

Original Article

TREATMENT OF INFECTED PSEUDOANEURYSM IN DRUG ABUSERS: LIGATION OR RECONSTRUCTION?

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Background: Recently, there has been an increase in the incidence of major vascular complications such as infected pseudoaneurysm due to intravenous drug use.

Objective: For better understanding of the existing controversies regarding the optimal surgical management of infected pseudoaneurysm, the present study was conducted.

Methods: Medical charts of 36 consecutive patients who underwent surgery in Taleghani Hospital, Tehran, Iran from 1996 through 2003, were retrospectively analyzed.

Results: We studied the hospital records of 33 cases; two patients had bilaterally infected pseudoaneurysms and one underwent an emergency reoperation. The total number of operations was 36. Eleven cases (30.5%) underwent ileofemoral reconstruction and 25 (69.5%) arteries were ligated. All patients presented with infected femoral or brachial pseudoaneurysms due to intravenous drug abuse. Postoperatively, there was no hemorrhage, vascular thrombosis, amputation, or mortality. Three cases (8%) had incisional infections (2 [18%] after reconstruction and 1 [4%] after ligation operation) and 7 patients (19%) had claudication (all after ligation).

Conclusion: Ligation is the optimal management for infected pseudoaneurysm, because it is easy, cost-effective, and safe. Reconstruction is not recommended, because of an extended infection at the location of pseudoaneurysm and at the artificial graft site.

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Keywords: Drug abusers • ligation • pseudoaneurysm

Introduction

Drug abuse is a global social and health problem. Recently, there has been an increase in the incidence of major vascular complications such as infection of the femoral region vessels due to intravenous (IV) drug use.^{1,2} Approximately 75% of all admissions for accidental intra-arterial drug injections involve the lower limb; hence, the most common site of infected pseudoaneurysm is the inguinal region.^{3,4} If left untreated, the infected pseudoaneurysm may be accompanied by systemic sepsis, life-threatening hemorrhage, loss of limb, or even death.

Treatment of infected pseudoaneurysm varies from excision and ligation of the involved vessel to ligation and routine revascularization.^{3,5} Some authors have advocated a simple arterial ligation due to the high incidence of graft infection following immediate reconstruction. Because of the addicts' tendency to reuse femoral sites for further drug administration, arterial reconstruction may be in jeopardy of recurrent infection.^{2,6} Some authors have adopted a more selective attitude towards revascularization, either simultaneously with ligation^{4,7} or as a delayed procedure.⁸

Concerning the existing controversies of the optimal surgical management of infected pseudoaneurysm, we reviewed the hospital records of 33 IV drug abusers with infected pseudoaneurysms and compared the results and complications of the two surgical methods.

Patients and Methods

Medical charts of 33 consecutive patients,

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presenting with infected femoral or brachial pseudoaneurysms due to IV drug abuse from 1996 through 2003, were retrospectively reviewed. Two patients had bilaterally infected pseudoaneurysms and one underwent an emergency reoperation. Thus, the total number of performed surgeries was 36.

All patients received systemic IV antibiotics (ceftriaxone, cefazolin, and metronidazole) before operation as well as afterward. IV antibiotics were discontinued as soon as leukocytosis and/or fever subsided. Patients received an average of one week of IV antibiotics. Thereafter, ciprofloxacin tablets (500 mg) were administered for two weeks.

Out of 36 operations, 11 (31%) patients underwent ileofemoral reconstruction, whereas ligation was performed on the remaining patients (69%). Ileo-femoral reconstruction was performed using saphenous vein (5 patients), Dacron (4 patients), and PTFE grafts (2 patients). All reconstructions were anastomosed in an extra-anatomical manner from the iliac to the superficial femoral artery, and placed subcutaneously.

Daily dressing of open wounds and checking for ischemic signs on the limbs were carried out. At the time of discharge, there was no patient with gangrene of the limbs.

Results

Experience with 36 arterial operations for the treatment of 35 femoral or brachial infected pseudoaneurysms has been described. All patients were males. The mean \pm SD age of patients was 36.3 ± 9.9 (range: 18 – 66) years (Table 1). Thirty patients (88%) had used heroin, three (6%) morphine, and another three (6%) had used both heroin and morphine. Ten (30%) patients had right lower limb involvement, 17 (52%) had left lower limb, and two (6%) patients had bilateral lower limb involvement. The right upper limb involvement was seen in three (9%) patients and the left upper limb in one (3%) case. Two patients were HBsAg and HIV positive. Three (12%) out of 25 ligations were on the brachial artery. Amongst the remaining ligations, thirteen were placed

Table 2. History and physical findings of patients with infected pseudoaneurysms.

Finding	Number of patients	%
History		
Groin swelling	31	91
Pain and/or tenderness	27	79
Bleeding	23	68
Fever and chills	17	52
Purulent drainage	16	47
Paresthesia	3	9
Physical examination		
Inflammation	27	79
Pulsatile mass	21	63
Warmness	20	59
Redness	18	53
Purulent drainage	17	50
Distal pulses (dorsalis pedis/posterior tibial)	16	47
Bleeding	16	47
Limb edema	15	44
Bruit	16	47
Thrill	7	21
Sensory dysfunction	8	24
Motor dysfunction	5	15

proximal to the bifurcation (59%), eight (36%) were distal to the bifurcation, and one was exactly at the bifurcation site.

