

PREGNANCY IN PATIENTS ON CHRONIC AMBULATORY PERITONEAL DIALYSIS (CAPD): CASE REPORT***M. Sebti, M. C. Fourati, F. Zidane, Pr. M. Yousfi and Pr S. Bargach,**

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I-INTRODUCTION

Peritoneal dialysis consists of an exchange between a liquid, the dialysate, and the patient's blood through the peritoneum.

Pregnancy in women with end-stage renal disease (ESRD) treated with peritoneal dialysis is very rare and at high maternal-fetal risk.

This markedly reduced fertility and fetal loss in dialysis patients is not well understood.

This would appear to be due to the consequences of metabolic and endocrine abnormalities resulting in decreased ovulation and a hostile intrauterine environment.

Pregnancy in dialysis patients is therefore a valuable pregnancy.

It is also a high-risk pregnancy involving renal prognosis and therefore reduced blood pressure control with a risk of placental insufficiency leading to preeclampsia, premature delivery and an extremely low live birth rate.

II-OBSERVATION

We report the case of a patient undergoing prenatal consultation in the high-risk pregnancy department of the Souissi maternity hospital in January 2019, from the diagnosis of pregnancy at 13 weeks of amenorrhea until her delivery.

A therapeutic termination of pregnancy was proposed but the patient wished to continue the pregnancy.

She is a 36-year-old woman who has been undergoing treatment for diabetic nephropathy since 2014, reached the stage of end-stage chronic renal failure in 2017 and is receiving 2 chronic ambulatory peritoneal dialysis with 2 sessions per week.

Patient has been oligo-anuric for 3 months.

The patient also has bilateral blindness and chronic arterial hypertension under treatment (alpha methyl dopa).

The patient was put on enoxaparin for thromboembolic prophylaxis, erythropoietin to prevent anemia, folic acid and alfacalcidol.

Hemoglobin ranged between 6,9 and 9,0 g/dL.

She also benefited from 3 per dialysis transfusions during the pregnancy.

She was followed up rigorously with multi-disciplinary management and meticulous clinical and paraclinical monitoring. (**Table 1**)

The patient's initial creatinine level was 133 mg/L and her clearance was 5.34 ml/min/1.72m².

Her peritoneal dialysis regime comprised an 8 hours cycle with four 1.5L exchanges of glucose solutions.

We added an extra session per week as soon as her pregnancy was diagnosed.

Urea levels varied from 0.82 to 1,48 g/L We also noticed that the high levels of urea was correlated to the metabolic disorders such as high blood pressure and pre-eclampsia (**Diagram 1**).

Her creatinine level varied from 120 to 150 mg/dL.

The clearance varied from 4,89 to 5,91 mL/min/1.72m².

Her blood pressure remained relatively stable without any clinical or biological complications with figures ranging from 130 to 160 mmHg for the systolic pressure and between 70 and 100 mmHg for the diastolic.

We noticed a higher blood pressure at the end of the pregnancy around 34 weeks of amenorrhea.

Glycemic targets were met and no treatment was changed (patient continued on insulin).

Fetal morphologic ultrasound at 22 weeks of amenorrhea and 32 weeks of amenorrhea revealed a male fetus following normal growth patterns and without any morphologic abnormalities.

A fetal heart rate recording was performed weekly until delivery from 32 weeks of amenorrhea onwards.

At 36 weeks, the patients presented important œdemas and high blood pressure figures which revealed a pre-eclampsia.

A study of fetal vitality was carried out and after multi-disciplinary consultation between our team, the nephrological team and an assessment of the risk-benefit-risk ratio we decided to induce labor and the patient delivered a male newborn weighing 2900g, Apgar 10/10.

The patient then underwent dialysis in the obstetric resuscitation unit and there were no particularities in the aftermath of the birth.

Her BP remained stable and no problems were reported.

The patient and her new born were declared discharged at 7 days postpartum after a post-dialysis and neonatal check-up.

The following table shows the evolution of the different criteria monitored during her pregnancy:

Table 1: clinical and paraclinical monitoring during the pregnancy.

