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### Successful pregnancy exclusively on peritoneal dialysis: a case report

(Succès d'une grossesse menée exclusivement en dialyse péritonéale: à propos d'un cas)

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#### Summary

**Introduction:** Conception in dialysis patients is a rare event. In peritoneal dialysis (PD), it is exceptional due to the technique's short half-life, as these are young women who are often waiting for a transplant project.

**Clinical observation:** We report a case of successful pregnancy conducted exclusively on peritoneal dialysis in a patient on PD for 2 years with preserved residual renal function.

At the beginning of pregnancy, our patient was on continuous ambulatory peritoneal dialysis (CAPD), and at 12 weeks of amenorrhea (WA), we indicated automated peritoneal dialysis (APD) for better fluid and sodium depletion and adequate dialysis. The delivery was programmed at 35 WA per caesarian section, which gave birth to a newborn weighing 3.5 kg and with an Apgar index of 10/10. CAPD was resumed 2 weeks later. After 4 years of follow-up, the child is in good health, and our patient is on APD.

**Discussion:** In peritoneal dialysis, pregnancy remains a rare but possible event. It requires regular adaptation of the prescription of dialysis and a close clinical and biological follow-up to improve the maternal-fetal prognosis.

**Conclusion:** Successful pregnancy in PD requires multidisciplinary care. The prognosis has improved thanks to advances in the technique (APD, Extrarenal®) and the introduction of erythropoietin. However, the data are insufficient, and more recent studies on larger numbers are needed

**Keywords:** chronic renal failure, peritoneal dialysis, pregnancy

#### Résumé

**Introduction :** La grossesse chez les patientes dialysées est un événement rare. En dialyse péritonéale (DP), elle est exceptionnelle en raison de la courte demi-vie de la technique, car il s'agit de jeunes femmes qui attendent souvent un projet de transplantation.

**Observation clinique :** Nous rapportons un cas d'une grossesse avec succès menée exclusivement sous dialyse péritonéale chez une patiente en DP depuis 2 ans avec une fonction rénale résiduelle préservée.

Au début de la grossesse, notre patiente était sous dialyse péritonéale continue ambulatoire (DPCA), et à 12 semaines d'aménorrhée (SA), nous avons indiqué une dialyse péritonéale automatisée (DPA) pour une meilleure déplétion volémique et en sodium et une dialyse adéquate. L'accouchement a été programmé à 35 SA par césarienne, donnant naissance à un nouveau-né pesant 3,5 kg et avec un indice d'Apgar de 10/10. La DPCA a été reprise 2 semaines plus tard. Après 4 ans de suivi, l'enfant est en bonne santé et notre patiente est sous DPA.

**Discussion :** En dialyse péritonéale, la grossesse reste un événement rare mais possible. Elle nécessite une adaptation régulière de la prescription de dialyse et un suivi clinique et biologique étroit pour améliorer le pronostic materno-fœtal.

**Conclusion :** Une grossesse réussie en DP nécessite une prise en charge multidisciplinaire. Le pronostic s'est amélioré grâce aux progrès de la technique (DPA, Extraneal®) et à l'introduction de l'érythropoïétine. Cependant, les données sont insuffisantes et des études plus récentes sur des effectifs plus importants sont nécessaires.

**Mots-clés :** dialyse péritonéale, grossesse, insuffisance rénale chronique

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## Introduction

Pregnancy in dialysis patients is a rare event due to the hormonal changes induced by chronic renal failure, the causative nephropathy, and the therapeutics used to treat it.

In peritoneal dialysis, the incidence of pregnancy is exceptional, estimated at 1.1%, two to three times less than in hemodialysis [1]. This may be explained by the short half-life of the technique, not exceeding 5 years in these young women, who are often waiting for a kidney transplant.

We report the case of a successful pregnancy carried out solely on peritoneal dialysis in a patient followed in the PD unit of the Ibn Sina Hospital in Rabat, Morocco.

## Clinical observation

KJ, aged 36, had been followed for type 1 diabetes since the age of 10, complicated by diabetic retinopathy with bilateral blindness. She had been in chronic end-stage renal failure since 2017 and had chosen PD as her extrarenal purification technique.

Her obstetrical history prior to dialysis included 4 gestations, including 2 full-term parities at Stage 3b of her chronic kidney disease (CKD) and 2 early spontaneous abortions (2nd and 3rd gestations). During her PD follow-up, the patient had regular menstrual cycles and was not taking oral contraception.

In 2017, she was on continuous ambulatory peritoneal dialysis (CAPD) with two daily exchanges of 1.36% glucose due to her estimated residual renal function (RRF) of 10.6 mL/min/1.73 m<sup>2</sup> (according to the formula  $((Uu \cdot V)/Up + (Cu \cdot V)/Cp)/2 / 1440$ , where  $Uu$  is urinary urea concentration and  $Up$  is plasma urea concentration,  $Cu$  is urinary creatinine concentration and  $Cp$  is plasma creatinine, and  $V$  is 24 h urinary volume).

