

Case report

A new technique for creating a complex hemodialysis access, a case report and review articles

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Abstract

The prevalence of End stage renal disease is increasing and we are facing a high number of patients suffering from ESRD with an increased lifespan as a result of progressive decrease in their mortality rate during the years. As they are going under a long time hemodialysis their vascular accesses are exhausted and so the unusual vascular access is necessary. In the case we explain ahead, it was impossible to create an AVF in upper extremities because of SVC obstruction and we had to save iliac vein for kidney transplant; so we used a new AV graft procedure between SFA and CIV in the left thigh that we found it a functional way for hemodialysis.

Key words: AVG, Complex vascular access

Introduction

The prevalence of End-stage renal disease (ESRD) is increasing rapidly worldwide and due to long time hemodialysis in these patients, loss of vascular access usually occurs[1, 2].

Since 1966, the standard procedure for creation permanent hemodialysis access was an arteriovenous (AV) fistula construction, but some patients do not have appropriate superficial veins for a primary AV fistula. In those patients the prosthetic grafts used for (AV) fistula creation. The upper extremities have been used for placement of these fistulas; however, outflow obstruction due to vein thrombosis, stenosis and occlusion or graft infection can lead to elimination of both upper extremity sites for these AV fistulas[3]. The formation of AV fistulas using prosthetic grafts in the lower extremities is also an other technique if the femoral veins were patent, therefore a systematic approach to alternative sites and techniques for vascular accesses is necessary[4-6].

In the case will be discussed ahead we were facing a patient with no usual vascular access for hemodialysis because of obstructed central veins such as SVC and femoral veins, on the other hand she was

candidate for a kidney transplant; so we needed iliac vein safe for this surgery.

In the surgical method we used, all these points were complied.

Case

A 23 years old female known case of end stage renal disease (ESRD) due to high blood pressure since three years ago was admitted to our clinic for creating a vascular access. with exhausted vascular access after multiple hemodialysis catheter insertion. The patient's dialysis care was complicated by recurrent vascular access failures. Her femoral and external iliac veins at both side were occluded in sonography because of previous multiple femoral access. Right jugular vein was occluded and SVC venography was done through left jugular vein cannulation under sonography guidance. Venography revealed total obstruction in superior vena cava and brachiocephalic veins due to acute thrombosis. Because of patient position and need to urgent dialysis the occlusion was passed by 0.035 standard hydrophilic guide-wire and 6F-JR catheter was passed among the clots to distal of SVC and double lumen dialysis catheter inserted under guide of the guide wire, the blood flow of each lumens



Figure. 1 - Tunneling for AV graft

were good, she got sufficient dialysis by this catheter. After 2 days this catheter was changed to a Perm-Cath. After 2 dialysis sessions Perm-Cath was thrombosed and another venography was done and we found thrombosis growth at the tip of catheter. We forced to change the Perm-Cath by a longer one. But we knew this catheter was at thrombosis risk and we should do a proper procedure at preparing patients to renal implantation. As mentioned above she had exhausted



