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Accidental Discovery of Pregnancy during End-Stage Chronic Renal Failure: A Case Study at Fousseyni DAOU Hospital in Kayes, Mali, and Review of the Literature

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Abstract

Pregnancy during end-stage chronic renal failure is rare. Its management is complex, requiring rigorous adjustment of dialysis parameters, early therapeutic adaptations to limit teratogenicity, and enhanced management of complications of chronic renal failure. We present a case of pregnancy in a 24-year-old patient with impaired renal function at 2206 µmol/l at 7 weeks + 2 days of pregnancy upon admission to nephrology. The outcome was marked by the birth by caesarean section at 34 weeks of a live male child weighing 1600 g after chronic haemodialysis with four weekly sessions of 4 hours 30 minutes, optimisation of blood pressure readings, and correction of anaemia and phospho-calcic disorders. **Conclusion:** Managing pregnancy during chronic dialysis in a resource-limited setting remains difficult and requires intensified dialysis and close collaboration between nephrologists, obstetrician-gynaecologists, paediatricians and anaesthetists.

Keywords

Pregnancy, Chronic Haemodialysis, Kayes, Mali

1. Introduction

Pregnancy in end-stage renal failure is rare and there are currently no recommendations regarding nephrological management in these patients [1]. In haemodialysis, although the prognosis has improved significantly, there remains a significant risk to both the mother (pre-eclampsia, eclampsia) and the foetus (prematurity, intrauterine growth retardation, foetal death in utero). An increase in the dialysis dose with daily dialysis sessions, early therapeutic adjustments to limit teratogenicity, and enhanced management of complications of chronic renal failure (anaemia, high blood pressure) are necessary [1].

Pregnancy during chronic haemodialysis (CHD) is rare, and its outcome is precarious, but since the first case was described by Confortini in 1971, several observations have been reported [2]. These pregnancies constitute a high-risk group and result in live births in only 60% of cases, due to the frequency of complications [3] [4]: the mother is exposed to haemorrhagic accidents, including retroplacental haematoma (RPH), worsening anaemia, thrombosis of the vascular access or extracorporeal circuit, and liver abnormalities, including cholestasis of pregnancy; the foetus suffers from maternal anaemia and chronic hypoxia; it is at risk of hydramnios if blood volume is poorly controlled; intrauterine growth retardation and prematurity are common.

We present a case of pregnancy in a 24-year-old patient with impaired renal function at 2206 µmol/l, *i.e.* plasma creatinine clearance at 1.8 ml/min (MDRD) at 07 weeks + 02 days of pregnancy on admission to nephrology.

2. Observation

Ms D. C, aged 24, housewife, Malian national, admitted on 10/01/2025 to the nephrology unit of the HFDK from the gynaecology and obstetrics department for renal failure, with impaired renal function at 2206 µmol/l at 7 weeks + 2 days of pregnancy. Her personal history was G5P4V3D0A1. Her fourth pregnancy was marked by the onset of severe pre-eclampsia, which resulted in a spontaneous abortion, with no subsequent follow-up. The interview revealed that she had been taking digoxin-based herbal medicine at home and had received two bags of isogroup isorhesus B+ whole blood transfusions, nicardipine and magnesium sulphate in the gynaecology department. The clinical symptoms were headache, vertigo, tinnitus, phosphenes, physical asthenia, uncontrollable vomiting streaked with blood, and exertional dyspnoea. Physical examination on admission revealed preserved consciousness with a Glasgow Coma Scale score of 15/15, conjunctival and palmar pallor, BP = 191/123 mmHg, heart rate = 101 bpm, temperature = 36.5˚C, weight = 66.1 kg, oliguria with estimated urine output of 200 cc/24hours of cloudy urine. Regular tachycardia with diffuse systolic murmur; crepitant rales in the pulmonary fields in rising tides, anarsia with cylindrical, symmetrical, painless legs and associated ascites of great abundance hindering the assessment of intra-abdominal organs with facial swelling. Additional tests found (**Table 1**).

Table 1. Paraclinical characteristics of the patient.

