

Surgical Management of Femoral Artery Pseudoaneurysms Secondary to Drug Abuse

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ABSTRACT

Objective: To assess the outcome of surgical management of mycotic false aneurysms due to local injury after intravenous injection of drugs.

Study Design: Case series.

Place and Duration of Study: Department of Surgery, Kerman Medical School of Sciences, Kerman, Iran, from July 2001 to June 2009.

Methodology: Twenty one consecutive patients presenting with infected femoral artery pseudoaneurysms (IFAPs) secondary to parenteral drug abuse treated in our department were studied. Data analyzed included demographic characteristics, modes of presentation, side of involvement, management and outcome.

Results: All patients were male with mean age of 32.2 ± 5.2 years. All presented with pain and swelling in the groin. Five patients presented with significant hemorrhage. The locations were the left side in 9 cases and the right side in 12 cases. The injured artery was the common femoral artery and its bifurcation. In 14 patients (64%), ligation-excision was carried out. In 5 patients (26%), primary repair of the artery with over-sewing was done. In 2 patients (10%), revascularization with saphenous interposition was carried out. Below-knee amputation was necessary in 1 patient who underwent ligation-excision. One patient died due to severe septicemia.

Conclusion: Ligation of IFAPs is an effective, safe and simple option. Primary repair with preservation of the native vessel is suggested if infection is limited.

Key words: False aneurysm. Femoral artery. Intravenous drug abuse. Ligation. Mycotic aneurysm.

INTRODUCTION

Management of mycotic false aneurysms due to local injury after intravenous injection is challenging. The continued increase in drug abuse in many countries has resulted in the rising incidence of this problem.¹

Repeated failed attempts of injection of drugs such as cocaine or heroin may injure arteries or veins. Among such injuries, the femoral artery and brachial artery are most at risk.²⁻⁴ Huebl and Read suggested that inadvertent injection into or around the artery is the primary cause of this aneurysm.^{4,5} Extravasation of blood and infection of the subsequent hematoma follows. This causes rupture of the vessel wall and, eventually, formation of mycotic false aneurysms.⁶

Infected femoral artery pseudoaneurysms (IFAPs) are a severe complication in parenteral drug abusers. Their management is difficult and controversial. Ligation alone without revascularization may be associated with subsequent intermittent claudication and limb amputation. Furthermore, arterial reconstruction with a

synthetic or venous conduit is limited because of a contaminated field and, often, the non-availability of autologous venous grafts.⁸

The aim of this study was to assess the outcome of surgical management of mycotic false aneurysms due to local injury after intravenous injection of drugs.

METHODOLOGY

The data of consecutive patients presenting with IFAPs secondary to parenteral drug abuse, who were treated in the Department of Surgery in the Kerman Medical School of Sciences, from July 2001 to June 2009 were collected and analyzed. The inpatient records included demographic characteristics, modes of presentation, the side of involvement, management and outcome.

Physical examination was done in all patients, while radiological imaging was not considered for diagnosis.

The basic surgical plan comprised (irrespective of the anatomical position of the aneurysm): ligation-excision of the infected femoral artery; local debridement of all necrotic tissue; and extensive drainage of local sepsis. Primary repair with preservation of native vessels was done if the infection was limited. In cases with extensive infection, the feeding vessels were ligated. This was followed by a period of observation; revascularization was done in limbs that appeared to be in danger of critical ischemia.

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Results were presented as mean \pm standard deviation for continuous data and absolute or relative frequency for categorical data. SPSS software version 13 was used.

RESULTS

There were 21 male patients with the mean age 32.2 ± 5.2 years (range, 20-48 years). The data of the study population are shown in Table I. Patients did not give a true history of drug abuse. It was ascertained that the predominant drug that was abused was heroin. All patients had a combination of pain and swelling in the groin. Five patients presented with significant hemorrhage (the locations were the left side in 9 cases and the right side in 12 cases). The injured artery was the common femoral artery and its bifurcation.

In 14 patients (64%), ligation-excision was carried out. In 5 patients (26%), primary repair of the artery with over-sewing was done. In 2 patients (10%), revascularization with saphenous interposition was carried out. Below-knee amputation was necessary in one patient who underwent ligation-excision. One patient died due to severe septicemia.

Table I: Characteristics of male patients with infected false aneurysms related to intravenous drug abuse.

