



Original Article

The successful clinical outcomes of pregnant women with advanced chronic kidney disease

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Background: Successful pregnancy outcomes in patients with advanced chronic kidney disease (CKD) are increasingly common in Western countries. However, in Korea, the available literature addressing this clinical issue is scarce.

Methods: We reviewed 5 successful parturitions [1 patient with Stage 5 CKD and 4 with maintenance hemodialysis (HD)] at Seoul St. Mary's Hospital over 3 years and investigated changes in dialysis prescription, anemia management, and the incidence of maternal and neonatal complications.

Results: There were no maternal or neonatal deaths in this cohort. The mean age at the time of conception and delivery was 35.8 ± 3.7 and 36.2 ± 3.5 years, respectively. Dialysis patients received more frequent and intensified HD during pregnancy, 20.0 ± 5.7 h/wk of HD over 5 visits with the ultrafiltration dose maintained between 1 and 2 kg per session. All patients received erythropoietin-stimulating agents and iron replacement therapy during pregnancy. The mean hematocrit was $33.1 \pm 1.9\%$ before pregnancy and was well maintained during gestation ($33.9 \pm 3.8\%$ at the first trimester, $29.2 \pm 4.2\%$ at the second trimester, and $33.6 \pm 8.7\%$ at delivery). The mean gestation period was 32.7 ± 4.7 weeks, with 60% of patients experiencing premature delivery. The primary maternal complication was pre-eclampsia; 3 women developed pre-eclampsia and underwent emergency cesarean sections. Most neonatal complications were related to preterm birth.

Conclusion: Dialysis-related care and general clinical management improved the clinical outcome of pregnancy for patients with advanced CKD.

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Introduction

Pregnancy is a challenging prospect for patients with advanced chronic kidney disease (CKD). Indeed, women with CKD have an extremely low conception rate because of endocrine abnormalities and sexual dysfunction [1]. Even when fertilization is successful, the clinical outcome of pregnancy is unfavorable, with a greater frequency of spontaneous abortions and an increased risk of perinatal mortality.

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Recent review articles reported improved pregnancy outcomes for patients with CKD [2,3]. Furthermore, close attention to the management of anemia, blood pressure and volume control, as well as dialysis prescriptions seemed to contribute to these promising results. However, in Korea, the available literature addressing this clinical issue is scarce [4–6]. Managing this risky pregnancy complicated by CKD is unusual and can be a challenging experience for both the patient and her health care provider.

Herein, we report 5 cases of patients with advanced CKD who delivered in our medical center and had successful pregnancy outcomes. We hope that our findings will generate interest in this clinically complex issue.

Methods

We reviewed the records of women with advanced CKD who had successfully completed parturition at Seoul St. Mary's Hospital between January 2012 and December 2014. The study included patients who conceived when their glomerular filtration rate (GFR) was severely reduced (GFR < 30 mL/min) and who maintained their pregnancy beyond the first trimester.

We evaluated the incidence of maternal and neonatal deaths, pregnancy-related complications, changes in dialysis prescriptions, and anemia management during pregnancy. A total of 5 women were included in the study.

From the hospital computer records, we obtained clinical information, including maternal age at conception and delivery, parity, primary renal disease, other underlying medical conditions, dialysis prescriptions, dose of erythropoietin (EPO) and iron therapy, and maternal and fetal outcomes. We also collected biochemical and hematologic data, including complete blood count, urea, creatinine, total protein, albumin, iron, total iron-binding capacity, and ferritin. Data are presented as the mean \pm standard deviation or counts and percentages to the nearest 10th.

This study was approved by the Institutional Review Board of Seoul St. Mary's Hospital (KC15RISI0621).

Results

Characteristics of patients

Three of the 5 women were treated in local clinics before their referral to our center. The mean age at the time of conception and delivery was 35.8 ± 3.7 and 36.2 ± 3.5 years, respectively. The mean parity was 0.4, with 3 of the 5 patients

having previously experienced spontaneous abortions. The primary causes of renal failure were rapidly progressive glomerulonephritis ($n = 1$), lupus nephritis ($n = 1$), and immunoglobulin A nephropathy ($n = 1$). Two cases were of unknown etiology ($n = 2$). Four of the 5 pregnancies occurred while patients were on a regular hemodialysis (HD) regimen; the mean duration of HD before conception was 70.2 ± 35.2 months (Table 1). One predialysis patient had Stage 4 CKD at the time of conception but developed Stage 5 CKD by the time of delivery. All patients had maintained good general health before conception, with mean serum albumin levels of 4.1 ± 0.4 g/dL.

Characteristics of pregnancy

On average, pregnancy was detected at 12.2 ± 6.8 weeks gestational age (GA). After confirmation of pregnancy, 4 of the 5 patients commenced regular examinations at the obstetrics clinic in our center, with an average of 12.6 days between each visit. Fetal biometry, amniotic fluid index, and cervical length were measured at each appointment. Screening tests for aneuploidy were performed as scheduled, and the Doppler indices of placental and uterine blood flow were regularly monitored. A fetal nonstress test was performed at each visit in the third trimester or when the patient felt contractions. The fifth patient, who did not receive care at the obstetrics clinic in our center, underwent prenatal obstetric care at a local clinic with nephrology follow-up visits at our center during her pregnancy. She successfully delivered her newborn under the care of our multidisciplinary team that included specialists in nephrology, obstetrics, and neonatology. On average, the women gained 5.2 ± 2.6 kg during pregnancy. One patient had a normal spontaneous vaginal delivery, but the others underwent cesarean sections, including 3 emergency cesarean sections due to pre-eclampsia. Additional pregnancy-related maternal complications included 2 cases of polyhydramnios and 1 case of premature rupture of membranes before delivery. Moreover, 3 of the patients who received treatment for pre-eclampsia required additional treatment after delivery. One patient, who received intravenous magnesium sulfate for pre-eclampsia, developed hypermagnesemia with central nervous system manifestations, and 2 patients required additional treatment for pleural effusion and acute pulmonary edema (Table 2). During pregnancy, the sole predialysis patient experienced a gradual decrease in renal function, and HD was initiated a month after delivery.

Characteristics of dialysis

Four dialysis patients received HD for an average of 70.2 ± 35.2 months before conception (Table 1). After the diagnosis of pregnancy, all dialysis patients received more frequent and intensified HD, which was on average 5 times/wk for a total of 20.0 ± 5.7 hours. The ultrafiltration dose was essentially maintained in the range of 1–2 kg/session for all patients, and the mean interdialytic weight gain just before delivery was 2.1 ± 0.8 kg (Table 3). The mean predialytic blood urea nitrogen level during gestation was less than 50 mg/dL in all patients except Patient 1 (Patient 1, 66.2 ± 22.3 ; Patient 2, 34.9 ± 6.3 ; Patient 3, 44.3 ± 27.9 ; Patient 4, 40.7 ± 11.1 ; and Patient 5, 48.2 ± 11.0).

Table 1. Characteristics of patients

Patient	Age (y)*	Primary renal disease	Obstetric history [†]	Time on dialysis (mo) [‡]	Urination
1	38/38	RPGN	1-0-0-1	60.5	No
2	40/40	Unknown	0-0-0-0	99.6	No
3	32/33	Unknown	0-0-2-0	96.1	No
4	37/38	Lupus nephritis	1-0-1-1	24.5	Yes
5	31/32	IgA nephropathy	0-0-1-0	–	Yes

*At conception/at delivery.

[†]Refers to term births-premature births-abortions-living children.

[‡]Before conception.

IgA, immunoglobulin A; RPGN, rapidly progressive glomerulonephritis.

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