Clinical Case Report

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# A case report of successful pregnancy and delivery after peritoneal dialysis in a patient misdiagnosed with primary infertility

Chi-Young Choi, MD[a], Nam-Jun Cho, MD[a], Samel Park, MD[a], Hyo Wook Gil, MD, PhD[a], Yun-Sook Kim, MD, PhD[b], Eun Young Lee, MD, PhD[a,c,*]



**Abstract**

**Rationale:** Currently, 15% of women in fertility age are infertile and the frequency is increasing. Among the various causes of infertility, end-stage renal disease (ESRD) has been shown to decrease the frequency of pregnancies compared with normal females. However, dialysis of patients with ESRD increases the likelihood of pregnancy.

Herein, we report successful pregnancy and delivery after peritoneal dialysis in a patient who was misdiagnosed as primary infertility.

**Patient concerns:** A 37-year-old female who was unaware of her ESRD was misdiagnosed with primary infertility. After undergoing artificial insemination, she was referred to department of internal medicine because of generalized edema, dyspnea, nausea, vomiting, and poor oral intake. After evaluation, she was diagnosed with ESRD and initiated peritoneal dialysis.

**Diagnoses:** The patients was on peritoneal dialysis for a year and discovered that she was pregnant.

**Interventions:** During pregnancy, the patient maintained a residual urine output, BUN levels below 50 mg/dL, controlled blood pressure and a targeted hemoglobin range. She obtained adequate calories and protein and was managed by a multidisciplinary team.

**Outcomes:** The patient delivered a preterm male baby with no anomalies.

**Lessons:** ESRD should also be considered among the several causes of infertility in fertile women. If ESRD is the cause of infertility, the frequency of pregnancy increases following dialysis. If pregnancy is diagnosed early, intensive renal replacement therapy, adequate nutritional intake and regular fetal monitoring during pregnancy increase the chances of successful delivery while maintaining PD.

**Abbreviations:** ACEs = angiotensin-converting enzyme inhibitors, ARBs = angiotensin receptor blockers, CAPD = continuous ambulatory peritoneal dialysis, CGN = chronic glomerulonephritis, CRL = crown rump length, ESRD = end stage renal disease, FHR = fetal heart rate, HD = hemodialysis, IIOC = incompetent internal os of cervix, NICU = neonatal intensive care unit, NST = nonstress test, PD = peritoneal dialysis, RRF = residual renal function.

**Keywords:** delivery, infertility, peritoneal dialysis, pregnancy

## 1. Introduction

The frequency of pregnancy is decreasing in fertile women. The major causes of female infertility include ovulatory dysfunction, tubal and peritoneal pathology, uterine pathology, and unexplained factors. End stage renal disease (ESRD) may also induce infertility. It is unusual for women with ESRD to become pregnant. The frequency of pregnancy is 1% to 7% in fertile female patients with dialyzable ESRD.[1] The decline in pregnancy frequency is not precisely understood, but is attributed to anovulation, reduced libido, the absence of follicle stimulation hormone (FSH), and luteinizing hormone (LH) surges.[2] Pregnancy in the presence of ESRD increases the mortality and morbidity of the mother and the fetus compared with pregnancy under normal kidney function due to increased pregnancy-related complications including preeclampsia, hydramnios, hypertension crisis, early uterine contractions, and pre-term delivery.[3]

In 1973, Unzelman et al[4] first reported a case of successful pregnancy and delivery in a patient who had received hemodialysis for 4 years. A recent study reported that pregnancy during intensive renal replacement therapy and multidisciplinary team management may result in significantly better outcomes for both mother and baby.

Herein, we report a case of successful pregnancy and delivery after peritoneal dialysis in a patient who was misdiagnosed as primary infertility.

## 2. Case report

The patient has provided informed consent for publication of the case. This is a case for a 37-year-old female who was unaware of her ESRD. She was Asian and an office worker. In 2016, she was diagnosed with primary infertility and received artificial

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[a] Department of Internal Medicine, [b] Department of Obstetrics and Gynecology, Soonchunhyang University Cheonan Hospital, [c] Institute of Tissue Regeneration, College of Medicine, Soonchunhyang University, Cheonan, Korea.

[*] Correspondence: Eun Young Lee, Department of Internal Medicine, Soonchunhyang University Cheonan Hospital, 23-20 Bongmyung-Dong, Cheonan, Korea (e-mail: eylee@sch.ac.kr).



