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Serial ultrasound of the vascular access

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To the Editor,

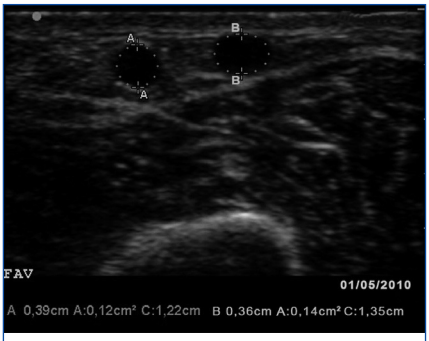
Current advances in nephrology and similar advances in other areas of medical knowledge mean that nephrologists must develop technical skills that are not provided by traditional training in nephrology. We present a case that illustrates that fact.

The patient in question is an 83 year old male in a conventional haemodialysis (HD) programme with chronic kidney disease secondary to diabetic nephropathy. He had a history of type 2 diabetes mellitus with various diabetes-related complications, arterial hypertension and atypical chest pain with no evidence of ischaemic heart disease.

The patient started HD via a tunnelled catheter in February 2010, with good haemodynamic tolerance and adaptation. A left humeral-cephalic arteriovenous fistula (AVF) was created one month later. Following a 30-day maturation period, we began venipuncture in the AVF and observed suboptimal maturation, difficult anatomical interpretation, venous collapse, ´frequent extravasations and impossibility of reaching a blood flow (Qb) greater than 250ml/min.

Given these findings, we examined the vascular access (VA) with a portable vascular ultrasound machine (EcoAVP) in the HD room (Figure 1) and observed no stenosis in the arteriovenous fistula and a dual venous system with a collateral vessel branching off 3cm from the arterial anastomosis with a thickness similar to that of the two veins (diameter: 0.39cm vs 0.36cm; area: 0.12 vs 0.14cm^2). We found 2 stenoses in the proximal part of the cephalic vein.

The fistulography (Figure 2) confirmed the ultrasound findings, a haemodynamically



A: cephalic vein; B: collateral vessel to cephalic vein

Figure 1. First B-mode ultrasound image of the vascular access in which we see two veins of similar size

significant (80%) stenosis at 10cm from the arteriovenous fistula and another smaller one in the proximal third of the cephalic vein. Percutaneous angioplasty was performed on the 2 stenoses with good angiographic results. The identified collateral vessel was not treated in any way.

One month later, the AVF had progressed well, allowing for cannulation with no extravasations and an acceptable Qb rate. A second image from the EcoAVP (Figure 3) confirmed the increase in the diameter and the cross-sectional area of the main vein (diameter: 0.5cm, area: 0.24cm^2) with a decrease in the size of the collateral vessel (diameter: 0.35, area: 0.08cm^2).

One year later, the AVF was functioning properly, with a Qb of 350ml/min and a normal venous pressure of 140mmHg.

Table 1 shows the changes in some clinical parameters and ultrasound images taken after the treatment with percutaneous angioplasty.

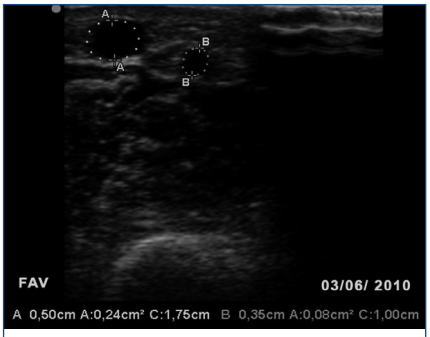
The use of an EcoAVP is not common in daily practice. However, it is very useful for approaching, monitoring, and diagnosing AVF complications.[1] Ultrasound provides both morphological and functional information in a fast, reliable and non-invasive way, which helps us determine whether percutaneous or surgical treatment is necessary.[2] The EcoAVP enables us to combine B-mode imaging, which estimates

A: cephalic vein; B: collateral vessel to cephalic vein

Figure 2. Fistulography image taken after percutaneous angioplasty to both stenoses

vein volume, the presence of haematomas, parietal calcifications, intraluminal thrombi, collateral vessels and stenosis, with the Colour Doppler mode, which estimates blood flow, peak systolic velocity, the presence of turbulences, and the shape of pulse waves with the corresponding resistance indices.[3] Ultrasound results must always be interpreted in conjunction with clinical findings.[3]

A broader view of the nephrologists' participation in decision-making would include using ultrasound for arterial and venous mapping, which has been proven to increase success in surgical



A: cephalic vein; B: collateral vessel to cephalic vein

Figure 3. Second B-mode ultrasound of the arteriovenous fistula showing an increase in cephalic vein size and decrease in the width of the collateral vessel

interventions,[4,5,6,7] and estimated venous elastography as a tool that may predict AVF success (limited evidence at present).[5]

