

Vascular access unsolved problem – When, which and for whom?

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I congratulate the authors Escoli et al¹, Moreira et al² and Belino et al³, on their recent analysis of the dilemma regarding the timing and type of vascular access creation, published in the last and current issue of this journal.

The world's population is experiencing an exponential growth of end stage renal disease (ESRD) requiring renal replacement therapy (RRT), and hemodialysis (HD) continues to be the most common mode of therapy³. Reported rates of incident-treated ESRD across the globe published by the 2016 USRDS annual Data Report show Portugal as one of the countries with the highest rate⁴. According to the Portuguese registry, 2166 (90.02% of all therapies) patients started hemodialysis in 2016 and there has also been an increasing incidence over the past few years⁵. Furthermore, there is a growing trend for patients over the age of 80 to initiate dialysis^{4,5}. On the other hand, Portugal has had a gradual reduction of financial resources earmarked for health, including the bundled payment for hemodialysis.

Clinical practice guidelines strongly recommend autologous arteriovenous fistulas (AVF) as the preferred vascular access (VA) in all patients, as it is associated with better outcomes, improved quality of life, and reduced costs as compared to arteriovenous grafts (AVG) and central venous catheters (CVCs)⁶. However this across-the-board recommendation is being called into question by several authors and the ideal timing to create a VA has not yet been found, as the time to start dialysis cannot be premeditated in most patients, since many factors may be involved.

It is a very complex question to choose when, for whom, and what type of VA to create. There are too

many factors involved and there is scant evidence available. In my opinion, the main factors that should be taken into account should focus on the following themes:

1. Competing risk of death before starting dialysis;
2. Deterioration rate of renal function;
3. Risk factors for AVF failure and ideal VA type;
4. Local resources (multidisciplinary team with vascular surgeons and interventional nephrologists).

■ 1. COMPETING RISK OF DEATH PRIOR TO HEMODIALYSIS START:

The high prevalence of morbidity and mortality in the CKD population, with cardiovascular disease ranking amongst the most important cause, means that the creation of a vascular access can be cumbersome, or result in patient suffering and heavy investment of time, money, and energy without any useful outcome⁷. It has been reported that an increasing number of patients have received creation of an AVF that was never used, either because they did not progress to the need for dialysis, or because they died of a non-nephrology-related cause before that time⁸. There are no studies directly quantifying the relative mortality risk in CKD patients. Escoli and colleagues found that malignancy and heart failure were associated to higher mortality¹. A Swedish study found that older age, presence of comorbidities (diabetes and circulatory disease), and low education were associated with an increased risk of death, compared to the risk of dialysis progression⁹.

■ 2. HOW FAST IS THE KIDNEY FUNCTION DETERIORATING?

There are limited data on the natural history of CKD in unselected populations. The current recommended approaches to permanent access placement based on a single threshold level of renal function for patients of all ages are not appropriate¹⁰. Several authors have found persistent proteinuria and diabetes associated to a more rapid progression to dialysis^{1,3,11}. One study found that diabetic nephropathy may progress at 10-12 ml/min/year if hypertension is untreated¹². Other authors also found that higher blood pressure, especially systolic, is associated with more rapid loss of GFR¹³.

In clinical practice, many other factors, such as therapeutic compliance, diet, level of education, and acute intercurrents, may be involved, and it is currently impossible to predict the dialysis start time for each patient individually.

■ 3. RISK FACTORS FOR AVF FAILURE AND IDEAL VA TYPE:

Female gender, age, obesity, diabetes, peripheral artery disease, distal localization, vessel diameter, and compliance are important factors associated with higher failure rate¹⁻³. Another important issue is surgical expertise.

Studies have a lot of drawbacks. One of the most important is, in my opinion, the reimbursement policy of each country. Moreover most studies define elderly groups as being > 65 years old. I do not believe that most colleagues agree that a 66-year-old patient should be considered unsuitable for a fistula-first initiative based solely on this criteria.

Superaged (> 80 years) patients may be the most problematic group, given its increasing incidence. They have poorer performance status, worst nutrition, and more comorbidities with higher risk of mortality before starting dialysis, but also higher risk of VA failure, which often leads to multiple interventions that entail high costs and greater patient morbidity¹⁴. In addition, there is no consensus regarding the best VA type for elderly patients¹⁵. In this setting, many authors advocate a different VA policy for this group¹⁶.

Many demographic factors should be taken into account, but ultrasound pre-surgical mapping is by far

the deciding factor. For instance, a young female patient with diabetic nephropathy (with higher probability of a rapid progression to dialysis) with borderline ultrasound mapping criteria for successful maturation of an autologous access should not see her first attempt to create a fistula delayed. On the other hand, an 85-year-old man with undetermined and relatively stable CKD (higher mortality risk) and reasonable vessel diameters may wait longer for access creation.

■ 4. LOCAL RESOURCES AND SKILLS:

Every center has its own team with its own organization, response time, methodology, skills, and expertise. Different structures and approaches may be acceptable according to the experience and resources available at each center. Nevertheless, an ideal model should always include an ultrasound vascular mapping and a multidisciplinary decision (with close proximity and effective communication between vascular surgeons and interventional nephrologists) on when and which access to create for each patient according to his or her individual characteristics.

So, in conclusion, rather than emphasizing the doctrine of one fitting all, the issue may be driven by individual patient outcome and local resources, and should be based on a shared decision-making process. Further studies are needed to find new tools to improve patient referral and management. In this context, a future challenge could embrace a score or algorithm (focused on the above four topics) that may help to standardize patient prioritization and to make a wise decision driven by individual outcome. This approach will minimize discomfort, failure, and morbidity, but will also reduce unnecessary costs and useless interventions. These initiatives and tools should never disregard the need for proper clinical judgment applied to each single patient.

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