Arterial Reconstruction of Infected Femoral Artery Pseudoaneurysms Using Superficial Femoral-Popliteal Vein

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BACKGROUND: Infected femoral artery pseudoaneurysms (IFAPs) secondary to percutaneous arterial access, injection of illegal substances, and from infected synthetic grafts, appear to be increasing in incidence. Ligation of IFAPs without revascularization offers control of infection but may risk limb ischemia. Revascularization with extraanatomic synthetic grafts may risk reinfection and abrupt thrombosis. Excision of IFAPs with revascularization using superficial femoral popliteal vein (SFPV) provides both control of infection and excellent limb perfusion.

STUDY DESIGN: A retrospective review was conducted of patients diagnosed with IFAP who underwent resection and revascularization with SFPV at a single medical center. Outcomes measured included reinfection and amputation rate. These were compared with other series using various methods to treat IFAPs.

RESULTS: Eleven patients with IFAP were encountered from 1992 to 2004. Mean age was 64 years (±10 SD). Five patients developed IFAP secondary to percutaneous arterial access procedures. Four patients developed infected femoral artery pseudoaneurysms secondary to synthetic graft infection. Two patients developed IFAP secondary to injection of illegal substances in the femoral region. All patients had positive wound cultures initially. *Staphylococcus* was the most common organism found in wound cultures. All patients underwent resection of IFAP with lower extremity revascularization using SFPV. There was no incidence of limb ischemia and no perioperative deaths in this series.

CONCLUSIONS: Excision of IFAP with revascularization can be successfully achieved using SFPV. This method may prove to be superior to other methods with apparent higher patency rates and resistance to reinfection. (J Am Coll Surg 2005;200:831–836. © 2005 by the American College of Surgeons)

Management of infected femoral artery pseudoaneurysms (IFAPs) continues to be a difficult surgical problem associated with high mortality and morbidity, including limb loss.[1-3] Complete resection of infected vascular tissues and revascularization can be challenging, especially when bifurcation of the common femoral artery is involved. IFAPs can arise from multiple causes, including injection of illegal substances, arterial access for diagnostic and endovascular procedures, closure device infections, and synthetic graft infections.[1-5] In most cases, direct arterial repair is not possible because of extensive vessel wall destruction and inflammatory changes in the surrounding tissues. Simple ligation of the involved femoral artery without revascularization has resulted in amputation rates > 30%, notably when major arteries at the common femoral bifurcation are sacrificed.[2-3] Extraanatomic bypass is frequently not feasible and may result in secondary infection of the prosthetic bypass graft.[2]

In a report that dealt primarily with aortic graft infections, Clagett and colleagues[6] first reported use of the superficial femoropopliteal vein (SFPV) graft for treatment of infected iliac and femoral aneurysms. Benjamin and colleagues[2] subsequently reported using this technique in a larger series of infected pseudoaneurysms, of which there were five IFAPs. Others have confirmed successful outcomes using this technique.[7-9] The current report updates our experience using SFPV grafts in the

Competing Interests Declared: None.

Received October 26, 2004; Revised December 9, 2004; Accepted February 2, 2005.

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ISSN 1072-7515/05/$30.00
doi:10.1016/j.jamcollsurg.2005.02.012

Abbreviations and Acronyms

IFAP = infected femoral artery pseudoaneurysm
PTCA = percutaneous transluminal coronary angioplasty
SFPV = superficial femoral popliteal vein

treatment of IFAPs and this represents the largest series reported to date.

METHODS

From 1992 to 2004, 11 patients underwent operations for IFAPs using SFPV grafts at the University of Texas Southwestern Medical Center at Dallas (Parkland Memorial Hospital, Zale Lipshy University Hospital, and the Dallas Veterans Administration Medical Center). Inpatient records, including anesthesia and operative data and outpatient clinic charts, were reviewed. Patient data are displayed in Table 1. There were 5 women and 6 men with a mean age of 64 years (±10 years SD). Medical comorbidities included hypertension, coronary artery disease, congestive heart failure, and diabetes mellitus. Eight patients had right-sided IFAPs and 3 patients had left-sided involvement. All patients underwent preoperative imaging that involved arteriography, computed tomography, or duplex scanning before operation.

Surgical technique

The technique is similar to that previously described for the treatment of aortic graft infections,[10] with specific modifications directed at localized femoral involvement. The reconstruction begins with the procurement of the venous autograft. An incision is usually made over the lateral border of the sartorius muscle in the ipsilateral thigh with the goal of avoiding infected tissue. During graft procurement, the infected site is covered with an adherent, iodine-impregnated plastic sheet to isolate infected tissue from the vein graft harvest site. Once the SFPV is isolated, the side branches are ligated. In general, the entire SFPV is harvested to perform the bypass and the vein graft is dissected from the femoral area to just above the knee. Side branches are carefully ligated with attention to the diameter of the side branch. If the branch has a diameter $\leq$ 1 mm, a single 3-0 silk tie is applied. All side branches $>$ 1 mm in diameter are doubly ligated and side branches $\geq$ 3 mm in diameter have a suture ligature placed as the second outer ligature. In contrast to handling the greater saphenous vein, ties are applied in close apposition to the vein wall. This is because many branches have a thin wall at their origin, which often extends onto the caudal port of the SFPV. Close opposition of ligatures at this site helps to buttress this thin area with adventitia. The vein is harvested and the valves are ablated using a rigid valvulotome or the vein graft is everted and the valves are completely excised. The grafts are stored in cold preservation solution until ready for placement. The superficial femoral and profunda femoris arteries are isolated through this same incision by extending it to the anterior superior iliac spine and retracting the sartorius muscle medially. My colleagues and I have been able to isolate this part of the

Table 1. Patients with Infected Femoral Artery Pseudoaneurysms

Patient no.	Age (y)	Gender	Side	Cause	Comorbidities	Culture	Reconstruction	Ankle brachial indices	
								Pre	Post
1	76	F	R	PTCA	CAD	*S aureus*	Lateral	1.0	1.0
2	73	F	R	Ax-fem bypass s/p TAA	HTN, CHF	*E faecalis*	Lateral	1.0	0.97
3	69	M	R	PTCA	CAD, DM	*S aureus*	Transobturator	0.8	0.78
4	76	M	R	AFB	HTN, CAD	*S epidermidis*	Transobturator	0.8	0.82
5	51	M	L	AFB	HTN	*S aureus, Pseudomonas, E faecalis, Bacteroides*	Lateral	1.0	1.1
6	57	F	R	Femoral access	Cerebral AVM	*S aureus*	Lateral	1.1	1.15
7	67	M	R	PTCA	HTN, CAD	*Corynebacterium*	Lateral	0.6	0.63
8	65	F	R	AFB	HTN, CAD	*S epidermidis*	Lateral	1.0	1.09
9	69	M	R	PTCA	HTN, CAD	*S epidermidis*	Transobturator	1.1	1.12
10	57	F	L	IV drug injection	HTN	*S aureus*	Transobturator	1.0	1.0
11	45	M	L	IV drug injection	HIV	Negative	In situ	0.9	0.9

AFB, aortobifemoral bypass; AVM, arteriovenous malformation; CAD, coronary artery disease; CHF, congestive heart failure; DM, diabetes mellitus; F, female; HTN, hypertension; L, left; M, male; PTCA, percutaneous coronary angioplasty; R, right; TAA, thoracoabdominal aneurysm.