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## Successful pregnancy in an end-stage renal disease woman on chronic hemodialysis

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### ABSTRACT

Successful conception in a female patient on hemodialysis (HD) is considered a high-risk pregnancy and associated with maternal and fetal complications. Thus, most such pregnancies lead to abortion or termination to preserve maternal health. Here, we report a successfully-delivered case of a 19th-week-diagnosed pregnancy in a 35-year-old mother with end-stage renal disease (ESRD). We present the case of a 35-year-old female with ESRD, diagnosed 10 years ago secondary to glomerulonephritis. The patient underwent the deceased-donor renal transplantation once, which unfortunately was rejected. During the initial tests for second-time kidney transplantation, a human chorionic gonadotropin-beta (beta-hCG) positive with a level of 9953 mIU/mL was reported, suggesting the pregnancy. The transvaginal ultrasonography confirmed the pregnancy at an approximate gestational age of 19 weeks. As a result, the patient underwent four and half hours of intensive HD five times a week and continued until 36 weeks of pregnancy. At 36 weeks, the patient presented to Shariati hospital, Tehran, Iran, with low- back pain. Consequently, a cesarean section (C/S) was performed, and the baby boy was born with a nine of ten Apgar score. Although successful pregnancy is possible for women with ESRD, it requires special multidisciplinary care. Intensive HD and regular fetal monitoring have improved the pregnancy outcome in this population. However, the risk of severe complications is still for the health of the mother and her offspring.

### *Implication for health policy/practice/research/medical education:*

Successful pregnancy in a 35-year-old woman with ESRD on chronic HD is reported. The mother had no symptoms of pregnancy until initial tests for second-time renal transplantation which revealed a high beta-hCG level. The transvaginal ultrasound confirmed the 19 weeks' pregnancy. As a result, the patient underwent intensive HD about 22 hours weekly, and intrauterine fetal monitoring was performed regularly. Finally, a baby boy with 2800 g weight was born at 36 weeks of gestation.

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### Introduction

The vast majority of women with end-stage renal disease (ESRD) on chronic hemodialysis (HD) are of reproductive age. However, pregnancy in this population compared to healthy mothers is about 9:725 (1,2). Anovulation, atrophy of the uterine, early menopause, and sexual dysfunctions contribute to the low pregnancy rate in ESRD women. Thus, due to common irregular menstruation and amenorrhea, pregnancy is usually diagnosed late in these patients.

Successful conception in a female patient on dialysis is considered a high-risk pregnancy and associated with maternal and fetal complications. Thus, most such

pregnancies lead to abortion or termination to preserve maternal health. Gestational hypertension, pre-eclampsia, thrombocytopenia, and elevated liver enzymes are some of the complications that threaten the mother's health. On the other hand, newborn prematurity and stillbirth are common results of pregnancy in ESRD mothers (3).

Although today, successful kidney transplantation is the best choice to restore the normal kidney function, advances in dialysis, preconception counseling, and interdisciplinary care of both mother and fetus have caused successful pregnancy in females with ESRD (3,4). An increasing live birth rate has been reported during the last decades in this population, which seems to be

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significantly related to more intensive HD (5-7). Here, we report a successfully-delivered case of a 19th-week-diagnosed pregnancy in a 35-year-old mother with ESRD.

### Case Presentation

We present the case of a 35-year-old female with ESRD, diagnosed 10 years ago secondary to glomerulonephritis. She has started four hours of conventional HD three times a week since 2012. The patient underwent the deceased-donor renal transplantation once, which unfortunately was rejected in the first week after the transplant, and then she continued conventional HD again.

The patient was treated with subcutaneous epoetin alfa for anemia, and calcium carbonate for hypocalcemia. She had an 18-year-old boy and no history of abortion. Her menstrual period has been irregular due to kidney failure. During the initial tests for second-time kidney transplantation, a human chorionic gonadotropin-beta (beta-hCG) positive with a level of 9953 mIU/mL was reported, suggesting the pregnancy. Thus, the transvaginal ultrasonography was requested, which confirmed the pregnancy at an approximate gestational age of 19 weeks. Interestingly, the patient had no pregnancy symptoms, including nausea, vomiting, fatigue, etc. Therefore, she did not suspect the pregnancy during these 19 weeks.

As a result, the patient underwent four and half hours of intensive HD five times a week and continued until 36 weeks of pregnancy. Heparin was administered at an initial dose of 2500 IU in each HD session as an anticoagulant agent. Epoetin alfa 4000 IU three times weekly was prescribed to maintain the hemoglobin level above 10 g/dL. Urea levels below 100 mg/dL, normal calcium levels, and hemoglobin levels of approximately 11 g/dL were our goals in the clinical management of our patient.

At 36 weeks, the patient presented to Shariati hospital, Tehran, Iran, with low back pain. Following examinations, the labor process was found to begin. Due to the critical clinical situation of the patient, a cesarean section (C/S) was conducted, and the baby boy was born with a nine of ten Apgar score. Table 1 reports the important parameters of inpatient test results for cesarean section. The newborn weight was 2800 g, and his vital signs were stable. During pregnancy the blood pressure and other vital signs of both mother and fetus were stable, and the fetus had grown well.

