



Positive effect of home hemodialysis in a pregnant woman with chronic kidney failure during the COVID-19 pandemic: A case report

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ABSTRACT

This report discusses the case of a 25-year-old pregnant woman from an underserved community, with two previous failed kidney transplants and a previous miscarriage. The patient required a progressive increase to 30 h a week of in-hospital hemodialysis during the COVID-19 pandemic lockdown. She delivered her baby while transitioning to home hemodialysis. Women with end-stage kidney disease who require hemodialysis and wish to become pregnant or who are pregnant have options to allow for a safe and healthy delivery. This can be achieved with vigorous hemodialysis, even at home.

1. Introduction

In general, home dialysis for patients with chronic renal failure is underutilized [1]. This is due to lack of education and exposure on the part of both patients and healthcare providers. For most patients, home hemodialysis is equally as effective if not superior to in-center hemodialysis and offers several benefits [2]. These include patient empowerment and independence, reduced financial burden, and slower decline in remaining kidney function [3]. The utilization of home dialysis is even more critical for a pregnant patient with chronic renal failure. We believe a transition to home dialysis is beneficial for both mother and baby during pregnancy and following birth. The literature has demonstrated the importance of mother-child bonding during and after birth, so that both are aware of each other's emotional needs and the mother can learn how to soothe and comfort the baby [4].

This report discusses the case of a pregnant woman with two previous failed kidney transplants and a previous miscarriage who transitioned from in-center hemodialysis to home hemodialysis during the COVID-19 pandemic who successfully delivered while on at-home dialysis.

2. Case Presentation

A 25-year-old Hispanic woman, G2P1011, with a past medical history of asthma, renal failure (with two failed renal transplants), 1 failed

pregnancy, and 1 pregnancy while on hemodialysis with a successful recent birth. She was currently on home hemodialysis, (Table 1).

The patient initially presented for a non-traumatic injury that had resulted in a swollen wrist. During her second evaluation, the patient was found to have only 15% renal function, and was highly recommended for kidney transplant. Fortunately, her mother was found to be a transplant match and donated her kidney. Soon after the initial transplant, the patient had no complications and her renal function was improving. However, after feeling unwell and having signs and symptoms of pregnancy, the patient was found to be pregnant. During week 9 of her first pregnancy, the patient lost the pregnancy and her transplanted kidney failed shortly after. She was matched to another donor the following year but that second transplanted kidney failed immediately after the operation.

As a result, the patient required immediate hemodialysis. While undergoing hemodialysis, the patient was found to be pregnant again. While completing hemodialysis with the support of a multidisciplinary team she was able to give birth while undergoing 30 h of hemodialysis a week. Her pregnancy on hemodialysis occurred during the COVID-19 pandemic, when many resources and facilities were limited. This case was also complicated by the fear of COVID and possible risks associated with her conditions.

The goal for the patient and healthcare team was to deliver a healthy baby and avoid major complications for the patient while maintaining her remaining kidney function. At the time of her C-section, her kidney

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Table 1
Timeline of patient's renal history.

Year 1	Patient found to have decreased kidney function incidentally in the emergency room for finger pain	Finding of decreased renal function (~15% capacity)
	Went to a second hospital for a second opinion	Found unilateral ureteropelvic junction obstruction resulting in kidney failure but the cause was unknown (possibly due to birth defect)
Year 2	Kidney transplant #1	Mother donated kidney to patient
Year 3	Pregnancy #1	Pregnancy was discovered 3 weeks after LMP
	Patient miscarried 9 weeks into the pregnancy	
	Renal transplant #1 begins to fail	
Year 4	Kidney transplant #2	Transplant failure on the same day - the kidney was too large for the patient and failed after relocation
		3 × a week for 3.5 h each session
Year 5	In-center hemodialysis begins while on the transplant list	
	In-center hemodialysis continues but is increased	4 × a week for 4 h each session
	A home pregnancy test is positive	
	Patient starts 30 h/week of hemodialysis	6 × a week: 4 h/day for 3 days and 6 h/day for 3 days
Year 6	Patient begins training for at-home dialysis	
	Patient delivers baby at 37 weeks via supraumbilical midline incision C-section	Appar scores of 9 and 9 Weight of 2420 g
	Patient continues on hospital dialysis while the at-home unit is installed	
	Baby is discharged from hospital after 6 days	

