Percutaneous closure of adjunctive arteriovenous fistulas after surgical reconstruction of iliac veins

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In open surgical reconstruction for chronic iliofemoral and iliocaval vein obstruction, addition of an arteriovenous fistula (AVF) can improve patency. The AVF is usually taken down in a second surgical procedure several months after the initial reconstruction. With the advancement of endovascular techniques, percutaneous closure of the fistula has become an option. We have completed percutaneous endovascular takedown of AVFs after surgical reconstruction of iliofemoral veins in three patients using an occlusion device. Complete occlusion was achieved in all cases, and no short-term complications were noted. Endovascular occlusion seems particularly appealing as further surgery in a groin usually scarred by previous open procedures can be avoided. (J Vasc Surg Cases 2016;2:66-7.)

Although endovascular revascularization with venous stenting has become first-line therapy for most cases of chronic iliofemoral and iliocaval vein obstruction, it is not a feasible or durable option in some patients, and open surgical reconstruction remains the only option for some.

Patency of grafts in the venous circulation is lower than that of grafts used for arterial reconstructions.[1] One way to try to improve patency is the addition of an arteriovenous fistula (AVF) that increases flow and decreases platelet and fibrin deposition in a prosthetic graft.[2,3] At our institution, we use fistulas in all prosthetic femoral venous bypasses. For Palma grafts, we use one if the vein is small (<5 mm) or if there was an early thrombosis that needed thrombectomy; during the second operation, we then add an AVF. We use prosthetic grafts for all of these AVFs. This avoids harvesting of additional veins and makes closure of the fistula with a plug uniform.

The AVF is usually taken down in a second surgical procedure several months after the initial reconstruction. We try to close the AVF at 3 months and at the latest 6 months after surgery. Leaving it too long might result in intimal hyperplasia; closing it too soon might result in graft thrombosis.

With the advancement of endovascular techniques in the past decade, percutaneous closure of the fistula has become an option. Using vascular plugs for various lesions has been described previously, although not in detail for closure of fistulas in venous reconstructions.[4]

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We have completed percutaneous endovascular takedown of AVFs after surgical reconstruction of iliofemoral veins in three patients.

For this publication, the Institutional Review Board waived the requirement for obtaining informed consent.

CASE REPORT AND TECHNIQUE

The three patients had polytetrafluoroethylene (PTFE) AVFs that originated from the superficial femoral artery and led to the venous bypass graft. These grafts were two venous femorofemoral bypasses (one PTFE, one saphenous vein) and one bifurcated PTFE graft from both iliofemoral axes to the inferior vena cava (Fig, *a*). In two patients, a 7- × 4-mm tapered PTFE graft was used to create the fistula; in the other one, a 6-mm PTFE graft with external support was used with a loop configuration.

Occlusion of the AVF was done 7 to 20 months after placement. Two patients received local anesthesia; one patient underwent general anesthesia for the procedure. Percutaneous access in all patients was achieved from the contralateral superficial femoral artery. First, a 0.035-inch soft angled guidewire was used to cannulate the contralateral iliac artery and the PTFE femoral AVF; then the guidewire was exchanged with a Kumpe catheter to a stiff Amplatz wire. A 6F or 7F Ansel-2 sheath was then inserted and advanced all the way through the contralateral iliac arteries into the common femoral artery and the PTFE AVF. As occlusion device, we used an Amplatzer Vascular Plug II (St. Jude Medical, St. Paul, Minn) ranging in size from 6 to 10 mm; a 10% to 15% oversizing results in good fixation and should prevent embolization (Fig, *b*).

The patients received 5000 units of heparin intravenously before deployment of the plugs to minimize thrombotic complications.

In two patients, the arteriogram at the conclusion of the procedure showed significantly decreased flow through the AVF. In one, the AVF occluded immediately after the placement of the occlusion device. In the other two, the fistula was occluded on duplex ultrasound at 5 months and at 6 months after the procedure. All three patients were maintained on long-term oral anticoagulation.

