

Blood pressure and laboratory profile in a successful pregnancy with end stage renal disease

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Abstract

Pregnancy is an uncommon event in end stage renal disease (ESRD). In this report, we analyzed the physiological and laboratory profile in a pregnant woman having ESRD who gave birth to a healthy newborn. A 42-year-old patient with ESRD for 2 years on dialysis was diagnosed to have pregnancy in 20th week for gaining weight (0.5 kg/month). Her blood pressure increased mildly (about 25 mmHg rise in systole and 10 mmHg rise in diastole) during pregnancy, which remained high until the first month following delivery. Phosphorus and alkaline phosphatase decreased during pregnancy while urea and creatinine increased from mid-term; uric acid was found to be increased during pregnancy from first month until delivery. Surveillance of her weight changes demonstrated that ultrasound may underestimate her gestational age for at least 6 weeks. Though there are few reports on the rare event of pregnancy in ESRD, to the best of our knowledge, this is the first case study that focuses on the underlying physiological and biochemical changes in such a rare pregnancy.

Key words: Laboratory profile, pregnancy, renal failure

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INTRODUCTION

Successful pregnancy in woman with end stage renal disease (ESRD) is an uncommon phenomenon. It may cause deleterious impact on both mother and fetus, especially in patients on maintenance hemodialysis.^[1,2] This is a rare coincidence, which may confuse physicians due to unpredictable laboratory, clinical, and physiological alternations that can create problems for both physicians and patients.

In this case report, we have discussed laboratory and physiological changes in a successful pregnancy, in a woman of 42 years of age who has been under hemodialysis for 2 years.

CASE REPORT

A 42-year-old woman with ESRD due to chronic pyelonephritis was under regular hemodialysis 3 times a week for 2 years. She complained of restlessness during dialysis, exacerbation of hypertension, unexplained weight gain, and abdominal distension, for which ascites was suspected. A five-month healthy fetus was detected by ultrasound and her antihypertensive drug was changed from angiotensin converting enzyme inhibitor (ACEI) to calcium channel blocker in refractory blood pressure (BP) episodes, and her hemodialysis sessions increased from 3 times per week to 5 times per week and her ultrafiltrate decreased from 3.5 liter per session (10.5 liter/week) to 2-2.5 liter per session (10-12.5 liter/week). She was transferred to the advanced obstetric centre for special care. After 29 weeks of gestation, she delivered a baby girl of 1700 grams by lower segment caesarean section.

Electrolytes, liver function test, ionized calcium, phosphorus, and alkaline phosphatase were tested on the first day of each month. As per the norms of the dialysis centre, these data were recorded from patients before each dialysis session from the day of her conception until 1 month after delivery. These include her weight before and after

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each dialysis session, her average BP, and the maximum and minimum weight during pregnancy in each month.

The least and highest weight measured before conception was between 94.1-100 kg whereas at the first month of conception it was between 98-103 kg. There was a gradual increase in weight until delivery, which decreased following one month after delivery to a level about 100.2-104.6 kg but it did not reach the primary weight as low as before conception. Her systolic and diastolic BP increased proportionately until delivery and one month after childbirth ranging between 134-164 mmHg and 81-91 mmHg, respectively [Figure 1]. Serum sodium and potassium levels were in normal range during this period, sodium changed between 135-140 meq/dl (normal: 135-150 meq/dl) and serum potassium was between 3.7-4.7 meq/dl (normal: 3.5-5 meq/dl). Liver aspartate aminotransferase (AST) and alanine aminotransferase (ALT) level during pregnancy were in normal range, but in the first months of pregnancy, their levels were in the upper limit of normal but dropped to lower limit of normal after the 3rd month of pregnancy (normal range of AST: 8-40 IU/L and ALT: 20-60 IU/L). Hemoglobin level decreased in a mild steep during pregnancy as much as 3 g/dl. Ionized calcium remained constant during this period but phosphorus and alkaline phosphatase (ALP) decreased in early to mid-term and remained low until 1 month after delivery. Urea and creatinine decreased in first months but increased from 4th month until delivery. Uric acid increased rapidly from the first month after conception until delivery and decreased after delivery [Figure 2].