During follow-up, her blood pressure (BP) averaged 120/70 mmHg on Ramipril 2.5 mg/day, 24-hour urine volume averaged 2 L, and ultrafiltration was on the order of 300 and 600 mL/day. Purification was optimal, with a mean total Kt/V (renal and dialytic) of 2.5 and nPCR of 0.6.

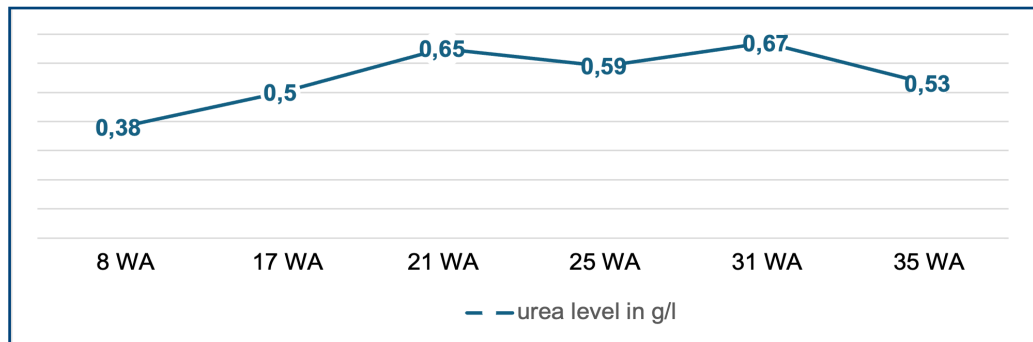
Two years later, in 2019 and still on CAPD, our patient presented with pelvic pain without digestive symptoms. The dialysate was clear on exchange, with a notion of amenorrhea of 6 weeks on questioning. The diagnosis of pregnancy was confirmed by plasma b-HCG assay and pelvic ultrasound, which estimated gestational age at 6 weeks.

Therapeutic adjustments consisted of discontinuing teratogenic drugs such as Ramipril and diuretics and prescribing a central antihypertensive combined with optimization of the erythropoietin dose.

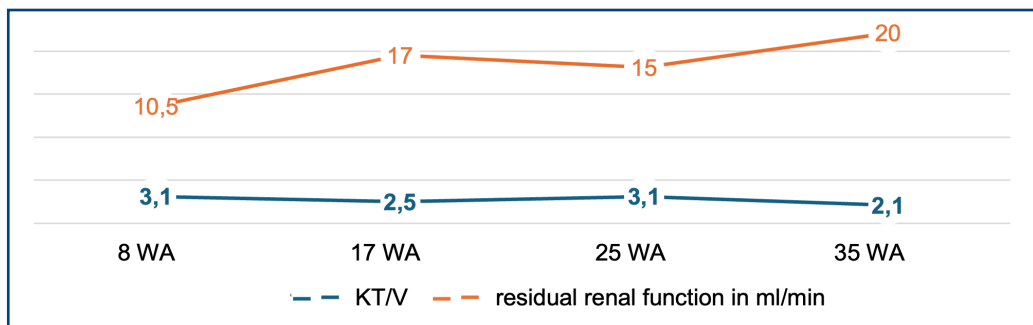
Clinically, BP averaged 120/80 mmHg on Aldomet 500 mg/day, with diuresis maintained at 1.5 L/day throughout pregnancy.

We adjusted the dialysis program according to the pregnancy term and clinical status to optimize the dialysis dose. At 10 weeks' amenorrhea (WA), we increased the number of CAPD exchanges

to 3 / day, including two 1.36% glucose exchanges and one icodextrin (Extraneal®) exchange in the evening, with a volume reduction to 1.5L per exchange. From 14 weeks' gestation, due to the abdominal discomfort felt by the patient, as well as the increase in intraperitoneal pressure (IPP at 21 mmHg) and uterine volume, it was decided to place the patient on APD at night according to the following schedule: total dialysate volume 10L, duration 9 h, injection volume 1.2 L, and last injection volume 1L. Mean hemoglobin during pregnancy was stable at 12 g/dL on beta-erythropoietin. Mean albumin was 36 g/L, with no phosphocalcic disorders, and her diabetes was balanced on insulin. Urea levels averaged 0.55 g/L (*Figure 1*). The mean Kt/V was 2.5 (*Figure 2*).



↑ *Figure 1. Evolution of the patient's urea level during pregnancy. WA = weeks of amenorrhea*



↑ *Figure 2. Evolution of KT/V urea and residual renal function during pregnancy. WA = weeks of amenorrhea*

Regarding obstetrical follow-up, a first pelvic ultrasound was performed at 6 weeks' gestation and a second at 17 weeks' gestation, revealing no abnormalities, particularly morphological, or abnormalities in the amniotic fluid. A fetal Doppler was then performed every 2 weeks from the 3rd trimester onwards to detect fetal distress. In consultation with the obstetrics and gynecology team, we decided to perform a cesarean section at 35 weeks' gestation, resulting in a male neonate weighing 3.5 kg and measuring 50 cm, with an Apgar score of 10/10. Our patient underwent bilateral tubal ligation with her prior consent.

