4. Devuyst O, Olinger E, Weber S, Eckardt K, Kmoch S, Rampoldi L, et al. Autosomal dominant tubulointerstitial kidney disease. Nat Rev Dis Primers. 2019;5:60.

5. Olinger E, Hofmann P, Kidd K, Dafour I, Belge H, Schaeffer C, et al. Clinical and genetic spectra of autosomal dominant tubulointerstitial kidney disease due to mutations in UMOD and MUC1. Kidney Int. 2020;98:717–31.

6. Connaughton D, Kennedy C, Shril S, Mann N, Murray S, Williams P, et al. Monogenic causes of chronic kidney disease in adults. Kidney Int. 2019;95:914–28.

7. Quaglia M, Musetti C, Ghiggeri GM, Battista G, Settanni F, Luciano R, et al. Unexpectedly high prevalence of rare genetic disorders in kidney transplant recipients with an unknown causal nephropathy. Clin Transplant. 2014;28:995–1003.

8. Bullich G, Domingo-Gallego A, Vargas I, Ruiz P, Lorente-Grandoso L, Furlano M, et al. A kidney-disease gene panel allows a comprehensive genetic diagnosis of cystic and glomerular inherited kidney diseases. Kidney Int. 2018;94:363–71.

9. Oh J, Shin J, Lee K, Lee C, Ko Y, Lee J. Clinical application of a phenotype-based NGS panel for differential diagnosis of inherited kidney disease and beyond. Clin Genet. 2021;99:236–49.

V. Barcia *, E. Monfá, B. de León, C. Martinez-Rosero, S. Sánchez-Montero, C. Barnes, C. Lucas, A. Sastre, J. Estifan y M. Prieto

Servicio de Nefrología, Complejo Asistencial Universitario de León, León, España

* Autor para correspondencia.
Correo electrónico: veronicaabarcia@gmail.com (V. Barcia).

A rare case of two successful pregnancies in a female patient on hemodialysis

Un caso raro de dos embarazos exitosos en una paciente en hemodiálisis

Dear Editor,

The occurrence of pregnancy in women with Chronic Kidney Disease (CKD) is unusual and these women are prone to more complications, especially among those on dialysis. Nevertheless, the high rate of complications such as hypertension, polyhydramnios, pre-eclampsia, restricted intrauterine growth and preterm birth make this physiological state a challenge in women with advanced CKD.

We report a case of a 29-year-old female patient with an obstetric history of a fetal loss at 31 weeks of gestation at the age of 18, in the sequence of an unsupervised pregnancy, diagnosed with gestational hypertension and severe pre-eclampsia at the time of delivery. At the age of 20, she presented with hypertension associated with thrombotic microangiopathy which required hemodialysis initiation. She was followed up as an outpatient in our hemodialysis department with dialysis prescription described in Table 1. Additional medical history of anemia and mineral bone disease associated with CKD controlled with darbopoetin, intravenous iron and vitamin D analogs.

Five months after starting hemodialysis, she was found to be pregnant on a routine abdominal ultrasound, with an estimated gestational age of 12 weeks. At the time, she was passing 1000 mL of urine a day and had a dry-weight of 42 kg. Immediately, dialysis prescription was changed to a 20 hours a week, as shown in Table 1. Pre-dialysis urea values were kept under 60 mg/dL, potassium levels between 4.2 and 5.3 mg/dL, blood pressure maintained under 140/90 mmHg and dry weight was gradually incremented. An increment of dialysis time was proposed to the patient, but she promptly refused. Prenatal care and follow-up were carried out at the Obstetric Unit, with frequent ultrasound checks excluded fetal malformations. At 36 weeks of gestation she was submitted to a programmed cesarean section for pelvic presentation with active contractility. The newborn had a birthweight of 2375 g an Apgar score of 9 at 0′ and 10 at 5′ and normal neonatal development.

After delivery patient returned to similar dialysis prescription (Table 1). Also, she always refused a kidney transplant and there was suspicion of poor therapeutic adherence. Nine years later, she presented with amenorrhea for three consecutive months, and pregnancy was confirmed after the detection of beta-subunit of human chorionic gonadotropin (11568 mUI/mL). Fetal ultrasound showed an embryo with an estimated gestational age of 4/5 weeks. At the time, she was passing 500 mL of urine a day and had a dry weight of 57.5 kg. This time, the total weekly dialysis time was increased to 24 h per week (Table 1). Pre-dialysis urea values were kept under 30 mg/dL. Blood pressure was difficult to control and varied between 130–180/60–100 mmHg. She was held on close obstetric monitoring, and at 25 weeks and 5 days of pregnancy

Table 1 – Dialysis prescription.