function was at 7%. The pregnancy had no unexpected complications. This was her first child. The patient's labor was scheduled via supraumbilical midline incision C-section due to the various scars from the previous kidney transplants. Her estimated blood loss was 1000 cc q BL 700 cc. The baby was in a breech position and pulled from the feet to evacuate the uterus. APGAR scores were 9 and 9. Due to the weight of the baby, 2420 g (<10%), he was kept in the hospital for 6 days for monitoring. The patient continued follow-up with her nephrologist to monitor creatinine, electrolytes, hemoglobin and volume status. She was then discharged home, where she began hemodialysis post-partum. She was able to take care of her newborn baby at home, and maintain her home hemodialysis as scheduled. She was followed up weekly by her primary medical doctor, obstetrician-gynecologist, and nephrologist, and nurses assisted her with the home hemodialysis.

3. Discussion

Immediately after the discovery of the patient's pregnancy, her dialysis was increased to 30 h per week. It was critical to clear the urea and solutes as an increased blood urea nitrogen (BUN) is directly correlated to higher incidences of fetal mortality, low birth weight and neonates who are small for gestational age [5]. Although there is no standard of care for the amount of time a woman is on dialysis during pregnancy, 30 h was decided based on her renal function and previous data on positive pregnancy outcomes while on dialysis. In a cohort comparison of Canadian and American pregnancies while on dialysis, it was found that, in the American population, there was a 37% increase in positive pregnancy outcomes when dialyzed intensively. These outcomes included a greater gestational age [6]. It was important to monitor the patient's kidney function during her pregnancy as there is data to suggest that Hispanic patients with chronic kidney disease (CKD) have a much faster progression than non-Hispanic patients and a faster

decline in glomerular filtration rate (eGFR) [7].

The patient's support system was limited to the hospital staff and her team of physicians. Being a Hispanic woman placed her at an increased risk of chronic stress throughout the pregnancy and a faster decline in kidney function. It is well documented that chronic stress during pregnancy is a risk factor for preterm birth, but women of color are at an increased risk due to stress from their interactions at the hospital. In a 2018 study from the University of California, Afro-descendant women reported their prenatal medical experiences to be "disrespectful and stressful." This may contribute to the chronic stress and increased incidence of preterm birth in this population [8].

All of these limitations were exacerbated by the COVID-19 pandemic. It was much more difficult to travel and the adverse effects of COVID and pregnancy were unknown. The patient never contracted COVID and never missed a dialysis appointment. Although the pandemic posed a major social limitation, it also pushed this patient and many others into home hemodialysis.

In 2019, an executive order was signed in the United States to increase the proportion of patients on home dialysis to 80% [9]. The patient decided to pursue home hemodialysis over clinic dialysis in order to continue her treatment after her pregnancy and spend more time with her baby. She would not have been able to bring her newborn into the hospital with her for dialysis because of COVID restrictions. Home hemodialysis has been shown to decrease mortality and morbidity of patients compared with in-clinic hemodialysis because they are able to use a lower-frequency ultrafiltration rate more often. This reduces the gap between dialysis treatments and reduces cardiac stress [10].

Whole-person healthcare is extremely important when treating individual patients. This patient had many potential barriers to a successful outcome, such as lack of social support, previously failed kidneys and possible discrimination in the healthcare system based on her race. The team of physicians, the dialysis units, nurses and all other staff members who worked on this case recognized these barriers and worked with the patient in order to overcome or reduce their risk. The patient was determined to have a successful pregnancy; the combination of an interdisciplinary team and an ambitious patient increased the likelihood of success. To our knowledge, this is the first case report of its kind.

Contributors

Dr. Andrew Shehata participated in the conception of the case report, acquired and interpreted the data, drafted the manuscript, revised the article critically for important intellectual content and approved the final submitted version.

Dr. Hammad Choudhry was involved in patient care, revised the article critically for important intellectual content and approved the final submitted version.

Darell Hawley acquired and interpreted the data, revised the article critically for important intellectual content and approved the final submitted version.

Roma Padalkar acquired and interpreted the data, revised the article critically for important intellectual content and approved the final submitted version.

Conflict of interest

The authors declare that they have no conflict of interest regarding the publication of this case report.

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Patient consent

The patient gave written consent and permission to use her information in our case report.

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