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### Ultrasounds as a management tool in nursing for vascular accesses for haemodialysis

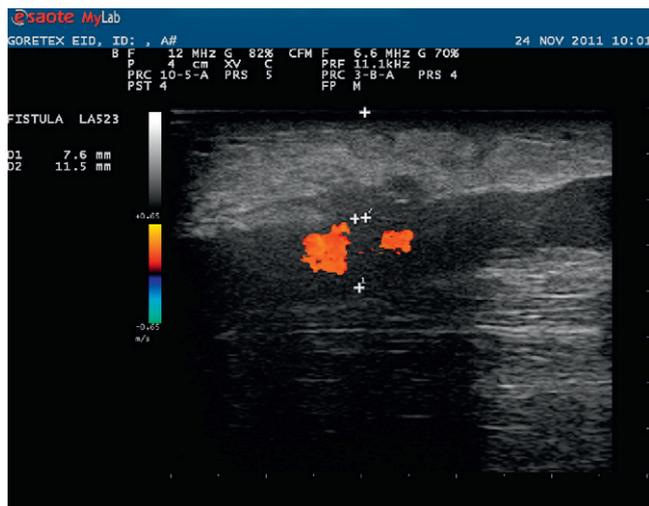
Javier Hernandez Lopez

*Nurse of the Nephrology Service, Galdakao-Usansolo Hospital, Galdakao. Bizkaia, Spain*

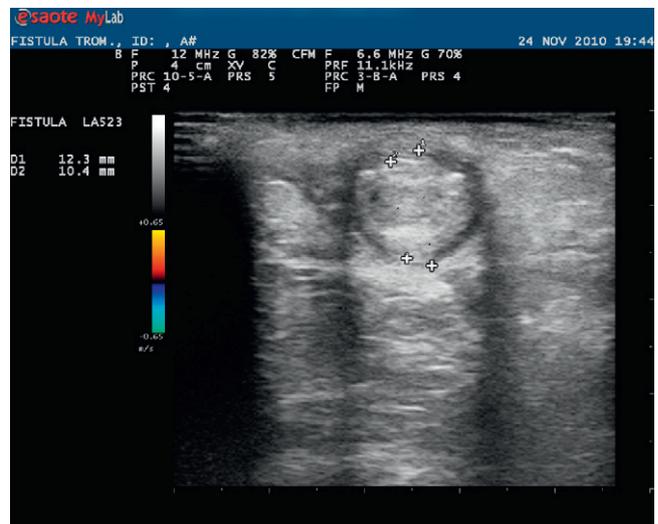
*E-mail address: javier.hernandezlopez@osakidetza.net.*

Vascular Access is a *fundamental* element for the correct management of patients with Chronic Renal Insufficiency (CRI), who are included in the Haemodialysis (HD) programme.

The *autologous* internal arteriovenous fistula (autologous IAVF) is the permanent vascular access of choice for patients who require haemodialysis. (*degree of evidence* a). (Figs. 1 and 2)



**Figure 1** Longitudinal cut femoral prosthetic fistula.



**Figure 2** Left brachial thrombosed fistula distal venous area.

For these patients with CRI in HD programmes, the Vascular Access of choice is Internal Arteriovenous Fistula (IAVF), although it is not the only one. The alternative vascular access to IAVF is Arteriovenous Prosthesis (AVP) due to it being the most commonly used. The normal material used is EXPANDED POLYTETRAFLUOROETHYLENE (PTFE). The third access modality is Central Venous Catheter (CVC), both in temporary catheter and in permanent tunnelled catheter.

One of the aims of haemodialysis units is for the majority of patients to be able to start the haemodialysis via a good vascular access, which, by choice, is the autologous internal arteriovenous fistula (IAVF A). The IAVF A has an average life of 5 to 10 years' survival. The AVP has an average life of 2 to 3 years' survival.

Whilst haemodialysis, as a technique, has evolved spectacularly during the second half of the 20<sup>th</sup> century, no vascular access has surpassed the success and initial effectiveness of the internal arteriovenous fistula (IAVF). It has been demonstrated that the radiocephalic IAVF, described by Brescia-Cimino, is still, today, the best vascular access for haemodialysis. It has a low complication rate and it presents an excellent long-term permeability and use rate. It also satisfies the objective of *ideal* vascular access, as it is a peripheral access, which is easy to approach (extensive and surface venous trajectory), with sufficient flow for the haemodialysis and it offers the possibility of carrying out more proximal fistulae.