At present, guidelines do not set strict criteria for periodical ultrasound assessments of VA or recommend a time to initiate ultrasound monitoring. In some studies, the complications involved in VA failure, which can be detected with a EcoAVP, are present in AVF that still function normally.[8] On the other hand, early dysfunction and primary failure in radiocephalic AVF and the frequent delayed maturation in diabetic patients leads us to recommend using a EcoAVP as a monitoring device for all patients on dialysis.[4] Considering the increased mean age of patients in dialysis units and data on the high number of complications at any level and any type of VA in elderly patients,[4,9] we can state that training in ultrasound examinations should be included in the nephrological curriculum. Active participation of nephrologists in the diagnosis and treatment of VA complications may reduce the number and duration of hospital stays associated with such problems, reduce the use of venous catheters, shorten waiting times for having an AVF, reduce costs derived from diagnostic and therapeutic procedures, and optimise prevention of complications in general.[10]

Despite a certain amount of dependence on specialties such as vascular surgery or interventional radiology in this field, the nephrologist is ultimately responsible for ensuring that the VA works correctly. This responsibility requires strict monitoring and early treatment of VA complications in a multidisciplinary area that encounters frequent administrative obstacles. Proper training in ultrasound examinations will enable professionals to make better treatment decisions in situations in which success depends upon swift action.

Conflicts of interest

The authors declare they have no potential conflicts of interest related to the contents of this article.

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Table 1. Changes in certain study parameters following percutaneous transluminal angioplasty of the arteriovenous fistula

	Diameter of cephalic vein	Diameter of collateral vein	Area of cephalic vein	Area of collateral vein	Blood flow
Pre-PTA	39mm	36mm	0.12cm²	0.14cm²	≤250ml/min.
Post-PTA	50mm	35mm	0.24cm²	0.08cm²	≥350 ml/min.

PTA: percutaneous transluminal angioplasty

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Economic impact of estimating renal function in patients with systemic lupus erythematosus

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To the Editor,

Kidney injury is one of the most important morbidity and mortality factors in patients with systemic lupus erythematosus (SLE).[1,2] Glomerular filtration rate (GFR) is the best indicator of renal function, and it is important in the diagnosis, determining the stage, gauging treatment response and dosing medications.[3]

The National Kidney Foundation (NKF) recommends estimating GFR using creatinine-based equations.[4,5] On the other hand, the European Consensus of Lupus Glomerulonephritis suggests that renal function in SLE patients should be measured either by serum creatinine levels or by estimating renal function using serum creatinine-based equations, but where GFR is higher than 60ml/min/1.73m^2, creatinine clearance should be used (CrCl).[6] In a recent publication, we reported on the high frequency of inappropriate sample collection from SLE patients when CrCl is used.[7]

We took a survey of Mexican rheumatologists to better understand the use of NKF-recommended equations in evaluating renal function in SLE patients.

We used the google.com survey tool to send questionnaires to members of the Mexican College of Rheumatology in September 2010. We evaluated their demographic data, including sex, years practicing medicine, number of SLE patients evaluated per week and the rheumatologist's method for evaluating renal function in patients with SLE.

We received responses from 45 rheumatologists throughout the country; the mean age of those responding was 40 years, with a mean of 9.5 years practicing medicine. Of those responding, 75.6% were male and 51.2% saw more than 10 SLE patients per week.

Almost half of the rheumatologists (46.7%) use CrCl in all of their patients in order to estimate GFR; 17.8% use it in two-thirds of their patients, and only 13.3% do not use it at all. Only 28.9% of those responding used equations for estimating GFR (MDRD, CKD-EPI, Cockcroft-Gault, others).

According to INEGI (Mexican National Institute of Statistics and Geography), nearly 112 million people lived in Mexico in 2010. As per the Peláez-Ballestas et al study, the SLE prevalence in Mexico is 0.06%.[8] We evaluated the mean cost of CrCl (serum and urinary creatinine in 24 hours) and the mean cost of measuring only serum creatinine (in order to determine GFR by means of equations) in three laboratories in central Mexico. The difference in cost between taking a single GFR measurement by one method or the other is more than 500 000 dollars if the rheumatologist uses CKD-EPI or MDRD instead of 24 hour CrCl (Table 1).

Despite the evidence suggesting a high frequency of inappropriate sample collecting and the recommendation made

Table 1. Costs associated with a single estimate of GFR in Mexico

	Costs	Population (Mexico)	Population total LES	Cost total
Equations	$ 47	112.337.000	67.402	$ 3.167.894
DCr	$ 160	112.337.000	67.402	$ 10.784.320
Saving $				$ 7.616.426
Saving USD				USD 647.396

$: Mexican pesos; CKD-EPI: the Chronic Kidney Disease Epidemiology Collaboration equation; CrCl: creatinine clearance. USD: dollars.