	Before pregnancies	First pregnancy	Between pregnancies	Second pregnancy
Vascular access	Right brachiocephalic AVF	Right brachiocephalic AVF	Right brachiocephalic AVF	Right brachiocephalic AVF
Type of dialysis	On-line post-dilution hemodiafiltration	High-flux hemodialysis	On-line post-dilution hemodiafiltration	High-flux hemodialysis
Dialysis time	4 h	3 h	4 h	4 h
N° treatments per week	3	5	3	6
Dialyser	Fresenius FX100® dialyser 2.2 m^2	Fresenius FX60® dialyser 1.4 m^2	Fresenius FX100® dialyser 2.2 m^2	Fresenius FX80® dialyzer 1.8 m^2
Blood flow rate (Qb) ml/min	400	250	450	300
Dialysate flow rate (Qd) ml/min	500	500	500	500
Anticoagulation	UFH	Enoxaparin	UFH	Enoxaparin
[Na$^+$] mmol/L	138	138	138	138
[K$^+$] mEq/L	2	2 + 40 mEq of potassium chloride 7.5%	2	2 + 40 mEq of potassium chloride 7.5%
[Ca^{2+}] mmol/L	1.25	1.50	1.25	1.50
[HCO^{3-}] mmol/L	28	28	28	26–28
Dry weight kg	42	41–51	45–57.5	57.5–65.3
Standard weekly Kt/V	2.6	3.8	2.8	5.12

AVF: arteriovenous fistula; UFH: unfractionated heparin.

she was referred to the Obstetrics Emergency Service due to decreased fetal movements and, after the diagnosis of fetal growth restriction, she was hospitalized for fetal pulmonary maturation and fetal surveillance. At 26 weeks and 4 days of pregnancy, an emergent cesarean section was performed due to a suspicion of placental abruption. With a birthweight of 660 g, and an Apgar score of 6 at 0′ and 7 at 5′ and 8 at 10′, the newborn required prolonged hospitalization in the neonatal intensive care unit, which was uneventful and showed good neonatal development.

During both pregnancies, erythropoiesis-stimulating agents and intravenous iron dosing was increased. The patient's hemoglobin was maintained at 10–12 g/dl with the use of darbepoetin alpha once a week and IV iron sucrose dosage enough to maintain transferrin saturation of 30% or greater per unit protocol. Anti-hypertensive therapy was also changed in both cases with immediate suspension of angiotensin-converting enzyme-inhibitor and furosemide and the introduction of alpha-methyldopa (while maintaining carvedilol and long-acting nifedipine). The patient also received multivitamin, calcium carbonate, and folic acid throughout the pregnancies. Programmed adjustment of the dry weight was made by revising the estimated dry weight weekly to an expected weight gain during pregnancy progression, and she was allowed unlimited protein intake. Metabolic alkalosis was also prevented by closely following acid-base status and adjusting dialysate bicarbonate concentration accordingly.

The two main determinants of hemodialysis schedule are dialysis frequency and dialysis duration that significantly correlated with prematurity and delivery of a small for gestational age baby.[1] The increase in dialysis time ensures a less uremic environment for the fetus, allows the mother a more liberal diet and fluid intake. It also helps to control hypertension and reduce the amplitude of blood volume and electrolyte shifts.[2–6] Although no randomized prospective trials of pregnant women on dialysis exist, retrospective data suggest maintaining pre-dialysis BUN values at ≤50 mg/dl is an appropriate goal.[2,3,5,6]

Careful attention needs to be paid to dialysis strategy, anemia control, fluid balance, control of hypertension, nutrition, and close monitoring of fetal well-being and maternal morbidities. Approaching pregnancy in a CKD patient in hemodialysis requires careful multidisciplinary management among nephrologists, obstetricians, nutritionists, nurses and dialysis staff.

Authors' contributions

João Carvão, Pedro Vieira and Luís Resende provided medical care of the patient. João Carvão wrote the manuscript. Luís Resende and Pedro Vieira reviewed the literature. All authors edited the manuscript. João Carvão is the article guarantor

Statement of ethics

Informed consent was obtained for this report.

Funding sources

Conflicts of interest

The authors have no conflicts of interest to declare.