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insemination at the the Obstetrics and Gynecology Clinic. After undergoing artificial insemination, she was referred to our hospital because of generalized edema, dyspnea, nausea, vomiting, and poor oral intake. Artificial insemination was performed without blood tests. She did not have diabetes, hypertension, or any other disease. Blood pressure was 170/100 mm Hg and urine test showed protein 3+ and RBC > 100. The following blood tests were carried out: Hb 7.2 g/dL, K 5.7 mEq/L, Cr 7.5 mg/dL, total CO2 12.7 mmol/L, P 7.3 mg/dL, total Ca 6.6, PTH 190 pg/mL, and HbA1c 5.6%. Abdominal ultrasound displayed kidney size was 6.8 cm × 7.9 cm, respectively, and kidney echogenicity was increased with loss of cortico-medullary differentiation indicating chronic kidney disease stage 5. However, the cause was not clear. Since an etiology of chronic glomerulonephritis (CGN) was considered, renal biopsy was not performed. We initiated peritoneal dialysis (PD) from March 4, 2016. The patient was on continuous ambulatory peritoneal dialysis (CAPD), with four 2 L exchanges per day, using extraneal (icodextrin dialysis solution produced by Baxter Company) and 1.5%–1.5%–2.5% physioneal (dextrose dialysis solution produced by Baxter Company). Her urine output was approximately 800 to 1000 mL per day without diuretics.

She was on peritoneal dialysis for a year. In April 2017, the patient discovered that she was pregnant. She had a history of irregular menstrual cycles for several years. She was a primipara. Two artificial inseminations failed. This time her pregnancy was from a natural outcome. Obstetric ultrasound displayed a single 7-week gestational age fetus. Crown rump length (CRL) was 9.5 mm and fetal heart rate (FHR) was 137/min. Although adequate counselling for her and her spouse concerning the complications associated with ESRD and advanced maternal age was provided, the couple decided to continue with pregnancy. A multidisciplinary team involving nephrologist, obstetricians, dialysis nurses and nutritionists were assigned to manage the patient. Regular maternal and fetal surveillance was carried out. She was followed-up at a peritoneal dialysis unit, nephrology and obstetrics clinics of our hospital during the first and second trimester pregnancy once every 2 weeks and every week in the third trimester.

At the time of pregnancy diagnosis, her height was 159.2 cm and weight was 62 kg. She had a urine creatinine clearance of 11.6 mL/min, residual renal function (RRF) of 3.7 mL/min. and Kt/V of 3.15. Her medications were scrutinized to ensure there were no contraindications for pregnancy. Her medications included valsartan 80 mg per day, amlodipine 5 mg per day, folic acid 4 g per day, ferrous iron 256 mg per day, and aspirin 100 mg per day. Valsartan and amlodipine were switched to nifedipine 120 mg per day. Epoetin beta 200 mcg was increased from once a month to once a week by subcutaneous injection. The peritoneal dialysis prescription was modified to five 2 L exchanges per day, using 2.5%–1.5%–1.5%–1.5% physioneal (dextrose dialysis solution produced by Baxter Company) and extraneal (icodextrin dialysis solution produced by Baxter Company).

During pregnancy, the protein intake was 1.5 g/kg and the calorie intake was 2000 kcal/day. Daily ultrafiltration was 800 to 1000 mL and blood pressure ranged from 110/70 to 140/90 mm Hg. The hemoglobin level was maintained between 9.5 and 10.5 g/L. The targeted goal of predialysis BUN was <50 mg/dL, which was the cutoff value recommended in previous studies.[5,6] Although they intermittently exceeded 50 mg/dL occasionally, it was generally maintained below 50 mg/dL. Albumin and electrolyte levels were maintained within the normal range. Urine output was 1000 to 1200 mL/day (Table 1).

The common fetal complications in these patients are abortions in the early stages in pregnancy. And after 20 week, intrauterine growth restriction, premature uterine contraction, and polyhydramnios are common. As a result, it is generally necessary to perform a fetal ultrasound and a fetal heart rate monitoring more frequently than a healthy pregnant woman. Careful uterine and fetal monitoring during dialysis, such as assessment of the fetal heart rate, combined with measures aimed at preventing dialysis-induced hypotension should be performed. Maternal haemodynamic instability may compromise the uteroplacental circulation and may be associated with the induction of uterine contractions. It is recommended to perform a fetal ultrasound frequently to determine its size, amount of amniotic fluid, and length of cervix to find out preterm labor quickly. If the fetus is smaller than 2 weeks, it should be performed once or twice a week.

At 21 weeks of gestation, the McDonald operation was performed due to incompetent internal os of cervix (IIOC) findings. Since then, the patient remained bedridden. Starting with the 24th week of gestation, the patient was administered tractocile (atosiban. Ferring, Saint-Prex, Swiss) in an effort to suppress uterine contractions. At 27 weeks and 2 days, the variability of fetal heart rate decreased. Therefore, we inserted a tunneled cuffed catheter to prepare for cesarean section. At 27 weeks 4 days, an urgent cesarean section was performed because fetal heart rate variability disappeared and late deceleration occurred in a nonstress test (NST). Hemodialysis (HD) was started from the day of surgery. Cesarean section was uneventful and delivered a preterm male baby with no anomalies, weighing 1060 mg, and 36 cm tall with an Apgar score of 3 and 7 at 1 and 5 minutes, respectively. The baby was transferred to the neonatal intensive care unit (NICU), intubated for 17 days and administered 3 doses of surfactant therapy. In the first blood test of the baby, creatinine was 4.94 mg/dL, which decreased later to 0.86 mg/dL after 10 days. Neonatal jaundice was detected.