DISCUSSION

This study evaluates the physiological changes in a patient with ESRD as a rare and complicated pregnancy. In fact, laboratory tests in normal pregnancy show endocrine changes that can affect electrolyte levels such as mild dilutional hyponatremia^[3] and unremarkable potassium changes.^[4] In pregnancy, serum calcium, phosphorous and magnesium also decrease.^[3,4]

In a normal pregnancy, ALP may increase until term, which is mainly of placental origin.^[4] In our patient, ALP level was 300 IU/l before conception and reached to 200 IU/l close to delivery at 7th month. Sodium and potassium levels in our case were not changed with regular dialysis. Phosphorous level was decreased during pregnancy but the ionized calcium level was stable. In a healthy woman, glomerular filtration rate (GFR) increases during a normal pregnancy that leads to a decreased urea and creatinine dilution effect and decreased production of urea by positive nitrogen balance.^[4,5]

In the present case, GFR was under 10 ml/min/1.73m², which usually necessitates renal replacement therapy. Urea and creatinine levels that reflects both efficacy of dialysis and nutritional status, decreased in first months of pregnancy and increased in mid-term remaining high until delivery and 1 month after delivery. Uric acid was also increased persistently from the first month of conception until delivery but decreased rapidly thereafter, whereas in normal healthy pregnant women, uric acid decreases from 8th week of pregnancy, and this reduced level is

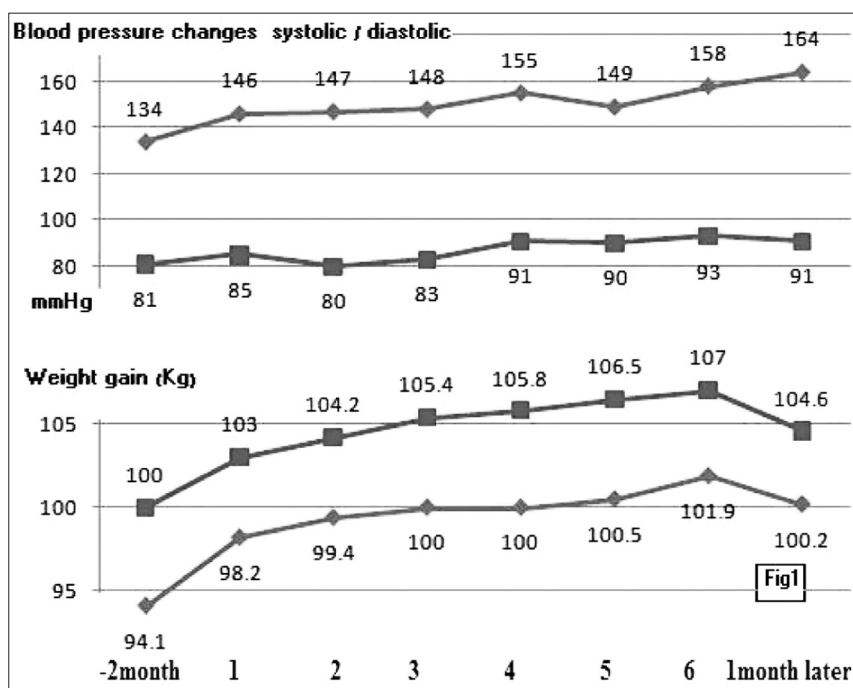


Figure 1: Blood pressure changes and weight gain during pregnancy with end stage renal disease. Blood pressure increased mildly during pregnancy to until 1 month after delivery. Weight increased mildly 0.5 kg/month in last 6 months, with a total weight gain up to 8 kg.

