Case Report - Cardiac general

Right intra-atrial catheter insertion at the end stage of peripheral vascular access for dialysis

Enrique Villagran Medinilla*, Manuel Carnero, Jacobo A. Silva, Jose E. Rodriguez

Department of Cardiovascular Surgery, Hospital Clinico San Carlos, C/Profesor Martin Lagos s/n, 28040 Madrid, Spain

Received 7 November 2010; received in revised form 12 December 2010; accepted 14 December 2010

Abstract

The number of patients with end-stage renal failure requiring dialysis keeps increasing every year. Many of these patients also suffer from peripheral arterial disease. We report the case of a middle age woman receiving dialysis who had undergone amputation of both lower limbs and suffered multiple deep venous thrombosis. Therefore, peripheral accesses for venous dialysis were not available. A catheter had to be implanted right into the right atrium.

Keywords: Artery/arteries (includes all peripheral arteries); Cardiac catheterization/intervention; Peripheral vascular disease (outside the chest)

1. Introduction

The number of patients with end-stage renal failure requiring dialysis increases every year all over the world, and, it seems this trend will not change for many years. The need for a permanent vascular access for such patients is crucial, to warrant an appropriate flow during dialysis sessions.

2. Case report

A 55-year-old female patient with diabetes, high blood pressure and peripheral arterial vascular disease had been receiving haemodialysis for the last five years due to a grade V renal failure [National Kidney Foundation (NKF) ranking]. As a result of peripheral arterial disease, arteriovenous fistulas were no longer suitable for haemodialysis. For the same reason, the patient had undergone the amputation of both lower limbs.

The patient was being dialysed via a right femoral venous catheter at the time she was referred to our department. She had suffered a thrombosis of the venous brachiocephalic trunks three years previously, which made the jugular and subclavian veins unsuitable for catheter insertion. During the previous five months a right femoral catheter had been used as a vascular access for dialysis. The patient was on oral anticoagulants (acenocumarol).

During the last weeks she had been admitted to our institution several times because of repeated infections of the catheter, which had to be subsequently removed. Due to the repeated infections of the access, and the subsequent replacements, the flow and pressure of the latter gradually deteriorated, to the point that dialysis became technically impossible. An abdominal computed tomography (CT) revealed an infra-renal thrombosis of the vena cava. As a last resource, the suprahepatic venous system was canalized percutaneously. This access only allowed a suboptimal dialysis, due to an insufficient flow.

Finally, cardiac surgeons were consulted to consider the insertion of a direct intra-atrial catheter. This procedure was carried out under general anaesthesia by a right anterolateral thoracotomy through the fifth intercostal space. The catheter was inserted in the right atrium (Fig. 1), and fixed with a double 4/0 polypropylene suture. It was then tunnelled under the breast, to the right supraclavicular space (Fig. 2). The catheter was then heparinized and its permeability checked, as was its position by fluoroscopy. There were no postoperative complications and 10 months later the patient continued dialysis via the mentioned catheter with adequate flows.

3. Discussion

The number of patients with end-stage renal failure requiring dialysis increases every year all over the world, and, it seems this trend will not change for many years.

The need for a permanent vascular access for such patients is crucial, to warrant an appropriate flow during dialysis sessions [1].

The ideal vascular access should offer at least three conditions:

1. Allow a safe and continued access to the vascular system
2. Achieve enough flow for the administration of the programmed dose of haemodialysis
3. Be relatively free of complications
Problems related to vascular access represent one of the main causes of mortality and the need of hospitalization among patients being treated with haemodialysis. Thrombosis is the most frequent complication and is likewise the main cause of loss of access [2, 3]. In the majority of cases, the thrombosis is associated to low flow and is the final result of progressive stenosis, due to the development of an intimal hyperplasia. However, in 15% of the cases, the thrombosis is not the result of an obstructive process and is due to other causes, such as hypotension, compression, an increase in the haematocrit, or hypercoagulability [4].

Infection with or without bacteraemia is another frequent complication. Bacteraemia is more frequent in non-tunneled patients: (3.8–6.5 for each 1000 catheters/day) than in tunneled patient (1.6–5.5 for each 1000 catheters/day) [5]. Regarding the location, infections are more frequent in femoral catheters than in internal jugular catheters, the latter being more frequent than subclavian catheters. It is usually the main cause of removal of the catheter and of various associated complications, such as osteomyelitis, endocarditis and death [6].

In the case being reported, all other possibilities of vascular access had been ruled out [7]. After various attempts, we finally opted for a direct intra-atrial catheter as it was the only alternative possibility and we assumed it would provide adequate flow for carrying out haemodialysis. Although the insertion was performed through a right thoracotomy, a video-assisted thoracic surgery (VATS) would have been another possible approach. We preferred the former as VATS would have been technically more demanding due to patient’s obesity [8]. Ten months after the procedure the catheter was still working well. Therefore, we consider it as an efficient option for those cases in which the use of peripheral catheters are no longer viable and when the patient has no other alternatives.

References


Nowadays there are three types of access to the vascular system: a) the autologous arteriovenous fistula, preferably radiocephalic, which better fulfills these requirements, given its high survival rate and rare complications; b) polytetrafluoroethylene prosthesis; c) and central venous catheters, although its use should only be considered as a temporary means; while waiting for the performance of a new fistula, when it is impossible to create an adequate access, whether as a result of a bad arterial bed or the lack of venous development, or for short periods of haemodialysis whilst awaiting a kidney transplant or when life expectancy is less than a year, etc.

In the USA more than 200,000 people need haemodialysis, and it is estimated that around 250,000 catheters are inserted every year. However, 60% of the patients starting haemodialysis do so by means of a catheter and 30% of those who require long-term haemodialysis, do so with a catheter. In Europe the incidence is lower, varying between 15% and 50%. 

Fig. 1. CT showing direct intra-atrial catheter.

Fig. 2. Catheter tunnelled under the breast.