**Table 1**

**Laboratory parameters in the pregnant.**

| Gestational Age | Pre pregnancy | At 10 weeks | At 20 weeks | At 27 weeks | Reference ranges |
|---|---|---|---|---|---|
| Weight, kg | 62 | 67 | 72 | 78 | |
| Urine volume, ml/day | 1200 | 1000 | 1000 | 1200 | |
| Hemoglobin, g/dL | 9.6 | 10.3 | 9.5 | 10.2 | 12–16 g/dL |
| Albumin, g/dL | 4 | 3.9 | 3.6 | 3.3 | 3.5–5 g/dL |
| Creatinine, mg/dL | 5.8 | 7.1 | 6.5 | 5.9 | 0.5–1.2 mg/dL |
| Blood urea nitrogen, mg/dL | 47.5 | 47.7 | 39.1 | 38.6 | 8–20 mg/dL |
| Phosphorus, mg/dL | 4.2 | 4.7 | 3.7 | 5.2 | 2.5–5.5 mg/dL |
| Uric acid, mg/dL | 5.7 | 8.6 | 8.5 | 7.2 | 3–7 mg/dL |
| Potassium, mmol/L | 3.9 | 3.6 | 4.6 | 4.1 | 3.5–5.1 mmol/L |

Phototherapy was performed to treat the newborn. The baby's initial total bilirubin was 2.6 mg/dL, 6.5 mg/dL on the third day and normalized after 1 month. Initial hemoblobin level was 13.7 g/dL. However, since premature infants develop anemia, erythropoietin was administered to prevent blood transfusion, and is a standard therapy for premature infants. Body weight decreased from 1250 to 1110 g on day 9 of birth, increased to 2560 g on discharge and increased to 8000 g after 7 months. A month after the operation the caesarian section scar was completely healed and PD was resumed.

## 3. Discussion

Among the many causes of infertility, ESRD interferes with pregnancy in women due to anovulation, loss of libido, and endocrine changes. Additionally, even if pregnancy ensues in women with ESRD, it increases the risk of maternal and fetal mortality and morbidity.[1] Therefore, a tendency to discourage pregnancy in women with ESRD has been reported. However, successful delivery by women with ESRD has also been reported.[7,8] We also reported successful pregnancy and delivery in a 29-year-old patient with diabetic ESRD undergoing hemodialysis.[5] Studies reported increased rates of pregnancy and successful delivery in women undergoing dialysis.[6,9] Despite multiple challenges faced by women on dialysis, prolonged dialysis, appropriate hemodynamic stability, effective management of obstetric complications, and adequate correction of anemia and malnutrition are needed for successful deliveries.[10]

Both PD and HD are possible modes of renal replacement therapy in pregnant ESRD women. The superiority of either mode is debatable in the absence of comparative studies investigating the effectiveness of either method.[11] A few studies showed no significant differences in maternal and fetal outcomes among pregnant women on hemodialysis and peritoneal dialysis.[1,12] The guideline presented by the Italian Study Group on Kidney and Pregnancy in 2015 suggests maintenance of a prepregnancy dialysis mode.[13] Maternal predialysis blood urea nitrogen (BUN) levels should be maintained below 50 mg/dL.[3] BUN levels below 50 mg/dL have been associated with maternal and fetal mortality and morbidity. Hypertension should be controlled to avoid proteinuria and preeclampsia. Alpha-methyldopa, beta-blockers, and hydralazine are safe drugs.[3] Angiotensin-converting enzyme inhibitors (ACEs) and angiotensin receptor blockers (ARBs) are contraindicated in pregnancy. Anemia can be managed by erythropoietin safely to achieve a target hemoglobin level above 10 to 11 g/dL and transferrin saturation above 30%.[14,15] It is recommended to maintain calorie intake of 30 to 35 kcal/day and protein intake of 1.8 g/kg/day.[3] Oral iron, folic acid and vitamin B12 also should be supplemented.[3,15] The frequency of visits should be personalized and fetal monitoring should be intensified.[15]

In our patient, the diagnosis of pregnancy was made in the 7th week, which was earlier than the mean time of diagnosis of 16.5 weeks. During pregnancy, the patient maintained a residual urine output, BUN levels below 50 mg/dL, controlled blood pressure and a targeted hemoglobin range. She obtained adequate calories and protein and was managed by a multidisciplinary team. She underwent urgent caesarean section due to reduced fetal heart rate. However, the cesarean section was uneventful and the patient delivered a preterm male baby with no anomalies.

ESRD should also be considered among the several causes of infertility in fertile women. If ESRD is the cause of infertility, the frequency of pregnancy increases following dialysis. However, the risk of pregnancy-related complications is increased in women becoming pregnant while undergoing peritoneal dialysis. However, if pregnancy is diagnosed early, intensive renal replacement therapy, adequate nutritional intake and regular fetal monitoring during pregnancy increase the chances of successful delivery while maintaining PD.

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## Author contributions

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