### Discussion

Women with ESRD are at high risk of being pregnant, threatening the fetus and maternal health. Thus, physicians often recommend these patients against pregnancy. Several developed countries have reported that the incidence of pregnancy in women with chronic kidney disease is approximately 3% of the pregnant population which is

**Table 1.** Test results at admission for cesarean section

Test	Result (referenc interval)	Unit
WBC	10.7 (4-11)	1000/ $\mu$ L
Hb	11.4 (12-15)	g/dL
Platelet	235 (150-450)	1000/ $\mu$ L
FBS	79 (60-99)	mg/dL
BUN	32 (7-18.6)	mg/dL
Cr	5.34 (0.7-1.3)	mg/dL
Na	137 (135-148)	mEq/L
K	4.86 (3.5-5.5)	mEq/L
Ca	9.2 (8.6-10.2)	mg/dL
P	5.5 (2.5-4.5)	mg/dL
Mg	2.4	mg/dL
Albumin	3.8	U/L
AST	15 (10-33)	U/L
ALT	11 (10-33)	U/L
ALK	272 (100-240)	U/L
PTH	286 (10-65)	pg/mL
LDH	298 (140-280)	U/L
Total bilirubin	0.4 (.3-1.0)	mg/dL
Arterial blood gas		
PH	7.36 (4.35-7.45)	
Pa CO <sub>2</sub>	30 (35-45)	mm Hg
HCO <sub>3</sub>	16 (22-26)	mEq/L

WBC, White blood cell; Hb, Hemoglobin; FBS, Fasting blood sugar; BUN, Blood urea nitrogen; Cr, Creatinine; AST, Aspartate aminotransferase; ALT, Alanine aminotransferase; ALK, Alkaline phosphatase; PTH, Parathyroid hormone; LDH, Lactate dehydrogenase.

reported up to 2% for women on dialysis. Usually, half of the dialysis mothers will have a living child, while less than one-fifth of these pregnancies last longer than 37 weeks gestation (8-10). Meaning that most newborns of dialysis mothers are preterm, requiring special care to maintain health and improve growth.

The fertility rate in women on dialysis is rare due to anovulatory owing to hypothalamic-pituitary-gonadal axis dysregulation caused by uremia (11). Further, hyperprolactinemia due to renal failure in efficient prolactin clearance inhibits ovulation (12). Although the follicular stimulating hormone (FSH) is the same as in non-dialysis pregnant women, the luteinizing hormone (LH) surge, essential for ovulation is absent (13). Furthermore, uterine atrophy is found in dialysis women due to decreased levels of estradiol and progesterone (11). It is reported that 84% of women on HD suffer from sexual dysfunction caused by factors, including medications, depression, and anemia, which leads to a low pregnancy rate (14).

While kidney transplants are the best choice for women

with ESRD to give them a healthy life, advances in dialysis methods shed light on the hope of a successful pregnancy in these patients. A meta-analysis by Piccoli et al indicated a significant increase in cases of pregnancy in women on HD from 2000 to 2014 (15). This achievement may be due to implementing intensive HD, using epoetin alfa along with special obstetric care, and efficient physician counseling.

However, the total hours of weekly HD and clearance are of great importance to have a successful pregnancy outcome in women with ESRD (6). Previous studies noted that 36 hours of dialysis weekly led to a live birth rate of 85%, whereas it was 45% for 20 hours or less weekly dialysis (16). Piccoli et al, in a meta-analysis of 681 pregnancies, showed that more hours of dialysis per week was associated with lower preterm live birth (15). But it should be noted that the intensified HD must be considered individually, as women with residual renal function may not need such an intensive regimen.

Although the mentioned clinical approaches have improved the successful pregnancy rate in women undergoing HD, there is still a potential risk of significant morbidities for both mother and fetus. Severe hypertension, preeclampsia, liver enzymes elevation, low-platelets counts, and hemolysis are serious complications that threaten maternal health (5). The higher rates of prematurity, intrauterine growth retardation, polyhydramnios, and stillbirth are found in offspring of HD mothers (17). Therefore, special clinical care, particularly nephrology and obstetrics, are necessary to achieve a successful outcome.

Managing intensive HD regimen, electrolytes evaluation, controlling anemia, bone care, and preventing teratogenic medications are vital interventions served by a nephrologist to a pregnant woman on HD. Anemia in women with ESRD is chronic morbidity that must be monitored and treated with oral supplements such as iron and folic acid, besides using erythropoietin to maintain the hemoglobin approximate to the physiological level in pregnant women (10-11 g/dL) (18). Providing information about fetus well-being is remarkable in this population. Assessment of fetal growth, amniotic fluid volume, and Doppler assessment of uterine, umbilical, fetal cerebral vessels, and ductus venosus, should be performed by an obstetrician on a specified schedule (19).

## Conclusion

In this study, we report the case of a pregnant woman with ten years' history of ESRD that fortunately could have a healthy living child. Here we showed that, although successful pregnancy is possible for women with ESRD, it requires special multidisciplinary care. Intensive HD and regular fetal monitoring have improved the pregnancy

outcome in this population. However, the risk of severe complications is still for the health of the mother and her offspring. Further, the psychological and emotional problems due to pregnancy with a chronic disease and undergoing various medical interventions during this period threaten these mothers that should be considered.

## Authors' contribution

Conceptualization: FY, FT. Writing—Original Draft Preparation: DD, SI. Writing—Review and Editing: FY, DD. Supervision: FY

## Conflicts of interest

The authors declare that they have no conflicts of interest.

## Data availability statement

All data that support the findings of this study are included in this article. Further enquiries can be directed to the corresponding author.

## Ethical issues

This case report was conducted ethically in accordance with the World Medical Association Declaration of Helsinki. The Research Ethics Committee of Tehran University of Medical Sciences approved all procedures performed in the current study with the approval number: IR.TUMS.MEDICINE.REC.1401.114. Written informed consent was obtained from the patient for publication of the details of their medical case and any accompanying images. Besides, ethical issues (including plagiarism, data fabrication and double publication) have been completely observed by the authors.

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