Settings	Values	Standards
Hemoglobin level (g/dL)	6.3	12 - 16
White blood cells (elts/mm^3)	10,000	4000 - 10,000
Platelets (elts/mm^3)	54,000	150,000 - 400,000
transferrin saturation coefficient (%)	35.01	20 - 40
Ferritin (ng/mL)	173	13 - 232
Vitamin B12 (pg/mL)	807	200 - 1100
Folic acid (ng/mL)	5.1	5.21 - 20
Creatinine level (µmol/L)	2206	53 - 124
Urea (mmol/L)	41.28	1.7 - 8
Uric acid (µmol/L)	656	89 - 417
Natremia (meq/L)	136	135 - 145
Potassium level (meq/L)	5.96	3.5 - 5.5
Chloremia (mEq/L)	106	98 - 108
Magnesium concentration (mg/L)	43	15 - 30
Calcemia (mmol/L)	1.79	2.20 - 2.60
Phosphatemia (mmol/L)	2.27	0.81 - 1.61
Vitamin D (ng/L)	24.2	Superior than 30
parathyroid hormones (ng/L)	986	10 - 65
cytobacteriological examination of urine	Leukocytes (12 elements/mm^3) red blood cells (5 elements/mm^3), positive culture with Escherichia coli sensitive to amoxicillin-clavulanic acid	
24-hour proteinuria (mg)	400 mg	30
Antidemic (g/l)	53.79	60 - 80
Albumin level (g/l)	20.96	35 - 40
Anti-nuclear factor	36.6	
AgHBS	Negative	Negative
HCV	Negative	Negative
HIV serology	Negative	Negative
Toxoplasmosis serology	Negative	Negative
Syphilis serology	Negative	Negative
Thick drop	Negative	Negative
Transaminases ASAT	18	inferior 40
Transaminases ALAT	25	inferior 40
Abdominal and pelvic ultrasound scan	Right kidney = 73 × 31 mm and left kidney = 70 × 29 mm, are hyperechoic, poorly differentiated, lithiasic and not dilated.	
Fundus	Single pregnancy, in utero, progressing from 07 weeks + 02 days. - Presence of retinal haemorrhages, dry exudates and cottony nodules: stage II hypertensive retinopathy. - Radial maculopathy (suggestive of renal failure).	
electrocardiogram	Sharp, broad, symmetrical and diffuse T waves. Ventricular hypertrophy with Sokolov index of 40.	
Cardiac ultrasound scan	60% LVEF. 7 mm non-compressive pericardial effusion.	

Given this picture, a diagnosis of high blood pressure was made, along with end-stage renal failure with cardiovascular, phospho-calcic, haematological, digestive and hydro-electrolytic complications. This was probably exacerbated by the urinary tract infection. Given this picture, replacement therapy by haemodialysis was started using a central venous catheter. It was performed using low molecular weight heparin (LMWH) anticoagulation and high permeability biocompatible polysulfone membranes. The patient was monitored in collaboration between obstetricians and nephrologists. The haemodialysis programme consisted of 4.5 hours 4 times a week, with the aim of limiting excessive inter-dialysis weight gain and therefore excessive ultrafiltration at each session, lowering pre-dialysis urea, facilitating the correction of anaemia, control blood pressure and allow a normal sodium diet, using a pump flow rate of between 230 and 300 ml/min, a dialysate flow rate of 500 ml, and a bicarbonate bath. Ultrafiltration assessments were based on monitoring maternal blood pressure before, during, and after dialysis (see Table 2). The normal sodium diet was maintained. The average pre-dialysis urea level was 14 mmol/l with a range from 6 to 18 mmol/L.

Table 2. Treatment data.

Treatment	Administration schedule
Haemodialysis	4 sessions per week, each lasting $4\frac{1}{2}$ hours
Methyl dopa 250 mg	2 tablets 3 times a day
Amlodipine 10 mg	1 tablet per day
Isogroup isoresus whole blood transfusion	As needed, depending on the severity of anemia
Iron inj	100 mg infusion in 0.9% saline solution/week
Epoetin Alfa 4000 UI	1 subcutaneous dose per week
Folic acid 5 mg tablets	1 tablet per day
Calcium + vitamin D tablet	1 tablet per day
Amoxicillin + clavulanic acid inj 1 g	2 g/day intravenously for 7 days for the treatment of urinary tract infection.

The progression was marked by the onset of central dialysis catheter infection on May 24, 2025, revealed by fever, chills, diffuse pain during dialysis, and confirmed by cytobacteriological analysis of the tip of the catheter, which revealed seropurulent secretion, 85% neutrophils, clusters of Gram-positive cocci on Gram staining, and the presence of Staphylococcus spp. sensitive to cefoxitin, vancomycin, and gentamicin on Chapman culture medium, chocolate agar, Drygalsky medium, and blood culture at *Staphylococcus spp* sensitive to cefoxitin, vancomycin, gentamicin, as well as procalcitonin positivity at 15 ng/ml. Treatment with cefoxitin for 7 days resulted in apyrexia, diffuse pain, and procalcitonin negativity at follow-up. Dialysis was maintained via the radio-cubital fistula created on May 2, 2025. Gynecologically, metrorrhagia due to cervicitis occurring at 26 weeks of ges-

