

Original article

Importance of monitoring and treatment of failed maturation in radiocephalic arteriovenous fistula in predialysis: Role of ultrasound[☆]

Salomé Muray Cases^{a,*}, José García Medina^b, Juan Mariano Pérez Abad^c,
Alberto Javier Andreu Muñoz^a, Fernanda Ramos Carrasco^a, Antonio Pérez Pérez^a,
Noelia Lacasa Pérez^b, Juan Bernardo Cabezuelo Romero^a

^a Servicio de Nefrología, Hospital General Universitario Reina Sofía, Murcia, Spain

^b Servicio de Radiología Vascular, Hospital General Universitario Reina Sofía, Murcia, Spain

^c Servicio de Cirugía, Clínica Mesa del Castillo, Murcia, Spain

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ABSTRACT

The aim of the study was to analyse outcomes of AVF-RC in predialysis stage in which a clinical and radiological follow up of its maturation had been done and primary failure had been treated.

Material and methods: We studied 127 RC-AVF in 117 predialysis patients. All cases had a preoperative map. The RC-AVF was considered mature if it had a brachial artery flow ≥ 500 ml/min and a cephalic vein diameter of ≥ 4 mm. Primary failure was treated radiologically or surgically depending on the type of lesion. Fifty-eight patients started dialysis at the time of the study.

Results: In 106 RC-AVF without thrombosis, 72 (68%) were mature and 34 (32%) were immature. A total of 97% of the immature had at least one lesion, and the most common site was the post-anastomotic vein. Lesions were found in 31% of mature RC-AVF, and 18% of patients required treatment. Radiological treatment was the most frequent for maturation failure. After 6 months, primary and secondary patency were 59% and 78%, while after 12 months they were 48% and 77%, respectively. The 80% of patients started dialysis with a

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* Corresponding author.

E-mail address: Salomuray@gmail.com (S. Muray Cases).

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distal AVF (76% RC-AVF and 4% ulnar basilic). None of the patients with treated immature RC-AVF started dialysis with CVC, while 78% of the patients started with said AVF.

Conclusion: Ultrasonography for monitoring maturation provides advantages over clinical monitoring. With our management of RC-AVF in predialysis, 80% of patients start dialysis with an adequate distal AVF.

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Importancia del seguimiento y tratamiento del fracaso de maduración en la fístula arteriovenosa radio-cefálica en prediálisis. Papel de la ecografía

R E S U M E N

Palabras clave:

Fístula arteriovenosa
radio-cefálica
Prediálisis
Fracaso de maduración
Ecografía

El objetivo del estudio fue analizar las FAV-RC en prediálisis en las que se hizo un seguimiento clínico y ecográfico de la maduración y cuyo fracaso se trató.

Material y métodos: Estudiamos 127 FAV-RC en 117 pacientes prediálisis. Todos disponían de un mapa preoperatorio. La FAV-RC era madura si tenía un flujo en la arteria humeral ≥ 500 ml/min y un diámetro en la vena cefálica ≥ 4 mm. Se trató el fracaso de maduración según el tipo de lesión. Un total de 58 pacientes iniciaron hemodiálisis durante el seguimiento.

Resultados: En las 106 FAV-RC funcionantes, 72 (68%) fueron maduras y 34 (32%) inmaduras. El 97% de las inmaduras presentaron al menos una lesión y la localización más frecuente fue la vena postanastomótica. El 31% de las FAV-RC maduras tenían lesiones y en el 18% precisaron tratamiento. El tratamiento más frecuente del fracaso de maduración fue radiológico. A los 6 meses la permeabilidad primaria y secundaria fue del 59 y del 78%; a los 12 meses del 48 y del 77%, respectivamente. El 80% de los pacientes iniciaron hemodiálisis con una FAV distal (76% radio-cefálicas y 4% cubitobasilicas). Ningún paciente con una FAV-RC inmadura tratada lo hizo con CVC y un 78% lo hizo con dicha FAV.

Conclusión: La ecografía en el seguimiento de la maduración aporta ventajas frente al seguimiento clínico. Con nuestro abordaje del AV en prediálisis conseguimos que el 80% de nuestros pacientes inicien hemodiálisis mediante una FAV distal.

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Introduction

A radiocephalic AVF (RC-AVF) is the vascular access (VA) of choice for haemodialysis (HD) patients, but it has a high rate of primary failure (20%–50%).^{1,2} Primary failure includes thrombosis and failure to mature. Maturation is a complex process that depends on the interplay of patient-dependent and surgical factors. The fundamental lesion that leads to failure to mature is stenosis wherein the pathological substrate is neointimal hyperplasia.³ In predialysis, a diagnosis of maturity tends to be made clinically, although the importance of ultrasound as a complementary method to have objective quantitative criteria is being increasingly emphasised. However, there are not many systematic ultrasound follow-up studies of maturation.^{4–7} There is effective treatment for failure to mature.^{8–12} Nonetheless, achieving a RC-AVF suitable for starting HD remains a significant challenge.

For this reason, we studied RC-AVFs placed in predialysis that had clinical and ultrasound follow-up of their maturation. The objectives of this study were to determine the characteristics of RC-AVFs by ultrasound, also the causes and frequency

of failure as well as the treatment for a failure to mature and, finally, the percentage that was suitable for use at the start of HD.

Patients and methods

In this retrospective study, we analysed the 127 RC-AVFs that were placed from January 2009 to March 2013 in 117 consecutive patients with G4 and G5 chronic kidney disease (CKD) without dialysis. By protocol, all patients had recent presurgical vascular mapping that consisted of a colour-Doppler duplex ultrasound scan (Siemens Acuson 150 \times) and a CO₂ venogram (Phillips Ayura) of the upper limb.¹³ All patients signed the informed consent form. None of the patients had nephrotoxicity associated with the limited quantity (3 ml) of non-ionic contrast material to as complement to CO₂. The radial, cubital and humeral artery were studied, as well as the superficial and deep venous system, including the central veins. The placement of a RC-AVF was not advised if any of the following conditions were present: if the vessels (radial artery

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