INTRODUCTION

End-stage renal disease (ESRD) patients typically have poor pregnancy outcomes [1]. In women with chronic kidney disease (CKD), fertility typically declines as the glomerular filtration rate (GFR) reduces, and women start to experience irregular menstrual cycles once GFR drops to below 15 mL/min [2]. Patients with ESRD receiving continuous dialysis face greater challenges during pregnancy. The challenges may arise from hypertension complications, which may develop in up to 70% of pregnant hemolysis patients, and it has become a constant issue throughout the pregnancy. The presence of hemolysis, elevated liver enzymes, low platelets syndrome, pre-eclampsia (PE), and eclampsia may make this situation worse. The other challenging issue is anemia, which may require higher erythropoietin and iron supplementation in dialysis-dependent pregnant women [3].

CASE PRESENTATION

We presented a case of a 37-year-old primigravida who has hypertension, ESRD on regular hemodialysis, and has one kidney congenitally. She undergoes renal dialysis, which is scheduled three times per week via left brachiocephalic fistula, since 2017. Her medications include tablet prazosin one mg twice per day, telmisartan 160 mg daily, felodipine 20 mg twice per day, and simvastatin 20 mg daily prior to this pregnancy. She was also on intravenous iron (Venofer®) 100 mg every two weeks and epoetin beta (Recormon®) 6,000 units weekly for iron maintenance therapy prior to the pregnancy. She spontaneously got pregnant after 10 years of marriage. She never sought any infertility treatment prior to the pregnancy. She had delayed menses for three months and performed a urine pregnancy test for which the results were positive. Due to irregularities in her menstrual cycle, the pregnancy was unexpected. She was seen during follow-up with a nephrologist the next day, and she informed him about the pregnancy test's result. The hemolysis schedule was then adjusted from three times per week to six times per week because of the unplanned pregnancy. Antihypertensive medications were replaced with tablets of methyldopa 500mg three times per day.

The following day, she was referred for antenatal booking, and a dating scan was done, and an 18-week intrauterine pregnancy was confirmed. Her blood pressure during the booking was noted at 195/102 mmHg, and the subsequent repeated blood pressure was 182/103 mmHg. She did not have any symptoms or signs of impending eclampsia at that time. She had anuria after the last hemodialysis, which was done a day prior to the antenatal booking visit; thus, a urine test could not be performed on that day. Due to her high blood pressure readings, she was sent for hospital admission as a hypertensive emergency was suspected. Her full blood count at this time showed white blood cell 6.51×109/L, hemoglobin (Hb) 9.8 g/L, mean cell volume, and mean cell hemoglobin of 100 fL, 30.9 pg, and platelet count of 105×109/L at this time. Serum ferritin

levels were 703.1 ug/L, serum iron levels 15.4 µmol/L, and total iron-binding capacity 40.2 µmol/L, all of which were quite similar to her pre-pregnancy levels. She did not have any symptoms of anemia, bleeding tendencies, fever, or any abdominal pain. A full blood picture was sent, and the result came back as anemia secondary to chronic disease and thrombocytopenia due to possible gestational thrombocytopenia. She was then scheduled for heparin-free hemolysis for four hours for each dialysis session due to her thrombocytopenia condition. The six-day-per-week hemodialysis was done as scheduled. While in the ward, an oral glucose tolerance test was performed, and the results were 4.1 mmol/L for fasting and 9.9 mmol/L after two hours post-glucose, confirming the presence of gestational diabetes mellitus. She was then discharged from the ward after her blood pressure stabilized. Her blood sugar profile during next follow-up was controlled, and she was on diet control for her gestational diabetes.

She had another two hospital admissions later for blood pressure stabilization, as her pregnancy was marked by poor blood pressure control. The highest reading of blood pressure was 195/102 mmHg. She was already on one gram of calcium carbonate three times per day, and the tablet methyldopa dosage was increased up to 1,000 mg three times per day. Since she persistently has thrombocytopenia, aspirin tablets were avoided. She also received twice a blood transfusion during hemodialysis as she had recurrent symptomatic anemia with lethargy and had one episode of presyncope attack during hemodialysis at 27 weeks of gestation. Her later Hb monitoring ranged between 8.3 and 9.7 g/L. Oral iron supplementation daily and intravenous iron (intravenous Venofer®) every two weeks were continued. Subcutaneous methoxy polyethylene glycol-epoetin beta (Mircera®) 150 mcg was also given every month.

