THE DIFFICULTY OF CHOOSING THE BEST HEMODIALYSIS VASCULAR ACCESS OPTION

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THE DIFFICULTY OF CHOOSING THE BEST HEMODIALYSIS VASCULAR ACCESS OPTION (Abstract): The increase in the incidence and prevalence of chronic kidney disease (CKD) seen lately augments the number of patients that need renal replacement therapy (RRT). The good management of CKD includes timely starting RRT and choosing the best treatment option. **Keywords:** CHRONIC KIDNEY DISEASE, RENAL REPLACEMENT THERAPY, HEMODIALYSIS, PERITONEAL DIALYSIS, RENAL TRANSPLANT

INTRODUCTION

CKD may be the consequence of cardiovascular disease but is also a risk factor for cardiovascular morbidity and mortality (1). The coexistence of other comorbidities inauspiciously strengthens this interdependence relationship, a telltale example being diabetes mellitus (2).

Identifying the patients with increased death risk is one of the main objectives of the clinician as close follow-up of the patients and more aggressive specific treatment play an important role in mortality reduction (1).

MATERIALS AND METHODS

1. Therapeutic options in end-stage renal disease

The correct management of the patients with advanced stage CKD consists in adapting guidelines' treatment recommendations to the specific circumstances of each patient. As CKD

progresses to end-stage renal disease, the clinician must choose among various treatment options for RRT: hemodialysis, peritoneal dialysis, or renal transplant (3,4).

2. Vascular Access For Hemodialysis

When starting hemodialysis, vascular access is needed, which includes central venous catheter (CVC) (temporary non-tunneled or permanent tunneled), vascular arterio-venous prosthesis, and arterio-venous fistula. Non-tunneled CVCs can be easily inserted in the femoral or jugular vein, but they are associated with increased thrombosis and infection risk. Consequently, they are not recommended in patients needing long term hemodialysis; in these patients one of the other options should be chosen (3,4).

Compared to catheters and prostheses, arterio-venous fistulae provide higher blood flow and incur lower infection risk; therefore, they are the preferred vascular access in patients on long term RRT. (4,5)

The patient's cardiovascular comorbidities, hemodynamic status, and patency of the vascular bed are the factors influencing the decision to choose among the various variants of permanent vascular access for long term hemodialysis (5,6,7).

RESULTS

We present the case of a 67 years-old patient, former smoker (he had quit 10 years previously, after 90 pack-years), former drinker, diabetic for 15 years, with multiple micro- and macrovascular complications and with severe cardiovascular comorbidities, including dilated cardiomyopathy with severe systolic dysfunction, severe tricuspid regurgitation, class III NYHA congestive heart failure, history of recurrent monomorphic ventricular tachycardia for which a VVI permanent cardiac pacemaker was implanted in 2002. The patient was followed by a nephrologist for stage 4 CKD. As the patient complained of persistent chest pain and the ECG findings were consistent with an acute coronary syndrome, coronary arteriography was performed, which demonstrated lesions in the epicardial coronary arteries. After the investigation, kidney function abruptly plummeted, the patient becoming anuric with a sharp rise in creatinine and urea plasma levels, severe acidosis, and hyperkalemia, unresponsive to non-invasive treatment. The clinical picture further deteriorated by the advent of pleural and peritoneal effusions, at which time the decision was made to start hemodialysis. A temporary catheter was implanted in the right jugular vein without any incident, and hemodialysis was started. The outcome of the RRT was favorable, with improvement in symptoms and lab tests, but without recovery of kidney function. Consequently, it was decided to establish permanent vascular access and continue hemodialysis. As the patient had diabetes and systemic atherosclerosis with stage IIIB peripheral arterial disease, the risk that an arteriovenous fistula (AVF) might be nonfunctional was deemed significant, therefore the decision was made to insert a hemodialysis long-life CVC. Catheter implantation followed the standard procedure and was devoid of incidents. Antibiotic was given for infection prevention and the patient was instructed to avoid contaminating the catheter implantation site and to promptly recognize early signs of local and systemic infection. Six months after catheter insertion the patient was in reasonably good health and had had no infectious event, while the permanent CVC remained permeable and functional.

DISCUSSION

In patients with preexistent cardiovascular pathology, the cardiovascular complications of CKD portend and contribute to an unfavorable outcome (8). Moreover, events that further enhance kidney injury (such as the administration of contrast) worsen the prognosis of CKD patients (9). The course of our patient corroborates this idea. On the background of both diabetic and ischemic chronic kidney disease, the decline in renal function was accelerated by the acute contrast nephropathy developed in the wake of coronary arteriography. After the procedure, the metabolic imbalance associated with the clinical and hemodynamic consequences of anuria resistant to conservatory treatment urged the initiation of hemodialysis on a temporary catheter inserted in the right jugular vein with no incidents or accidents. In the following days up to his discharge, the patient did not develop signs of infection and remained hemodynamically stable, but the kidney function did not recover, making long term hemodialysis necessary. For the chronic RRT the patient needed permanent vascular access.

The cardiac device already present in this patient (the permanent pacemaker) considerably increased complications risk, including central venous stenosis and infection. An AVF has a much lower infection risk and is therefore the preferred vascular access for hemodialysis in patients with intracardiac devices. The presence of a permanent pacemaker (inserted via the left subclavian vein), by stimulating intimal hyperplasia and fibrosis, may lead in time to central venous stenosis. In hemodialysis patients, heightened central venous pressure leads to arm, chest, neck, and face edema and markedly increases the risk of hemodialysis vascular access dysfunction (10,11,12).

In view of the severity of the associated peripheral artery disease, which decreased the likelihood of an AVF to be functional, the best solution for continuing hemodialysis was considered the insertion of a permanent hemodialysis catheter, despite the presence of the permanent pacemaker. The coexistence of both devices substantially increased infection risk. In contradiction to the current guidelines, a long-term CVC was nonetheless considered the preferred vascular access given the particular circumstances of our patient (10). The antibiotic given after the insertion of the temporary CVC is meant to prevent infection. Instructing the patient to observe the infection prevention measures and the close follow-up by the attending physician are also important steps toward infection prevention. (13) Six months after the implantation of the permanent hemodialysis catheter the patient had no signs of infection or of central venous stenosis and had a favorable outcome. In the future the patient should be carefully followed up, as the early recognition and prompt treatment of the complications may reduce death risk (13,14).

CONCLUSIONS

In a cardiac patient on chronic hemodialysis, decreasing the death risk is the clinician's main objective. This article demonstrates that increasing the survival in such a patient may sometime require management decisions at odds with the current guidelines' recommendations but adapted to the particular setting of each patient.

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