Any internal vascular access must be assessed and its evolution tracked, since creation, by the *haemodialysis nursing staff* of the Dialysis Unit, nephrologists and the actual patient.

During the monitoring of the access function, a systematic physical examination is compulsory before and after each haemodialysis session:

- 1) Direct observation, 2) Palpation, and 3) Auscultation.

### Observation

Evaluate the venous trajectory, noticing the existence of haematomas, stenosis, aneurysms, pseudo-aneurysms,

oedema, reddening, infected points, scabs, coldness of the limb, venous hypertension.

## Palpation

Evaluate the Thrill, murmur, vibration of the access in the anastomosis and the rest of the venous trajectory. And if necessary.

## Auscultation

Evaluate the murmur of the access and venous route by auscultation.

The haemodynamic parameters must also be assessed on a regular basis: Access flow, circuit flow, dynamic pressures and static pressures, to be able to detect changes that occur in time.

After detecting a *dysfunction* of the access (*puncture difficulty*, low flow, venous hypertension, high recirculation, etc.) or complication (suspicion of infection, aneurysms, pseudo-aneurysms, ischemia, oedema, etc.) the diagnosis must be confirmed.

A good measure to confirm the diagnosis and evolution of the vascular access, since its creation until its use, and later during the life of the IAVF, by *nursing staff* would be the use of ultrasound.

From the moment the access is created and matured, the control by *nursing staff* is important to detect possible dysfunctions. The Doppler Ultrasound can be a very important tool.

At the time of the puncture, quite a frequent complication is that *difficult* IAVF, due to limited maturity, limited development, stenosis in juxta-anastomotic vein and the existence of collateral, non-puncturable accessory veins, previous haematomas from earlier punctures. Even not knowing the direction of the cannulation.

Faced with these difficulties at the time of the puncture, the *nursing staff* must have a valid tool, such as the Doppler Ultrasound. It is a *non-invasive* test and with reliable results. The ultrasound is an immediate image technique. It enables us to differentiate between IAVF, soft parts, stenosis, extralumen haematomas, abscesses, aneurysms, pseudo-aneurysms and oedemas. The only diagnostic method that provides *anatomic and haemodynamic* information at the same time. It permits measuring the flow of the Vascular Access. The examination of the Vascular Access can be carried out with the translator both in longitudinal plane and in transverse plane (with or without colour).

The Doppler Ultrasound is a very important tool for the nursing staff, once trained in its use, because it enables us to evaluate the IAVF immediately, as it is a non-invasive procedure. As it provides us with information related to the arterial and venous permeability. Direction of flow. The existing depth between the surface of the skin and the wall of the vessel. The diameter of the vessel (measured from intima to intima). And the possibility of carrying out a guided puncture.

## Further reading

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### Importance of nursing in vascular accesses for dialysis. evaluation of the vascular surgeon

R. Martínez Cercos

*Clinical Chief of the Angiology and Vascular Surgery Service of the Hospital del Mar, Barcelona*

*Angiology and Vascular Surgery Consultant of the Hospital del Mollet, Barcelona. Vascular Access for Dialysis Consultant of the Hospital de Figueras, Girona*

The paramount importance of vascular access (VA) within the complex world of haemodialysis has always been underscored, as well as the need to have the collaboration of an expert vascular surgeon in this type of intervention to be able to achieve long-lasting and efficient VAs with the least possible complications. However, another group of health practitioners involved in this topic, the group comprised of the nursing team of the haemodialysis room and of the Nephrology Service, is often, possibly involuntarily, left in a second plane, undervaluing their medical care. In my opinion, this is a tremendous mistake, as I consider that the role of haemodialysis nursing is essential, due to their close relationship with the patients, as they experience the day-to-day renal replacement therapy with them, and they act as a link between the patient and the nephrologists and vascular surgeons that attend to them.

I have not acquired this concept, which situates haemodialysis nursing as an essential ally of the vascular surgeon, from one day to the next, rather it is something that I have assumed and reinforced throughout the years that I have been engaged in carrying out VAs for dialysis. As an example of this, at the ADER<sup>1</sup> meeting that was held in Barcelona in 2003, I already mentioned that: "*If in doubt, dialysis patients must firstly ask Nursing, then the Nephrologist, and finally the Vascular Surgeon*".

Later, at the National Congress of Angiology and Vascular Surgery that was held in Cadiz in 2007<sup>2</sup>, one of the round tables addressed VA for dialysis. As a participant and speaker on the table, and in the section on monitoring VA,