This patient received multidisciplinary care from a nephrologist, an obstetrician, and a primary care specialist. Her fetal growth was closely monitored, and it was good until the third trimester of her pregnancy. At 30 weeks of gestation, two doses of 12 mg intramuscular dexamethasone were administered, as she was planned for early delivery at 34 weeks of gestation due to her uncontrolled hypertension and anemia. However, at 33 weeks of gestation, she had developed a headache with a blood pressure of 186/100 mmHg, and she was immediately referred to a tertiary hospital. She was admitted to the antenatal ward, and nifedipine 10 mg three times daily was added to control her blood pressure. She was noticed pale and developed pitting oedema up to the shin area, with basal crepitations in both lower zones of the lung. At this time, Hb level was 8.2 g/L and platelet count was 89×109/L. The diagnosis of a hypertensive crisis with fluid overload, anemia, and thrombocytopenia was made. Hemodialysis with a one-pint pack cell transfusion was done to increase Hb level prior to delivery, and she also received intravenous magnesium sulphate for fetal neuroprotection and eclampsia prophylaxis. An echocardiogram was done and showed an ejection fraction of 67% without any significant valvular lesions or clots. Once her blood pressure and fluid overload were controlled, the patient was arranged for an emergency lower caesarean section with bilateral tubal ligation with consent from herself and her husband. She successfully gave birth to a 1.8-kg baby girl with an Apgar score of five in the first minute and eight in the next five minutes.

DISCUSSION

ESRD places the mother and fetus at considerable risk during pregnancy. Women with CKD have a higher chance of having an unfavorable pregnancy outcome and facing obstetric complications including PE, fetal growth restriction, and premature birth [4]. Although kidney illness can have an impact on the health of both pregnant women and their unborn children, most women with CKD have successful pregnancies. Problems associated with pregnancy during dialysis are extremely prevalent. Miscarriage, anemia, infection, polyhydramnios, premature membrane rupture, preterm birth, hypertension, superimposed PE or eclampsia, increased hemorrhagic risk, and maternal death are among the risks for women on dialysis [1]. Up to 40% of pregnant CKD patients may develop PE. In dialysis patients, hypertension contributes to 1% of maternal fatalities and complicates about 80% of births [1]. Most dialysis patients have better pregnancy outcomes if they can postpone getting pregnant until after a successful kidney transplant [4].

The requirement for increased dialysis frequency may become another obstacle for women with ESRD when trying to get pregnant. The recommended approach is to strengthen treatment regimens to achieve improved gestational outcomes while reducing the fetus' exposure to risky medicines and interdialytic weight gain. Intensive dialysis regimens improve the likelihood of conception and are connected to positive pregnancy outcomes, such as gestational age and birth weight, as well as placental development, which is crucial for the health of the fetus [5]. Intensive HD allows the evacuation of extra fluid easier than regular dialysis (20 hours per week), and it reduces variance in intra-dialytic blood pressure, improves blood pressure control, decreases the requirement for antihypertensive drugs, and decreases the usage of diuretics. Also, it enhances uremic toxin clearance, which enhances pregnancy outcomes [5].

Uncontrolled hypertension is one of the difficulties with ESRD during pregnancy. The most concerning side effect of having high blood pressure during pregnancy, which carries serious dangers for both the mother and the fetus, is eclampsia [1]. Hypertension usually improves with intense dialysis, but if it worsens after 20 weeks of pregnancy, PE should be a concern. Additionally, modifications in placental doppler blood flow, delayed fetal growth, and fresh constraints on fetal growth are more suggestive of placental causes of hypertension [2]. Renin-angiotensin inhibitors like angiotensin-converting enzyme inhibitors and angiotensin II receptor blockers are the preferred antihypertensive drugs for people with high blood pressure who are not pregnant. However, due to the risks to the baby, it is not recommended to use these medications while pregnant. Fetal hypotension and reduced renal blood flow perfusion may be the main causes of these outcomes, which include kidney ischemia, anuria, and oligohydramnios [6]. Labetalol, nifedipine, and methyldopa are recommended for the treatment of pregnancy-related hypertension. Hypotension (blood pressure below 120/70 mmHg) should be avoided, and the target blood pressure is less than 140/90 mmHg [5]. Low blood pressure affects fetoplacental circulation and lowers the risk of intrauterine growth restriction, stillbirth, and fetal mortality. Unfavorable pregnancy outcomes are more common among people with poorly controlled hypertension and those who need to take numerous medications to control their blood pressure [5].