GA	HB	CREAT PD	CL	BP	FETUS	UREA (g/L)	FBG	œDEMAS
13	T 8,6	133	5,34	13/9	+	1,01	1,12	=
15	8,4	129	5,5	14/8	+	0,96	1,03	=
17	8,0	134	5,3	15/7	+	1,08	1,21	=
19	7,7	120	4,89	12/6	+	0,82	0,91	=
21	7,1	150	4,73	16/9	+	1,48	0,95	+++
22	6,9	142	5	15/9	+	1,41	0,97	++
24	T 8,5	138	5,14	12/6	+	1,32	0,67	+
26	8,4	140	5,07	13/7	+	1,34	0,74	++
28	8,0	132	5,38	13/7	+	1,03	1,01	++
30	7,9	126	5,3	14/9	+	0,92	ND	++
31	7,8	119	5,96	14/9	+	0,99	ND	++
32	7,8	125	5,68	13/8	+	1,02	ND	++
33	7,4	127	5,59	13/8	+	1,42	1,03	++
35	7,1	132	5,82	16/9	+	1,45	0,83	+++
36	T 9,0	143	5,91	16/10	+	1,37	0,99	+++

(GA: Gestational age; HB: Hemoglobin; CREAT BD: creatininemia before dialysis in mg/L; CL: Clearance in ml/min/1.72m²; BP: Blood pressure; FBG: fasting blood glucose in g/L; T: transfusion)

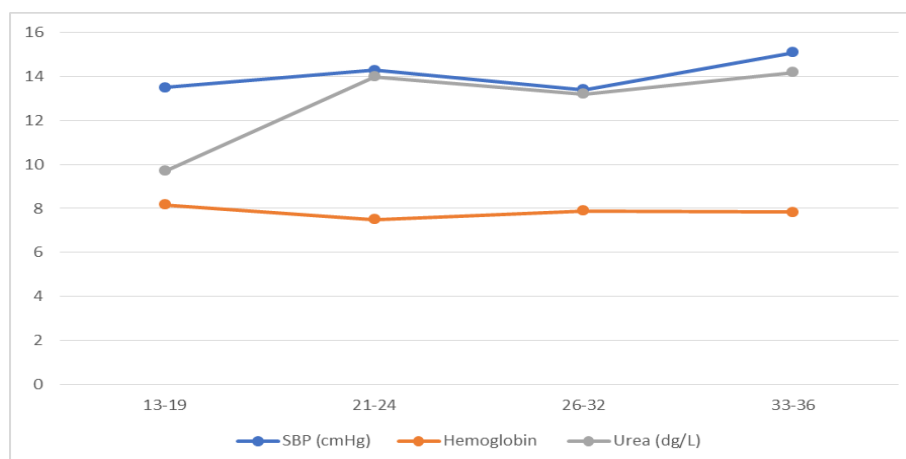


Diagram 1: monitoring of the main parameters during pregnancy.

(SBP: systolic blood pressure)

As shown in Diagram 1, urea levels are responsible for changes in blood pressure. The higher the urea level, the higher the blood pressure is.

This highlights the role of urea in hemodynamic fluctuations and in particular in the occurrence of hypertension and even pre-eclampsia.

III-DISCUSSION

1/ CONCEPTION AND PREGNANCY

There are few data on the frequency of pregnancy in dialysis patients, making the estimation of its incidence uncertain.^[1]

In 1978, the European Dialysis and Transplant Registry reported pregnancies in 0.9% of 13 000 women between the ages of 15 and 44 followed by the association.^[2]

The success rate of pregnancies in hemodialysis patients in the EDTA report was 23% and in the report of Roxe and Parker 19.2%.^[3,4]

The US Registry for Pregnancy in Dialysis Patients (RPDP) separates patients on hemodialysis from patients on DP and noted that conception occurs in DP less than half the rate of its frequency in hemodialysis patients.^[5]

There is less than 100 published cases of pregnancies in patients on CAPD.

2/OUTCOME OF PREGNANCY

The success rate of pregnancies in peritoneal dialysis is even lower and less information is available.^[6] In the medical literature, when pregnancy occurs, the successful outcome of it is difficult to establish as seen in the data of table 2.^[7]

Redrow *et al*^[8], reported in a review of literature three cases of pregnancy with favorable outcomes in patients on CAPD.

Gaddalah and *al*^[9] described three cases of pregnancy in women on CAPD, two of whom were able to deliver successfully.

Kioko *et al*^[10] monitored a 26 years old CAPD woman with advanced diabetic nephropathy who delivered successfully.

Cattran^[11] outlined a stillborn at 32 weeks of amenorrhea.