BIBLIOGRAFÍA

1. Piccoli GB, Minelli F, Versino E, Cabiddu G, Attini R, Vigotti FN, et al. Pregnancy in dialysis patients in the new millennium: a systematic review and meta-regression analysis correlating dialysis schedules and pregnancy outcomes. Nephrol Dial Transplant. 2016;31:1915–34, http://dx.doi.org/10.1093/ndt/gfv395.
2. Holley JL, Reddy SS. Pregnancy in dialysis patients: a review of outcomes complications, and management. Semin Dial. 2003;16:384–8, http://dx.doi.org/10.1046/j.1525-139X.2003.16085.x.
3. Manisco G, Potì M, Maggiulli G, Di Tullio M, Losappio V, Vernaglione L. Pregnancy in end-stage renal disease patients on dialysis: how to achieve a successful delivery. Clin Kidney J. 2015;8:293–9, http://dx.doi.org/10.1093/ckj/sfv016.
4. Yang LY, Thia EWH, Tan LK. Obstetric outcomes in women with end-stage renal disease on chronic dialysis: a review. Obstet Med. 2010;3:48–53, http://dx.doi.org/10.1258/om.2010.100001.
5. Giatras I, Levy DP, Malone FD, Carlson JA, Jungers P. Pregnancy during dialysis: case report and management guidelines. Nephrol Dial Transplant. 1998;13:3266–72, http://dx.doi.org/10.1093/ndt/13.12.3266.
6. Hou SH. Pregnancy in women on haemodialysis and peritoneal dialysis. Baillieres Clin Obstet Gynaecol. 1994;8:481–500, http://dx.doi.org/10.1016/S0950-3552(05)80332-3.

João Carvão [a,*], Ana Calhau [b], Luís Resende [a], Carlota Vida [a], Francisca Silva [a], Pedro Vieira [a], Gil Silva [a]

[a] *Nephrology Department, Hospital Central do Funchal, Funchal, Portugal*
[b] *Obstetrics and Gynaecology Department, Hospital Central do Funchal, Funchal, Portugal*

* *Corresponding author.*
E-mail address: jnjcarvao@campus.ul.pt (J. Carvão).

¿Es útil el dispositivo VasQ™ en la maduración de las fístulas arteriovenosas nativas? Experiencia de nuestro centro

Is the VasQ™ device useful in the maturation of native arteriovenous fistulas? A single-center experience

Sr. Director,

Las fístulas arteriovenosas nativas (FAVn) representan el acceso vascular de elección en los pacientes con ERC 5D. Sin embargo, algunos estudios reportan fallos de maduración que oscilan entre un 20 y un 50%[1]. Según los últimos datos del Registro Catalán (RMRC)[2], se ha reducido su porcentaje (55,8%) y solo el 36,1% de los incidentes en el 2020 lo hicieron con este tipo de acceso vascular.

Desde el punto de vista fisiopatológico, se ha relacionado una baja fuerza tangencial (*shear stress*) con un incremento de la tensión a nivel de la pared de la vena eferente, aparición de flujo turbulento y la generación de la hiperplasia neointimal venosa acelerada como principal causa de estenosis yuxtaanastomótica. Dichos mecanismos se encuentran relacionados con la liberación de todo un conjunto de factores inflamatorios que inducen la agregación plaquetaria, la migración de miofibroblastos desde la capa media a la íntima y, en último término, la trombosis y la pérdida del acceso vascular[3].

En este sentido, se ha desarrollado el dispositivo externo VasQ™ (Laminate Ltd., Tel Aviv, Israel), que se encuentra constituido por 2 partes, cuello y brazo de nitinol, que implanta el cirujano vascular a nivel de la anastomosis quirúrgica y por fuera de la primera porción de la vena eferente (fig. 1). Este dispositivo permite aumentar el ángulo a nivel de la anastomosis quirúrgica a 40-50°, obteniéndose un flujo vascular más uniforme o laminar, menor tensión a nivel de la zona yuxtaanastomótica de la vena (disposición cónica), así como un posible efecto protector a nivel de los factores hemodinámicos cardíacos (gasto cardíaco)[4,5]. *A priori,* este nuevo dispositivo
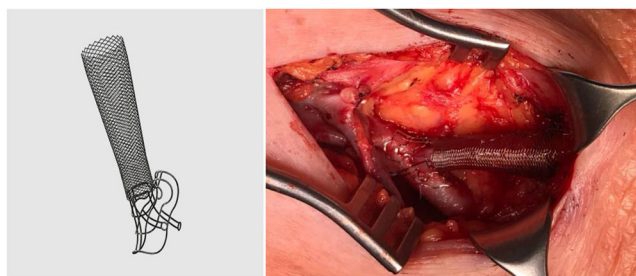
Figura 1 – **Dispositivo externo VasQ™ (Laminate Ltd., Tel Aviv, Israel).**