PD was temporarily suspended without recourse to hemodialysis, given her preserved RRF, with resumption of previously discontinued treatments (ACE inhibitor and furosemide), which was possible given that the patient did not breastfeed. She was resumed after 2 weeks on the patient's usual schedule: two CAPD exchanges per day of 1.36% glucose.

After 4 years of follow-up, our patient is in APD, and the child is in good health. The patient has still not benefited from a kidney transplant, as combined kidney-pancreas transplantation is not feasible in our facility.

## Discussion

The first successful pregnancy in a woman on dialysis dates back to 1971, but the prevalence and incidence have improved with the improvement in the quality of dialysis and the introduction of erythropoietin. According to Holley et al. [2], the incidence of pregnancy varies between 1% and 7% in dialyzed women of childbearing age. Diagnosis is often difficult and delayed due to irregular, anovulatory menstrual cycles [3]. The average time to diagnosis of pregnancy is around 16.5 weeks [4].

Fewer studies have been carried out on the management of pregnancy in PD than in hemodialysis (HD) [5][6][7], probably due to the technique's limited diffusion in the general population compared with HD and its short half-life (5 years on average) given the rapid transition of patients to renal transplantation. Although the pregnancy rate in women undergoing PD is lower than in women undergoing HD (1.1% in PD versus 2.4% in HD) [1], the chances of success are better [8]. This is due to the preservation of RIF, continuous purification, and gentle ultrafiltration in PD, with no risk of hypovolemia leading to intrauterine growth retardation (IUGR) or intrauterine fetal death (IUFD). Furthermore, to date, there are insufficient data to support the efficacy, safety, and equivalence of peritoneal dialysis in the management of pregnancy, compared with intensified hemodialysis. The choice of one technique over another may be guided by the patient's clinical condition during follow-up, by the existence of good residual renal function, and by the patient's personal informed choice, which was the case with our patient.

The management of this rare and often precious pregnancy is complicated and requires multidisciplinary care. Arterial hypertension and pre-eclampsia are maternal complications [9]. Fetal complications are dominated by hypotrophy, hydramnios, IUGR, prematurity, and IUGR [2], while complications specific to peritoneal dialysis include peritonitis and premature delivery [10].

Peritoneal dialysis remains compatible with pregnancy but may become difficult to tolerate in the final months due to increased uterine volume and PIP. In the last trimester, it is recommended to decrease volumes and increase the number of exchanges in order to optimize the dialysis dose. In general, nocturnal APD is combined with one or two CAPD exchanges during the day [11], or nocturnal APD is combined with HD sessions [12]. In our patient, a shift to nocturnal APD, with a total duration of 9 h and a dialysate volume of 10 L, made it possible to satisfactorily achieve the objectives in terms of blood volume; urea level, which was maintained at around 0.55; and total KT/V at around 2.5.

Nephrological follow-up should enable dry weight and BP to be monitored, any mechanical and infectious complications associated with the technique to be managed, and the biological monitoring balance to be assessed. It has been suggested that the Kt/V of pregnant dialysis patients should be between 2.2 and 2.4 for a good pregnancy prognosis [13]. According to the literature, a dialysate volume of up to 20 L per day is recommended to achieve this Kt/V target [13]. In our case, the switch to APD with a total duration of 9 h and a total dialysate volume of 10 L enabled us to achieve a Kt/V within the objectives (2.5 on average), thanks to our patient's preserved RRF, and a urea level maintained at around 0.55 g/L, which prevented the occurrence of hydramnios.

Obstetrical monitoring should begin as soon as pregnancy is confirmed. Literature data on obstetrical monitoring in end-stage renal disease are limited, but monitoring should be regular and close, starting at 26 weeks' gestation, in order to check viability, fetal growth, and vascular resistance using uterine Doppler [14].

Our first case of PD pregnancy was successful: the child is almost full-term, with no complications, and the patient was able to resume CAPD 2 weeks after delivery without recourse to hemodialysis thanks to the preserved RIF and close nephrological and obstetrical follow-up; moreover, she is in good physical and mental health after 4 years of follow-up. This result contributes to promoting pregnancy among women undergoing dialysis in general and peritoneal dialysis in particular.

### Conclusion

Pregnancy management in PD is based on a multidisciplinary approach. Its success depends essentially on clinical and dialytic management, with close therapeutic adaptation by the nephrologist and close obstetrical monitoring during the third trimester to ensure that the pregnancy runs smoothly and without any maternal or fetal complications.

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### Declaration of interests

*No conflicts of interest to declare.*

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