Figure. 2 - End to side anastomosis between PTFE graft and common iliac vein

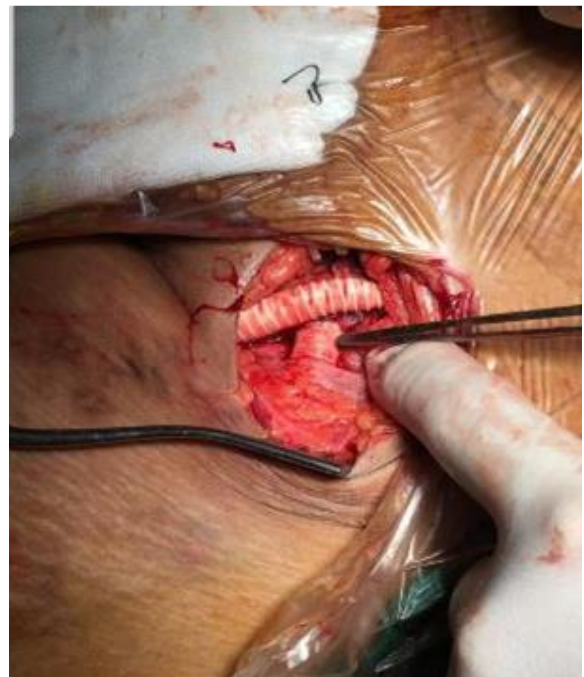


Figure. 3 - End to side anastomosis between PTFE graft and SFA

options for access in the upper extremity and as we needed to save iliac veins for kidney transplantation so we did not insert Perm-Cath in femoral veins and IVC and We decided to prepare an operation to create a loop thigh arteriovenous (AV) graft between left superficial femoral artery and left common iliac vein

We explored left common iliac vein through a left hockey stick incision and SFA using a longitudinal groin incision. then they were dissected from the surrounding tissues and were encircled with vessel loops. We also found external iliac vein was completely occluded and fibroses. A 7-mm ringed polytetrafluoroethylene Graft (PTFE) was tunneled in a loop configuration in the thigh and was sewn end-to-side to the superficial femoral artery and CIV. It should be mentioned that we picked the rings up from the part of graft comes below the inguinal ligament, in the looped part of the graft in the thigh. One week after surgery, standard hemodialysis was successfully initiated via her AVG. At this time, the graft is patent and serves as a hemodialysis access.

Discussion

As the patients suffering from end-stage renal disease require a long time hemodialysis, vascular exhaustion (vein thrombosis or stenosis) secondary to multiple central venous catheter insertion and

manipulation of peripheral veins for AV fistula occurs. So we are looking for unconventional procedures to create a functional access for hemodialysis.

There are different examples for complex vascular hemodialysis accesses. A bypass between subclavian artery-to-contralateral subclavian vein or The axillary-axillary arteriovenous graft. (necklace AVGs) were evaluated before as an effective vascular access and also they were technically easy to perform and easy to needle because of their superficial positions[7]. but we were facing a patient with SVC obstruction, Stenosis and occlusion of central veins can be treated by surgical methods or an angioplasty to make them suitable for AV access, but despite its excellent initial success, the primary patency rates for 1 year is $\leq 50\%$ and restenosis rates is high. And also suitable jugular vein or undisturbed contralateral venous outflow are needed for surgical methods. Creation an arterioarterial prosthetic loop (AAPL) for these patients with unsuitability of large deep veins has been done. The AAPL is a polytetrafluoroethylene (PTFE) graft loop interposed in the continuity of the axillary or femoral artery that can be used as the vascular access for hemodialysis. This method in patients with Critical ischemia of the extremity due to AV access and also patients suffering Cardiac insufficiency that is intolerable to the additional cardiac load of a high-flow AV graft is more indicated, but in our case we still had common iliac vein as a patent and suitable venous access for hemodialysis and this approach although its effectiveness is reserved only for patients without any other possible conventional vascular access[8]. A bypass between Axillary artery and right atrium was done for hemodialysis in a patient with difficult vascular access. In this method although its efficacy, a complex surgery including a sternotomy was imposed to patient[9]. Placing an intra-arterial catheter through an open operation also was tried in a situation that there is vascular capital exhaustion, but it showed significant risks and high mortality [10]. Therefore, in order to patient's inefficient central venous system of upper extremities due to SVC obstruction and also the bilateral obstructed femoral veins and her need to save the iliac vein for kidney transplant surgery in near

future, we used the arteriovenous fistula through a PTFE graft between superficial femoral artery and common iliac vein as the least invasive technique with a favorable complication rate. As mentioned, we were using a new method to creation an arteriovenous fistula by a prosthetic graft in a patient with exhausted vascular access for hemodialysis that it has not been done before. also we found it as a functional access was created through a safe and less invasive procedure. This case demonstrated that our surgical method can be used to create a competent vascular access in challenging access situations.

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