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## Case Report

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## Pregnancy Carried To Term with Hemodialysis in a Resource Limited Center: A First Case in Kaolack Hemodialysis Center

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### Abstract

**Introduction:** Conception on Chronic Hemodialysis (CHD) is a rare and high-risk maternal--fetal event. We report on the first case of pregnancy with birth of a live child in our hemodialysis center in Kaolack (Senegal).

**Observation:** A 35-year-old woman had been on chronic hemodialysis for 18 months. Amenorrhea (AS) was identified at week 22 of pregnancy. Control of blood pressure, dry weight, an acceptable hemoglobin level, and intensification of dialysis sessions, enabled a natural delivery at 32 weeks of a live newborn weighing 1200g.

**Conclusion:** Close collaboration between nephrologists, obstetricians, neonatologists, and nutritionists determined the success of pregnancy with CHD.

**Keywords:** Chronic renal failure; Hemodialysis; Pregnancy; Senegal

### Introduction

Becoming pregnant while on hemodialysis is a rare and high-risk maternal-fetal event [1]. However, over the last 20 years, the incidence of pregnancy during hemodialysis has increased but its prognosis has also improved remarkably, with fetal survival approaching 90% in some studies [1-3].

Increasing the number of dialysis sessions, adapting and optimizing the usual antihypertensive therapy, plus early correction of anemia with Erythropoiesis-Stimulating Agents (ESA) are associated with pregnancies that have a good prognosis [3-5]. The first case of a pregnancy and a live birth that occurred in our hemodialysis center in Kaolack (Senegal) is reported here.

## Observation

This case is about a 35-year-old housewife who had undergone six gestations/six births, with one stillbirth (2014) due to gravid toxemia. She had been irregularly followed for hypertension for 3 years. She was admitted into the Nephrology Department of Kaolack Hospital in November 2015, with severe and chronic renal failure and an Estimated Glomerular-Filtration Rate (eGFR) of 2 mL/min according to the MDRD formula. She had not received a previous nephrological examination. Her condition was diagnosed as chronic glomerulonephritis of undetermined etiology. She was immediately put on hemodialysis at two 4-hour sessions per week. She was initially dialyzed on a femoral catheter (two in total) for three months, then on a radio-radial arteriovenous fistula. Her Dry Weight (DW) was 68 kg; the average inter-dialytic weight gain was 3 kg or 4.5% of the DW. Diuresis was estimated at 1500 mL. Blood Pressure (BP) values before and after dialysis were 170/90 and 150/85 mmHg, respectively. The membrane dialysis filter used had a surface of 1.7 m<sup>2</sup>. The needles used in the bi-puncture mode were 16G. The dialysis bath contained calcium (1.50 mmol/L), potassium (2 mmol/L), sodium (138 mmol/L), chlorine (109 mmol/L), bicarbonate (32 mmol/L), and glucose (1 g/L). Pump-flow rate was 250 mL/min; dialysate flow rate was 500 mL/min, and maximum hourly ultrafiltration (UF) was 800 mL/h. Enoxaparin sodium was the anticoagulant used at a dose of 4000 IU per session.

Hemoglobin level varied between 7 and 9 g/dL because of a very irregular supply of ESA (due to lack of financial resources). The patient also received infusions of injectable iron (100 mg/week). The drug treatment included amlodipine (10 mg/d), perindopril (10 mg/d), folic acid (5 mg/d), calcium element (1.5 g/d), omeprazole (20 mg/d), and epoetin alfa 5000UI as one injection per week. The hemodialysis sessions were conducted without any major incidents.

After 18 months of hemodialysis, the patient was found to have had amenorrhea for 5 months. An ultrasound confirmed a 22-week mono-fetal intrauterine pregnancy. This was a chance discovery. In view of the patient's desire to keep her pregnancy and after extensive consultation, the team decided to support this pregnancy. Perindopril was stopped because of its teratogenicity, and acetyl salicylic acid therapy (100 mg/d) was added. Hemodialysis sessions were increased to three sessions of five hours per week. Daily hemodialysis was not possible due to the cost of transportation and the number of hemodialysis patients at the center, which was the only one in the area. Weight was regularly adjusted according to the course of pregnancy. Dry weight was increased from 68 kg at the time of pregnancy to 71 kg at the end of pregnancy. The other hemodialysis parameters were not changed.

