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Necklace fistula for complicated dialysis access patients

Komplike diyaliz girişim yolu bulunan hastalar için "kolye arteriovenöz fistül"

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Introduction

The number of patients undergoing dialysis has grown annually by 9% (1), and there is no reason to believe that this trend will not continue. Since its first description in 1966 (2), the arteriovenous fistula (AVF) has been the preferred vascular access for dialysis. However, vascular access dysfunction remains the principal reason for hospitalization in patients undergoing dialysis, and it is not uncommon for all usual AVF sites to fail, often in patients for whom neither peritoneal dialysis nor transplantation is an appropriate option. Thus, in some patients, creation of an access in the lower limb or a complex bypass using an expanded polytetrafluoroethylene (ePTFE) graft may be necessary. We describe our experience with complex (exotic, extra-anatomic) access procedure in a patient with difficult vascular access problems.

Case report

A female patient (age 67 years) undergoing hemodialysis in whom previous six upper extremity arteriovenous fistulas in both sides failed, was admitted to our clinic. The preoperative assessment included duplex scanning of both venous outflow and arterial inflow. Because of uncertainty regarding vein patency, a venogram was obtained. Venography revealed total occlusion of both left internal jugular vein and brachiocephalic vein, while normal flow of right subclavian vein was detected.

For a necklace bypass, the patient was placed under general anesthesia in the decubitus position with the shoulders supported. Incisions were made 1 cm below each clavicle (Fig. 1). Underneath the pectoralis major muscle, the axillary artery and vein were dissected. A curved subcutaneous tunnel running in front of the superior third of the sternum was made for graft implantation (Fig. 2). The venous anastomosis was created first, by using a 5-0 polypropylene running suture. Heparin (2000 IU) was then injected and the arterial anastomosis was done with the same suture (Fig. 3).

Follow-up included an assessment by the surgeon 3 weeks postoperatively and then referral to the dialysis clinic. The time between surgery and first cannulation was 4 weeks. Subsequently she underwent bimonthly clinical examinations in which the thrill, bruit, skin, cannulation sites, and adequacy of dialysis were reviewed. At second and tenth month follow up ultrasound dilution assessment (Transonic Systems, Ithaca, NY) that included measurement of the graft inflow rate and maximum systolic velocity (Vmax) were also performed. At the second month of follow-up, Vmax was 125 cm/sc and inflow rate was 1040 ml/min and the 10th month Doppler investigation revealed Vmax as 120 cm/sc and inflow rate as 960 ml/min. The results pointed the vascular access was functional at the 10th month follow-up.

Discussion

In patients with no remaining upper limb access options, the most commonly used alternatives are a long saphenous vein loop to the

Figure 1. Incisions below each clavicle and subcutaneous tunneling

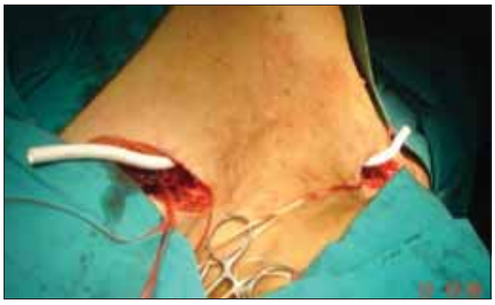

Figure 2. Graft implantation

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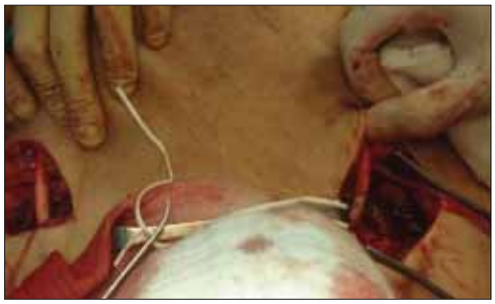

Figure 3. Scene after anastomoses done

femoral artery and transposition to the popliteal artery. Saphenous vein fistulas have low patency (3) and require many additional procedures, including surgical revision and dilation (4). Femoral grafts necessitating dissection of the femoral triangle have high infection rates and poor healing. Therefore, Gradman et al. (5) advocate femoral vein transposition in patients with central venous stenosis or obstruction, who are not eligible for peritoneal dialysis and are neither obese nor diabetic. In diabetic and obese patients, Karp et al. (6) have used the axillary artery to popliteal vein bypass. This long bypass avoids the femoral triangle and has provided satisfactory results during long-term follow-up in patients who otherwise were considered eligible for any access (6).

Despite efforts in recent years to maximize access, prosthetic bridge grafts are still necessary in about half of patients, despite inferior patency results. The necklace (axillo-axillary) bypass has been described previously, although no long-term results in series have been reported (6). In individual cases, good results and usually uneventful follow-up have been observed. We advocate use of this bypass in patients with exhaustion of all access possibilities in the arm who have a patent superior vena cava or patients with a unilateral subclavian vein or artery occlusion. The necklace bypass is also useful in patients at high risk of steal syndrome because it has only rarely been associated with this problem (7).

Numerous surgical solutions for dialyzed patients presenting central venous obstruction have been reported (8), including bypass to the right atrium. Chemla et al. presented their management pathway flow chart as an aid to decision making when a patient with central vein obstruction is encountered (3, 9).

Conclusion

Our case indicates that there is no “hopeless case” for vascular access, even if the procedure required to provide it is highly complex. The reasonable patency and minimal complications associated with our complex bypass show that this procedure is worth trying and that, with close follow-up, patients can gain some good-quality time.

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