tation was treated with local antiseptics, ciprofloxacin and metronidazole administered locally, and bed rest. The delivery took place by emergency cesarean section at 34 weeks + 6 days due to umbilical cord prolapse with pelvic pain and metrorrhagia. This allowed the extraction of a live male newborn with no malformations, with an APGAR score of 10/10 at 1 minute, weight 1600 g, height 41 cm, and head circumference 33 cm. Due to the low birth weight, the newborn was admitted to the neonatal unit for 72 hours and diuresis was maintained. Table 3 summarizes clinical events in relation to gestational age. On day 3 of observation, the newborn's biological parameters were normal, with hemoglobin at 18 g/dl, creatinine at 40 µmol/l, azotemia at 2.1 mmol/l, and a normal blood ionogram. The mother had a straightforward postpartum recovery and resumed hemodialysis sessions 48 hours after giving birth.

Table 3. Clinical events in relation to gestational age.

Events		Gestational ages
Sepsis Associated with Central Dialysis Catheter Infection	Episode 1	16th week of pregnancy
	Episode 2	26th week of pregnancy
Creation of an ulnar arteriovenous fistula		23rd week of pregnancy
Cervicitis		26th week of pregnancy
Childbirth		34th week of pregnancy and 6 days

3. Discussion

This case highlights, on the one hand, the absence or inadequate follow-up of this patient after a high-risk pregnancy and pre-eclampsia, leading to uncontrolled chronic hypertension causing multiple organ damage with a poor functional or vital prognosis, and, on the other hand, the problem of chronic haemodialysis during pregnancy in a context of limited resources and poor technical facilities. Renal failure was discovered at stage V of kidney disease during an ongoing pregnancy. While the occurrence of pregnancy during chronic haemodialysis is well documented, data on the occurrence of pregnancy in the terminal stage of chronic renal failure without dialysis are rare. Fertility is inversely proportional to the degree of renal dysfunction and, in patients with end-stage renal failure (ESRF), the incidence of pregnancy is only 0.5% per year. At this stage, hypofertility is multifactorial, most often due to central anovulation caused by hypothalamic dysfunction [5] [6]. Follicle-stimulating hormone (FSH) and luteinising hormone (LH) concentrations are increased, the oestrogen-induced LH surge is absent and progesterone concentration is decreased. Hyperprolactinemia is present in 70% to 90% of patients, contributing to anovulation by inhibiting GnRH secretion [7] [8]. This hyperprolactinemia is induced by hyperparathyroidism and by a decrease in renal clearance of prolactin [9]. In addition, hyperprolactinemia increases the number of hematopoietic precursors responding to erythropoietin (EPO) and can be considered a compensatory mechanism for anaemia in renal failure [10]. These

hypothalamic-pituitary abnormalities improve after increasing the dialysis dose. After switching to long-term nocturnal haemodialysis, 28% of patients regained a menstrual cycle with relative normalisation of prolactin levels [8]. Hormonal and clinical improvement has also been reported after kidney transplantation [11] [12]. To estimate renal function, several authors recommend using plasma creatinine measurements instead. Wiles *et al.* suggest that the normal range for creatinine in pregnant women should be considered as <85% of the upper limit of normal in the first trimester, <80% in the second trimester and <86% in the third trimester, compared to the current laboratory standard [13]. Proteinuria should be assessed using a spot urine sample, calculating the protein/creatinine ratio (UPCR, normal < 30 mg/mmol) and/or the albumin/creatinine ratio in urine, which is a validated tool in pregnancy [13]. Thus, estimating renal function and the degree of albuminuria allows the primary care physician to assess the need for a nephrology consultation [14]. GFR equations are not recommended in clinical practice during pregnancy because they frequently overestimate or underestimate GFR [15] [16]. As for creatinine clearance measured by 24-hour urine collection, the current reference method is complex and complicated by urinary retention associated with dilation of the urinary tract. As a result, changes in serum creatinine levels are generally used in clinical practice to assess deterioration in renal function. It should be noted that the inverse hyperbolic relationship between serum creatinine and GFR is attenuated at high GFR values, which are characteristic of pregnancy [17]. The initial nephropathy was vascular in origin, of the malignant hypertension type. Hypertensive nephropathy is the most common nosological entity in several African studies involving predominantly young patients with chronic renal failure [18]-[20]. Hypertension is a factor associated with poor maternal prognosis regardless of the initial nephropathy. It may be related to either a toxemic manifestation or vascular overload, or it may be secondary to CRF or a combination of these three causes. Controlling hypertension during pregnancy in dialysis patients is extremely difficult and is all the more important as it exposes them to serious complications such as retroplacental haematoma or eclampsia [21]. Primiparity is associated with a high risk of foetal complications, regardless of pre-eclampsia [22]; in our observation, the last pregnancy was multiparous with four parities without obstetric complications, the last of which resulted in an abortion in the context of pre-eclampsia. The use of herbal medicine is a reality in our context [23], most often administered empirically and likely to induce kidney disease or exacerbate pre-existing nephropathy due to the potential toxicity of the plants used. The diagnosis of pregnancy was made on the basis of an obstetric ultrasound scan requested in response to the presence of anasarca in order to rule out a gynaecological cause. This is the main diagnostic tool in the terminal stage of renal failure [21] [24] [25]. This is because menstrual cycle disorders are common in stage V chronic kidney disease and uraemic symptoms can be confused with the sympathetic signs of pregnancy. The reliability of pregnancy tests and beta-human chorionic gonadotropin (βHCG) assays is debated, as some authors have demon-