Over time, there was significant inter-dialytic weight gain with difficult-to-control blood pressure. Biological monitoring was irregular due to a lack of resources. The patient benefited from two antenatal consultations, which reported a good course of pregnancy. The patient gave birth naturally without complications after a labor that started spontaneously at 32 weeks. She gave birth to a male weighing 1200g. The baby was hypotrophic and premature, measuring 46 cm with an Apgar score at 10/10. A physical examination did not reveal any apparent malformations. There were no issues of immediate or later effects of childbirth for the mother. She resumed dialysis without anticoagulant on the day after giving birth, with a blood transfusion.

The newborn spent 30 days in the neonatal ward. A check-up carried out 48 hours after admission yielded the following results: urea at 0.42 g/L, creatinine at 8 mg/L, and hemoglobin at 15 g/dL.

## Discussion

The occurrence of pregnancy during hemodialysis is rare. The first case of successful pregnancy with chronic hemodialysis was reported by Confortini et al. in 1971 [6]. Since then, several other cases have been reported. In 1980, the European Association of Dialysis and Transplantation (EDTA) reported an incidence of pregnancy during dialysis of 0.9% [7]. A large American study conducted in the 1990s found a rate of 2.4% [8]. Recent small-scale studies have estimated incidences of between 1.2 and 7.14% [2,9]. In Senegal, very few chronic hemodialysis pregnancies have been reported [26]. Thus, the management of pregnancy with hemodialysis in low-income countries still remains a challenge.

However, the prognosis for pregnancy with hemodialysis has improved over recent years (from 23% in 1980, to 50% in the 1990s, to more than 90% in recent years) [7-9]. These success rates vary by study and country: improvements are mostly associated with the advances in hemodialysis techniques.

In our context, in Africa, it is difficult to know the exact numbers of unplanned conceptions as there are no data on miscarriages or on the numbers of voluntary terminations of pregnancy.

The initial nephropathy of our patient was undetermined. Some authors believe that initial nephropathy may alter the possibility of conception, especially in cases of lupus and/or antiphospholipid syndrome [25], but others do not find this correlation [26].

## Diagnosis of Pregnancy

Diagnosing pregnancy in a hemodialysis patient is often late because of the commonality of menstrual-cycle disorders encountered with chronic uremia. Also functional signs of pregnancy can be confused with signs of severe uremia. Moreover, beta-HCG levels are elevated in chronic hemodialysis patients, even in the absence of pregnancy [11]. In the majority of cases, discovering pregnancy is coincidental and is often associated with finding a pelvic mass or the perception of fetal movements [2]. As demonstrated here, the diagnosis of pregnancy was very late: it was revealed by amenorrhea that had occurred for several months, and was then confirmed by an obstetric ultrasound that dated the pregnancy to 22 weeks. This was an unknown and unplanned pregnancy.

There are many reasons for delays in diagnosing pregnancy: some patients refuse contraception for social reasons and others do not undergo a gynecological follow-up for economic reasons. If there is a desire for pregnancy, the nephrologist should inform the patient about the risks. Our patient decided to maintain her pregnancy, and the team aided her in this decision. Thus, potentially teratogenic drugs were discontinued, including renin-angiotensin-system inhibitors [12].

In our case, the duration of hemodialysis before conception was 20 months. Hadj Sadek et al. reported a duration of hemodialysis of 76 months before pregnancy [2]. Some authors suggest that residual clearance of at least 7 mL/min is needed to enable conception [11]. However, others suggest that residual clearance is not decisive, either for the possibility of conception or during the course of pregnancy [2]. Our patient had diuresis maintained at 1.5 L/24 h.

Increasing the number of hemodialysis sessions during pregnancy can improve fetal prognosis, and increase term and birth weight [2,10]. Several authors report an average birth weight of less than 2000 g in hemodialysis females [3,9,14]. In our study, birth weight was 1200 g with a 32-week term. The duration of dialysis was only 15 hours per week. Other authors report birth weights well over 2000g when dialysis time can exceed forty hours per week, and term of pregnancy can be close to normal [15,16]. Intensification of hemodialysis sessions makes it possible to have sessions that are generally well tolerated (low inter-dialytic weight gain, satisfactory blood-pressure figures, less frequent episodes of hypotension, acceptable pre-dialytic creatinine and uremia levels). This makes it possible to increase the mother's diet (potassium and protein).