Melendez *et al*^[12] delivered a healthy newborn at 34 weeks of amenorrhea for non reactivity.

Our case is similar to Kioko and *al*'s report and was the only one seen during the year in our department.

Table 2 shows the pregnancy outcome in patients on CAPD :

Table 2 : Pregnancy outcome in patients on CAPD.

STUDY	GA AT DELIVERY	REASON TO DELIVERY	APGAR (1/5MIN)
MELENDEZ	34	FNR	9/10
KIOKO	20	SPONTANEOUS ABORTION	—
KIOKO	32	FNR	9/9
CATTRAN	32	SPONTANEOUS DELIVERY	0
REDROW	34	FNR	1/3
GADDALAH	29	SPONTANEOUS DELIVERY	7/9
GADDALAH	38	SPONTANEOUS DELIVERY	7/9
GADDALAH	24	SPONTANEOUS ABORTION	—
OUR STUDY	36	INDUCED LABOR VAGINAL DELIVERY	10/10

(GA : gestational age ; FNR : fetal nonreactivity)

3/ CAPD PATIENTS CARE

Existing data are incomplete to be able to determine guidelines to optimize the prognosis of pregnant dialysis patients.^[13]

Decisions should therefore be made on a case-by-case basis after multi-disciplinary consent.

In our case, the patient presented an impaired renal function with oligo-anuria, which put her at risk of

developing various hydro-electrolytic and metabolic disorders with in particular an accumulation of nitrogenous waste products during pregnancy. Nevertheless, the patient progressed to term without any particular problem thanks to the optimization of its nephrological management.

Early diagnosis is an important factor in the prognosis of these patients.^[14]

Indeed, early management allows for good multi-disciplinary coordination in order to optimise both nephrological and obstetrical management.

In the literature, the average gestational age of diagnosis is 16 weeks of amenorrhea.^[15]

The pregnancy was diagnosed at 13 weeks of amenorrhea in our case.

The mean gestational age for the liveborn infants was 32.9 weeks. For those who survived, the mean gestational age was 33, 8 weeks.^[5]

Recommendations have been made for elective delivery at 32,34 or 36 weeks because of the risk of third trimester stillbirth.^[5]

In the end, it would seem that pregnancy should be continued up to 36 weeks of amenorrhea in order to reduce the risks secondary to prematurity.^[16]

In our case, we waited until 36 weeks of amenorrhea and the appearance of signs of preeclampsia accompanied by hard-to-control blood pressure figures before deciding to induce delivery.

The vaginal route was accepted and the delivery went smoothly.

The birth weight of the newborn was 2900g.

4/ MATERNAL COMPLICATIONS

Peritoneal dialysis allows continuous dialysis with better control of urea levels and fewer hemodynamic variations that can affect utero-placental flow, and therefore fewer fluctuations in blood pressure.^[17]

In women who begin dialysis after conception, about 70% survive when delivery is carried to term and about 55% for those who deliver before term.^[18]

Our patient was already beneficiating of CADP before the conception, which is very rare to report.

It will be necessary to avoid as much as possible falls in blood pressure during the sessions which are highly detrimental to the fetus, and monitor the frequent occurrence of uterine contractions at the end of the second and third session quarters.^[19]

Okundaye et al found 79% pregnancy induced hypertension (PIH), with less use of antihypertensive treatment and a good response to the increase in HD time.^[19]

Optimal blood pressure control requires an accurate assessment of the dry weight, an estimate that remains mostly clinical, aided by the knowledge of the "ideal" physiological weight gain during pregnancy which is 1 to

1.5 kg in the first quarter and 500 g/week in the second and third quarters.^[20]

However, the research concerning DP is very poor in this regard and seems to follow the same pattern.

In pregnant women, the pregnant uterus may have insufficient space and peritoneal surface area for exchange. This is usually resolved by reducing the volume of exchanges and increasing their frequency.^[21]

This was the case of our patient who benefited from 3 sessions per week of 7 hours instead of 2 of 8 hours, i.e. 5 hours of dialysis in addition.

She also benefited from 2 more sessions at the end of her pregnancy.

High blood pressure with added pre-eclampsia, anemia and prematurity are the main complications in pregnant patients undergoing peritoneal dialysis.

Blood pressure figures should be carefully monitored during pregnancy^[22], with figures never exceeding 140/90.