On physical examination, 21 (63%) patients had a pulsatile mass in their groins or arms and 11 (33%) had a mass without pulsation. The size of the masses varied. The mean mass size was 6.26 cm^3 , ranging from 2.5 to 20 cm^3 . Limb edema was detected in 14 (42%) patients. Involvement of the leg and thigh occurred in 12 (36%) patients, while involvement of the leg and forearm and involvement of the hand occurred in one (3%) patient each. Nineteen (58%) patients had no limb edema. Table 2 summarizes the histories and physical findings of the 33 patients who took part in this study.

For one patient, ligation of the artery was initially performed. Two hours after the operation, however, he showed ischemic signs in the lower limb. As a result, he underwent an emergency reoperation and reconstruction procedure. There was no hemorrhage, vascular thrombosis, amputation, or mortality. Local infection and claudication were the only complications identified

Table 1. Some variables in patients with infected pseudoaneurysms.

Variables	Mean (SD)	Maximum	Minimum
Age (yr)	36.3 (9.9)	66	18
Duration of abuse (yr)	7.5	50	0.5
Delay in examination (day)	26	75	1
Oral temperature ($^{\circ}\text{C}$)	37.4 (0.7)	39.5	36.5
White blood cells ($/\text{mm}^3$)	15,000	36,500	4,000

Table 3. Assessment of surgery and its outcome in patients with infected pseudoaneurysms.

Outcome of surgery	Yes/No	Reconstruction (n = 11)	Ligation (n = 25)
Bleeding	Yes	0	0
	No	11 (100%)	25 (100%)
Thrombosis	Yes	0	0
	No	11 (100%)	25 (100%)
Amputation	Yes	0	0
	No	11 (100%)	25 (100%)
Mortality	Yes	0	0
	No	11 (100%)	25 (100%)
Infection	Yes	2 (18%)	1 (4%)
	No	9 (82%)	24 (96%)
Claudication	Yes	0	7 (19%)
	No	11 (100%)	18 (81%)

in this study. Overall, three (8%) cases had incisional infection (two [18%] after reconstruction and one [4%] after ligation operation) and seven (19%) patients had claudication (all after ligation) (Table 3).

Discussion

The most common arterial complication in IV drug abusers is infected pseudoaneurysm of the femoral artery.^{3, 4, 6 - 13} Arterial pseudoaneurysm from selfinjection of drugs occurs most commonly in the groin.^{8, 14} The most common presenting symptoms were inflammation/swelling of groin and pain (41% and 80%, respectively). On physical examination, inflammation (79%) and pulsatile mass (63%) were the most common findings.^{15, 16}

The debate regarding reconstruction is of particular interest in the subset of patients with infected pseudoaneurysm of the femoral bifurcation, which is the result of IV drug abuse.¹⁷ If the reconstruction is to require prosthetic material, then the resulting reinfection could be more complicated and dangerous.² Thereby, from that point of view, most of the authors have advocated simple arterial ligation and resection of the infected tissues.^{2, 18} However, the amputation rate after simple ligation is 33% when the femoral bifurcation is involved.^{3, 13}

In a study by Arora et al,¹⁹ they performed a simple arterial ligation for all patients. There was no amputation after the operation and the only complication was mild claudication after 18 months. Reddy et al⁴ carried out arterial ligation on 39 patients. They reported two (5%) amputations, performed on patients who did not have appropriate collateral blood circulation because of

a previous common femoral artery ligation. McIlroy et al¹⁶ conducted a study on 60 IV drug abusers. Twelve cases underwent reconstruction surgery and the others (48 patients) underwent ligation. In comparison with ligation, reconstruction surgery had more postoperative complications (50% rejection of the graft and 17% amputation above the knee vs. 8% amputation after ligation). They recommended that in all cases, surgical treatment should include ligation of the aneurysm, debridement of necrotic tissue, and packing of the open wound to allow healing by secondary intention. At the time of surgery, the surgeon can select which patient will benefit from a reconstruction, based on the degree of the initial infection and the segment of the femoral artery involved.

Johnson et al⁸ in a study on 38 patients, preferred the ligation operation for the management of infected femoral pseudoaneurysms. In a study carried out by Cheng et al,⁵ no significant difference in the amputation rate between ligation and delayed reconstruction operations (in cases of acute ischemia) and early reconstruction was observed. Therefore, they selected the ligation procedure as the safer method. Welch et al²⁰ reached the same conclusion. On the other hand, al-Zahrani et al²¹ recommended early reconstruction of all major vessels, whenever possible, based on the current advances both in the antibiotic industry and in vascular surgery. Consequently, they believed that reconstruction was the best way to save patient's organs. However, long-term prognosis, in their experience, was poor and unpredictable. Reconstruction of vessels to manage an infected pseudoaneurysm is recommended by Kaiser et al²² and Levi et al²³ because of the lower

rate of postoperative claudication. These two studies comprised a low number of patients (two and eight, respectively).

The best management of all infected pseudoaneurysms is the ligation of the artery. All patients who underwent ligation surgery had healthy limbs at the time of discharge. After ligation, seven patients showed signs of claudication, which is more acceptable than complications such as amputation and gangrene, resulting from reconstruction. Ligation is the optimal management for infected pseudoaneurysms because it is easy, cost-effective, and safe. Early reconstruction is not recommended, since there is an extended infection in the location of the pseudoaneurysm. Moreover, infection of the artificial graft is also not uncommon. On the other hand, reconstruction of a vessel needs a skillful surgeon; otherwise, technical problems can lead to postoperative complications such as the development of aneurysms in the suture line. Because of the IV drug abusers' tendency to reuse the femoral sites for further drug administration, and because subcutaneous sites of extra-anatomical grafts increase their access for the reuse of the artery for injection, the arterial reconstruction maybe in jeopardy of recurrent infection. Consequently, ligation is the optimal management of infected pseudoaneurysm in IV drug abusers.

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