For our patient, no modification of the dialysis bath was performed. Calcium level was maintained at 1.5 mmol /L, although some teams recommend a low-calcium bath in order to avoid hypercalcemia during sessions, which may induce uterine contractions [27].

An increase in dry weight should be gradual, systematic, and weekly throughout pregnancy. Average weight gain is around 130 g per week in the second trimester and 280 g per week in the third trimester [14,17]. Shemin et al. recommend an increase in dry weight of 500 g per week from the second trimester [18]. Regular assessment of dry weight should be guided by blood pressure. It is also possible to use impedancemetry, ultrasound to assess the volume of the hydramnios or the size of the inferior vena cava. In our study, assessment of dry weight was clinical, which allowed an increase from 68 kg at the beginning to 71 kg by the end of pregnancy.

## Maternal Complications

Anemia is a classic problem in pregnant hemodialysis patients due to a defect in renal erythropoietin secretion, aggravated by the physiological hemodilution of pregnancy. It is partly responsible for intrauterine growth retardation and prematurity. Thus, it is necessary to increase doses of erythropoiesis-stimulating agents early in order to avoid the appearance of the latter. An increase in dosage of 50--100% is often necessary [19]. Continuing iron supplementation is also indispensable. Higher hemoglobin concentrations and higher hematocrit levels are associated with a better fetal prognosis [9,14]. In any case, blood transfusions should be avoided in these young patients in order to limit the risk of anti-HLA sensitization while waiting for kidney transplantation. In this study, the average hemoglobin level was 8 g/dL despite multiple transfusions, irregular administration of ESA (lack of means), and supplementation with iron and folic acid.

High blood pressure is both a factor for poor maternal and fetal prognosis regardless of the initial nephropathy. Diagnosis is confirmed once blood pressure exceeds 140/90 mmHg. Its frequency in pregnant hemodialysis patients is estimated at 69% with 32% of patients having arterial pressures greater than 170/110 mmHg [8]. Its control during pregnancy in women on dialysis is extremely difficult and is all the more important because it exposes them to formidable complications, such as retro-placental hematoma or eclampsia. The usual antihypertensive treatments should be adapted. Blockers of the renin--angiotensin system should be discontinued before and during pregnancy due to the risk of oligoamnios and pulmonary hypoplasia [20].

Our patient's blood pressure averaged 160/85 mmHg in the first two trimesters and 145/80 mmHg in the last trimester.

Sufficient calcium intake is necessary for bone growth of the fetus [21]. Some authors believe that 30 g of calcium are necessary for the development of the fetal skeleton [22,23]. Our patient received 1.5 grams per day of calcium carbonate as supplementation; we kept calcium concentration in the dialysis bath at 1.50 mmol/L.

## Fetal Complications

Prematurity with a term of less than 37 weeks is common [2-4,8,12,14]. More extreme prematurity (before 28 weeks) is found in 25% of cases [8]. This prematurity is multifactorial: it may be spontaneous (e.g. caused by hydramnios, infection) or be triggered medically because of the complexity of medical care and maternal risk (severe high blood pressure, pre-eclampsia, IUGR).

Intrauterine Growth Retardation (IUGR) is very common in fetuses of dialysis mothers. In the recent ANZDATA registry, IUGR was found in 65% of cases [24]. However, it is necessary to consider birth weight in relation to gestational age given the frequent prematurity in this population. Our patient gave birth naturally to a live male at 32 weeks: the baby weighed 1200g, was hypotrophic and was premature, with an Apgar score of 10/10. Examination of the newborn did not detect any malformations. He was well hydrated. Normalization of creatinine and urea was noted at 48 hours. He was placed in a neonatal ward for 30 days. Bamberg et al. found an average duration of hospitalization for premature newborns of 26 days [19].

## Conclusions

Our case-report demonstrates that in a low-resource country from western Africa successful pregnancy in an hemodialysis female is possible.

## Conflict of Interest

The authors have no conflicts of interest to declare.

## Informed Consent

Informed consent was obtained from the patient.

## Conclusions

Our case-report demonstrates that in a low-resource country from western Africa, successful pregnancy in an hemodialysis female is possible.

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