Our patient had very stable figures well managed with DP until the end of her pregnancy where pre-eclampsia were diagnosed.

A few cases of peritonitis have been reported in CAPD pregnant patients.

Five cases of peritonitis have been reported to the RPDP.^[23]

This complication did not occur during the evolution of our patient.

The hemoglobin target for a healthy pregnant woman is 9 to 11.5 g/dl.^[24]

Transfusion should be avoided as a source of alloimmunization in particularly in pregnant women.^[25]

Our patients received 3 transfusions per dialysis due to her low hemoglobin levels and EPO resistance.

Concerning the use of EPO during pregnancy, it is not found that of EPO receptor in the human placenta or complications secondary to its use.^[19,26,27]

Its dosage should be increased due to the higher need for in red blood cell production.^[27]

Our patient received EPO only 2 times and presented a resistance, hence the need for transfusion.

The use or increase early dosage of EPO helps to reduce the frequency of 77% to 26% transfusion.^[19]

We compared the variation of our case parameters with those of studies made in patients on chronic hemodialysis.

Table 3: Maternal complications.

STUDY	HEMOGLOBIN g/dL	HYPERTENSION
CHAO ^[28]	7,2	72,2%
HAASE ^[29]	8,9	40%
CHOU ^[30]	9,9	57,4%
DOUKKALI ^[31]	8	41,66%
OUR CASE	7,1---9,0	CHRONIC / PREECLAMPSIA

Deliverance hemorrhage is also a fairly commonly described complication due to the continuous anticoagulation of these patients in order to avoid thromboembolic disorders, but its incidence remains low.^[31]

Our patient had a directed delivery and presented a good safety globe.

5/ FETAL COMPLICATIONS

Prematurity and intra-uterine growth retardation are common complications.

The literature shows that prematurity significantly increases fetal morbidity and mortality.^[32]

On the metabolic level, the literature suggests starting dialysis with a urea level of 1.02 mg/l to avoid polyhydramnios and to correct anemia and metabolic acidosis.^[31]

Nevertheless, most of these data are mainly related to hemodialysis.

Moreover, the formation of hydramnios linked to fetal osmotic diuresis in utero is found in 50% of the cases in our study, and in 55 to 70% of the cases in the literature.^[33]

Our patient already had 2 sessions of peritoneal dialysis in view of her stage of chronic end-stage renal oligo-anuric failure, and no polyhydramnios were noted.

The goal is for the baby to be born with the lowest possible uremia and creatinine levels, to limit osmotic complications at birth.^[31]

In our study, the newborn's renal balance was normal and no osmotic complications were noticed.

With the lack of data concerning CAPD patients we have compared different studies in patients on chronic hemodialysis.

Table 4: Fetal complications.

STUDY	HYDRAMNIOS	IUGR	PREMATURITY
CHAO ^[28]	30,3%	88,9%	27,8%
ERGOLU ^[34]	28,57%	14,28%	42,85%
CHOU ^[30]	71,42%	25,57%	ND
DOUKKALI ^[31]	50%	8,3%	8,3%
OUR CASE	-	-	-

In the literature, the majority of births are premature and birth weights are most often below 2000g.^[31]

In our case, the birth weight was 2900g and the delivery occurred at 36 weeks of amenorrhea.

Table 5: Neonatal weight.

STUDY	PREGNANCIES	MEAN NEONATAL WEIGHT
EDTA ^[3]	70	1900G
TAN ^[35]	10	1390G
CHANG ^[36]	10	1511G
DOUKKALI ^[35]	12	1800G
OUR CASE	1	2900G

IV- CONCLUSION

The synthesis of our case and discussion leads us to believe that there is also a place for pregnancy in chronic ambulatory dialysis patients.

Diagnosis of pregnancy should be made early to allow optimal multidisciplinary management and avoid maternal and fetal complications.


The main complications encountered in peritoneal dialysis are preeclampsia, hydramnios, IUGR and prematurity, which requires rigorous surveillance, regular and careful maternal-fetal monitoring.

The management of CAPD patients is done on a case-by-case basis, taking into account the different starting and progression parameters of each patient. Therapeutic progress nevertheless allows us to foresee in the future the establishment of guidelines to improve the prognosis of these pregnancies.

Although pregnancy in dialysis is technically possible, it is also strongly discouraged, and the ideal is to wait until kidney transplantation, when it is possible.

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