strated the presence of βHCG in women with CRF despite the absence of trophoblasts and placenta [3] [26] [27]. Given the urgent need for dialysis, the patient was started on a double-lumen jugular dialysis catheter for 18 hours per week (4.5 hours × 4 times per week). Haemodialysis during pregnancy is usually performed using an arteriovenous fistula in women who are usually on chronic dialysis [28]-[30]. Due to infection with two episodes of sepsis at 16 and 21 weeks of gestation requiring catheter removal and culture, dysfunction and the absence of a vascular surgeon in our facility, the catheter was replaced three times (two femoral catheters and one jugular catheter) in five months to ensure continuity of dialysis. Wearing a central dialysis catheter may increase the usual risks of haemorrhagic accidents, including retroplacental haematoma (RPH), worsening anaemia, thrombosis of the vascular access or extracorporeal circuit, and liver abnormalities, including intrahepatic cholestasis of pregnancy; chronic foetal hypoxia, hydramnios, intrauterine growth retardation, and prematurity during haemodialysis [1] due to chronic inflammation, sepsis or septic shock, and poor dialysis quality caused by insufficient blood flow. A weekly dialysis duration of 18 hours was reported by Aboubacar Sidiki Fofana *et al.* [25]. This weekly dialysis time is longer than those reported by other authors [29] [30]. In patients undergoing chronic haemodialysis, the frequency of HD should be increased as soon as possible to four sessions and then to six sessions per week from the fifth month onwards in order to optimise metabolic and volume control, with a target of 16 to 24 hours of HD per week, which is associated with a better foetal prognosis [31]. In 2004, Hou was the first to demonstrate a significant improvement in live births among women on haemodialysis receiving more than 20 hours of dialysis per week during pregnancy [3]. As a result, it is becoming increasingly common to significantly increase the intensity of dialysis during pregnancy [32] [33]. Concurrently with dialysis, management of other complications of renal failure affecting the maternal-foetal prognosis was initiated, with a gynaecological-obstetric follow-up schedule, which enabled the diagnosis and treatment of cervicitis at 29 weeks of gestation. Thus, correction of anaemia, phosphorus-calcium disorders, water-sodium retention (dry weight) and blood pressure levels was initiated.

The target haemoglobin level in healthy pregnant women is 9 to 11.5 g/dl [34]. Anaemia was corrected with a haemoglobin level of 8 - 12 g/dl by means of whole blood transfusions (the only form available in the facility), venofer, folic acid and recombinant erythropoietin. The use of transfusions was motivated, on the one hand, by the appearance of signs of anaemic decompensation and, on the other hand, by the high cost of erythropoiesis-stimulating agents, which were beyond the reach of patients without medical coverage. According to some authors [35] [36], a decrease in haematocrit is described in 61% of patients during pregnancy, with 25% to 30% of patients requiring transfusions. During pregnancy on haemodialysis, it is necessary to increase the doses of erythropoiesis-stimulating agents (ESAs) early on in order to prevent the onset of anaemia linked in part to haemodilution. A 50% to 100% increase in dosage is generally observed [37]. Contin-