A clinical evaluation for superimposed PE should be made if severe hypertension develops persistently in women who already have chronic hypertension and proteinuria (systolic blood pressure >160 mmHg, diastolic blood pressure >110 mmHg) [4]. PE causes extracellular fluid accumulation and intravascular volume contraction, which make it more difficult to determine the fluid status. Pulmonary oedema, which develops as a result of capillary leaks, reduced plasma oncotic pressure, and variable cardiac output, Women with CKD are entitled to PE prevention with aspirin since they are more likely than women without CKD to develop PE [4]. Aspirin was not administered in our situation, though, due to the patient's thrombocytopenia. Intravenous magnesium sulphate is advisable for the treatment of eclampsia, eclampsia prevention in PE, and fetal neuroprotection when delivery occurs before 34 weeks of gestation. Preterm delivery and intrauterine growth restriction are common in ESRF patients receiving dialysis [5]. It is estimated that 50% of ESRD patients have newborns of small gestational age [5]. The timing of pregnancy in CKD patients is influenced by obstetrical variables like declining renal function, symptomatic hypoalbuminemia, pulmonary oedema, and refractory hypertension [4]. In our situation, the delivery was scheduled for 34 weeks into the pregnancy. However, due to consistently high blood pressure and the presence of pulmonary oedema, the birth occurred earlier than expected.

A successful pregnancy is correlated with maternal Hb levels in women with ESRD [7]. Pregnant women frequently experience anemia, which necessitates either iron therapy, intravenous iron therapy, or occasionally blood transfusions. For women on dialysis, it is advisable to raise the dose by 50% to 100% during pregnancy because there may be some relative resistance to erythropoietin. Avoiding anemia-related symptoms and the requirement for transfusion support should be a priority whenever possible [8]. Patients are at risk for iron deficiency because of repeated blood draws and residual blood loss from hemodialysis treatments [9]. Values for hematocrit, transferrin saturation, and Hb should all be maintained above 10 g/dL, between 30% and 35%, respectively [8]. Hb levels of ESRD patients on hemodialysis increased after erythropoiesis-stimulating agents (ESA) were approved to be used since 1989, and the need for red blood cell (RBC) transfusions became significantly less necessary [10]. ESA is needed more frequently during pregnancy, and intravenous iron is needed to maintain adequate iron saturation [4]. ESA and iron therapy have been effective in raising Hb levels in dialysis patients, lowering the requirement for RBC transfusions, and enhancing a patient's general health. However, RBC transfusions are still required for patients who have symptomatic anemia and need an immediate increase in oxygen-carrying capacity or who are resistant to ESA therapy [10, 11].

Although the incidence of thrombocytopenia in uremic patients has been reported to range from 16% to 55%, it is challenging to estimate the actual occurrence in ESRD [12]. Thrombocytopenia can be caused by the use of heparin, uremia, sepsis, blood loss, medication, and bone marrow suppression. Routine platelet count testing is not advisable prior to dialysis intravenous access procedures unless clinically necessary in the particular patient due to other considerations [4, 12]. A platelet count of 50,000/mm^3 is enough to undertake percutaneous procedures on dialysis access with a manageable risk of bleeding [12].

CONCLUSIONS

Anemia, hypertension with superimposed PE and eclampsia are both important challenges in the management of pregnant women on dialysis. Optimizing the mother's health is essential as it will enhance the positive outcomes of the pregnancy and the baby. An extensive protocol should be prepared to manage the concerns of pregnant women with ESRD who choose to carry out their pregnancy, and specialists in family medicine, obstetrics, nephrology, and neonatology should collaborate.

It is imperative that women receive prenatal counselling before deciding to become pregnant in order to educate them on the hazards to both them and their unborn child. Additionally, contraception should be discussed before an unintended pregnancy occurs.

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