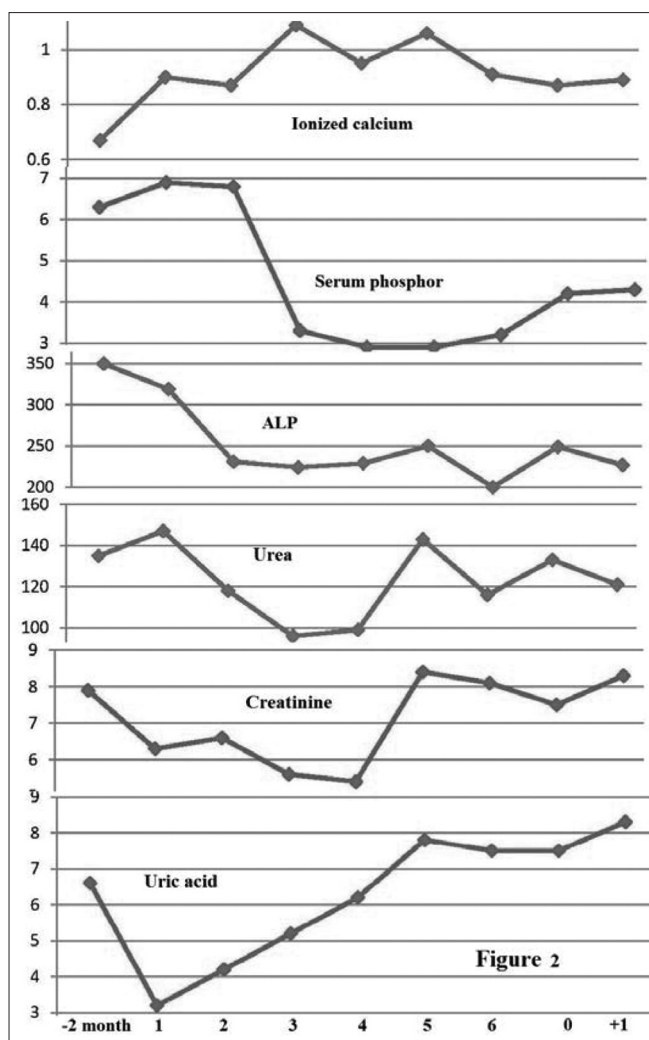


Figure 2: Biochemical changes observed during pregnancy with ESRD. Ionized calcium remained stable during pregnancy but phosphorous and alkaline phosphatase decreased in the mid-term. Urea and creatinine decreased in first few months but increased following 4th month. Uric acid increased from the first months and reached its highest in near term.

maintained up to 24th week, following which there is an increase until delivery that remains elevated for at least 12 weeks after delivery.^[6]

Weight gain during a normal pregnancy may range between 7-18 kg, which is correlated to body mass index (BMI).^[7] BMI of this case was greater than 29 and she gained weight of 7.5 kg close to delivery. However, she gave birth to low birth weight neonate (1700 grams). Her weight gain after one month of delivery was 4.5 kg roughly. Her weight gain was 0.5 kg per month in average until delivery time. Although ultrasound detected gestational age of

the neonate as 29 weeks, our surveillance for weight determination showed weight gain started 6-8 weeks earlier than what estimated by the ultrasound. In fact, the mother's weight-chart demonstrated that ultrasound underestimates gestational age by at least 6 weeks in this case. Birth weight of 1700 gram for gestational age of 29th week (97% or large for gestational age) changed to 1700 gram for 35th week that is 3% or less for the gestational age, which is a more compatible clinical finding.

BP changes during pregnancy are variable in normotensive group, with steady fall in BP until 20th week of pregnancy following which BP increases until delivery.^[8] In the present case, both systolic and diastolic BP increased with mild slope until late weeks of pregnancy. The patient's BP decreased after delivery but the systolic BP increased mildly (6 mmHg) with no change in the diastolic BP (93 mmHg before vs. 91 after delivery).

In this case report, we have discussed many physiological and biochemical changes occurring during pregnancy in a 42-year-old patient with ESRD, who delivered successfully. Some of the changes were similar to that of the healthy group and others were different. Thus, this report indicates that completion of pregnancy and successful delivery is possible in ESRD.

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