ued iron supplementation is also essential. Venofer1 (ferric hydroxide sucrose complex) can be used throughout pregnancy without risk to the foetus. Higher haemoglobin levels are associated with a better foetal prognosis [35] [36]. In all cases, blood transfusions should be avoided in these young patients in order to limit the risk of immunisation while awaiting kidney transplantation [1]. Correction of calcium and phosphorus levels is necessary for foetal bone growth. In addition to the use of calcium-enriched dialysis baths (1.75 mmol/l), oral calcium supplementation with active vitamin D was introduced, achieving corrected serum calcium levels between 2.20 and 2.50 mmol/l. Dual antihypertensive therapy consisting of amlodipine 10 mg/day and methyldopa 250 mg 3 times/day, combined with optimisation of dry weight, stabilised blood pressure readings between 110 - 140 mmHg for systolic and 70 - 90 mmHg for diastolic. It should be noted that per-dialysis hypotension was prevented by adjusting the ultrafiltration volume and closely monitoring haemodynamic parameters during per-dialysis. Diuretics, commonly used during pregnancy, may be used in haemodialysis patients to improve blood pressure control, but must be discontinued in the event of pre-eclampsia [38]. However, angiotensin-converting enzyme (ACE) inhibitors or angiotensin II receptor antagonists (ARA II) are absolutely contraindicated from the second trimester onwards and during breastfeeding, as they can cause fatal complications in the foetus (malformations, oligohydramnios, intrauterine death) and in the newborn (arterial hypotension and renal failure with oliguria) [39]. Early prescription of antiplatelet-dose aspirin for primary prevention of pre-eclampsia, although sometimes debated [1], effectively prevents pre-eclampsia and intrauterine growth restriction in women with a history of severe pre-eclampsia or complicated by intrauterine growth restriction [40]. The average pre-dialysis urea level was 14 mmol/l. Pre-dialysis urea concentrations are also a good prognostic indicator. Lower urea concentrations are correlated with higher birth weight and more advanced gestational age [35] [36]. Asamiya *et al.* recommend maintaining pre-dialysis urea concentrations < 45 mg/100 mL, or 8 mmol/L [36]. This was implemented in our patient from the diagnosis of pregnancy until delivery. Faced with pelvic pain and metrorrhagia at 34 weeks + 6 days, a gynaecological examination revealed umbilical cord prolapse, indicating the need for an emergency caesarean section. This method of delivery is indicated in emergencies due to the occurrence of maternal or foetal complications [24] [41]. Prematurity with a gestational age of less than 37 weeks is almost constant; it is found in 54% to 91% of pregnancies, depending on the series [42] [43] [48]. Extreme prematurity, before 28 weeks of gestation, was found in 25% of cases in a study conducted between 1992 and 1995 [43]. In comparison, in the United States in 2010, 12% of births were premature [44]. They may be related to hypertension, pre-eclampsia, premature rupture of membranes (PROM), intrauterine growth restriction (IUGR), uterine contractions induced by dialysis sessions and polyhydramnios [41]. The newborn had no congenital malformations in the observations reported by Yattara H and Aboubacar Sidiki Fofana [25] [29]. However, C.A Raharivelina [21] reported a congenital anomaly of bilat-

eral flexum of the third and fourth fingers in his observation. Okundaye notes 8% congenital anomalies in children, with developmental delay correlated with the degree of prematurity [42]. Seventy-two hours (72 hours) after birth, the newborn's renal function was normal. After delivery, rapid resolution of azotaemia was noted in the child with induction of osmotic diuresis and weight loss within the first 48 hours [1]. Prematurity is the norm in the majority of cases, accounting for up to 83% of live births according to data from several authors [45]. In the United States [46], 85% of pregnancies were reported to be premature, with an average gestational age of 32.4 weeks. Like the incidence, the prognosis for pregnancies in haemodialysis patients has improved in recent years. In the 1980s, an EDTA report recorded 115 cases of pregnancy in dialysis patients, with a foetal survival rate of 23% [47]. In the 1990s, foetal survival improved to around 42% - 49% in large American and Japanese series [42] [43]. More recently, foetal survival has become comparable to that observed in earlier stages of renal failure and is close to that observed after renal transplantation [35] [36] [48].

4. Conclusion

Pregnancy in the end-stage of kidney failure is rare. Despite limited treatment options, managing such cases is still possible through close collaboration between a nephrologist, obstetricians and gynecologists, and pediatricians to adjust dialysis parameters and manage complications related to chronic uremia, prevent or anticipate maternal-fetal complications, and ensure appropriate care for the newborn, who is often premature.

Author Contributions

Diagnosis and monitoring of the patient during pregnancy: Magara Samake, Aboubacar Sidiki Fofana, Niakale Diakite, SY Seydou, Sitapha Dembele. Postnatal monitoring of the child: Sidy Mohama Toure. Literature review: Hamadoun Yattara, Ballan Macalou, Sah dit Baba Coulibaly, Djeneba Maiga, Mamadou Badou Sanogo. Data entry and reference synthesis: Penda Tounkara, Moctar Coulibaly, Bakary Diarra, Famory Kamissoko, Sahare Fongoro. All authors have read and approved the final version.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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