DISCUSSION

The benefit of an AVF of possible better graft patency is offset by potential side effects. These include an increase

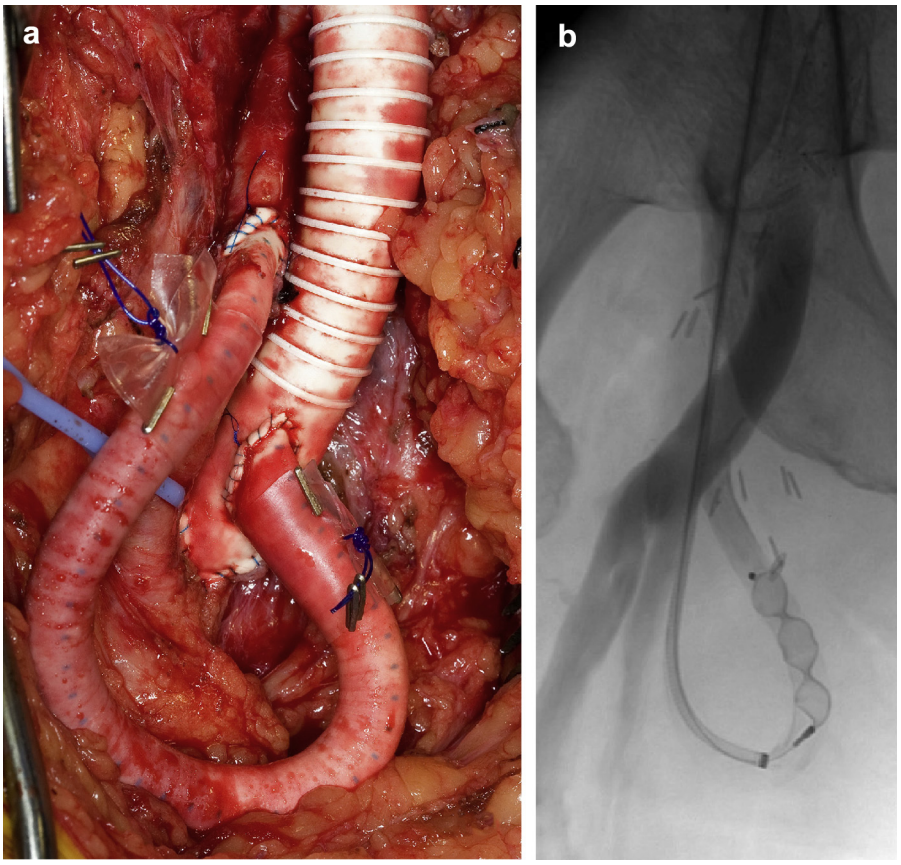

Fig. a, Arteriovenous fistula (AVF) from the common femoral artery to an iliofemoral venous polytetrafluoroethylene (PTFE) graft. A Silastic sheath is placed around the graft with a Prolene suture and two clips so that it can be recognized easily and ligated if open closure is needed. **b,** Angiogram of the same AVF after placement of occlusion device.

in venous pressure, defeating the purpose of the reconstruction and sustaining symptoms, and high-output heart failure triggered by a high shunt volume. Takedown of the AVF is timed according to a perceived shift from the beneficial effect on early graft patency to the negative effects.

As open surgical reconstruction of iliofemoral veins is in itself a rare procedure, data on adjunctive therapies such as AVFs and their closure or removal are also limited. The option of endovascular occlusion of adjunctive loop graft AVFs seems particularly appealing, as further surgery in a groin usually significantly scarred by previous open procedures can be avoided.

Complete occlusion was achieved in all three of our cases, and no short-term complications were noted.

REFERENCES

1. Alimi YS, Hartung O. Iliocaval venous obstruction: surgical treatment. In: Cronenwett JL, Johnston KW, editors. Rutherford's Vascular Surgery. 7th ed. Philadelphia: Saunders Elsevier; 2010. p. 919-45.
2. Menawat SS, Gloviczki P, Mozes G, Whitley D, Anding WJ, Serry RD. Effect of a femoral arteriovenous fistula on lower extremity venous hemodynamics after femorocaval reconstruction. J Vasc Surg 1996;24:793-9.
3. Gloviczki P, Hollier LH, Dewanjee MK, Trastek VF, Hoffman EA, Kaye MP. Experimental replacement of the inferior vena cava: factors affecting patency. Surgery 1984;95:657-66.
4. Güneyli S, Çinar C, Bozkaya H, Parıldar M, Oran İ. Applications of the Amplatzer Vascular Plug to various vascular lesions. Diagn Interv Radiol 2014;20:155-9.

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