Variables	Absolute frequency
Age (years)	
20-30	9
30-40	11
40-50	1
Presentation	
Pain	21
Swelling	21
Bleeding	5
Surgery type	
E-L	14
PR	5
E-SI	2
Amputation required	1

E-L, excision of pseudoaneurysm and ligation of femoral artery; PR, primary repair with preservation of native vessels; E-SI, excision of pseudoaneurysm and saphenous vein interposition.

DISCUSSION

The diagnosis of an IFAP is straight forward even to the general surgeon because induration and erythema over a pulsatile mass is usually evident on initial examination. In some patients, soft-tissue swelling makes pulsation of the mass difficult.⁹ Nevertheless in 25% of patients, IFAPs present with a non-pulsatile mass. A skin track is seen at the site of injection with purulent drainage.¹⁰ The diminished or absence of peripheral pulses of arteries and gangrene in the extremities seen in traumatic injuries are not common in IFAPs.¹¹

A history of inadvertent or intentional arterial puncture several days-to-weeks before hospital admission was

reported by most of the patients, and this could have led to active bleeding.¹¹ Five (25%) of our patients suffered bleeding before seeking medical help.

High-quality evidence on the best management of infected femoral false aneurysms is lacking. Clinicians must rely on several heterogeneous case series.^{7,12} The aim of treatment should be to obtain sufficient debridement and to control bleeding.¹³ Any swelling around the great vessels in drug abusers should be assumed to be an IFAP unless proven otherwise. Urgent referral to a vascular surgeon for appropriate treatment should be encouraged.¹

The therapeutic options that have been proposed or presented in the literature include: primary repair, immediate interposition grafting, extra-anatomic bypass, ligation-excision alone, and delayed revascularization. Some authors have employed more than one option.¹⁴

In 5 of our patients (35%), primary repair of the common femoral artery with over-sewing was carried out. Primary repair with preservation of native vessels is usually thought to be the best choice if the infection is limited. However, it is not advocated by some surgeons because extensive damage of the arterial wall causes secondary bleeding.¹⁵

In 2 patients (10%), revascularization with saphenous interposition grafting was done without complication and amputation was not required. Attempts to utilize prosthetic materials in the infected bed of resected IFAPs have yielded poor results. Tsao *et al.* recently reported a case of an IFAP managed with an arterial allograft hypogastric artery.¹⁰ Georgiadis *et al.* reported 26 patients with infected femoral artery false aneurysm, who underwent revascularization with vein graft or vein angioplasty. In this series no claudication but two cases of bleeding were detected after surgery.¹¹

Extra-anatomic bypass through non-infected tissue planes provides an alternative approach, but this approach was not used in our patients.¹⁶ If successful treatment is a viable limb and resistance to re-infection, then a more rational and cosmetically pleasing choice is to lay an autogenous channel in an anatomically separate course that is not infected.¹⁴ If an infection in the groin reaches the medial thigh, the lateral femoral route is chosen. In this way the superficial femoral artery and deep femoral artery can be revascularized. If possible, retrograde flow should be retained, and the common femoral artery ligated just proximal to the bifurcation to prevent necrosis of the thigh. Ligation alone permits communication between the profunda femoral artery and superficial femoral artery to be maintained. If the pelvis is free of infection, proximal anastomosis can be employed to the common or external iliac artery. If the pelvis is infected, the axillary artery or contralateral femoral vessels can be used.¹¹

Nevertheless, the use of the obturator route is a better option, but creation of the tunnel is difficult.^{15,16} Using this therapeutic approach, Patel *et al.* reported a low prevalence of late amputation and infection (7%) and no prevalence of bleeding. However, the risk of early infection of the graft remains because eradication of bacteremia is not possible in emergency situations.¹⁴

One option that has been accepted in the literature is ligation without revascularization.^{17,18} This decreases the risk of ischemia or claudication related to infection due to implantation of prosthetic material.¹⁹

Ligation-excision was done in 14 patients (65%). Salehian *et al.* reported that ligation is the optimal management for infected pseudoaneurysms because it is simple, cost-effective, and safe. The main drawback of using a graft is primary and secondary infection which may occur until 1 year after surgery.⁴ Critics of ligation-excision alone state that the risk of anastomotic disruption is the same as for ligation alone because ligation points cannot be totally excluded from the infected area. One example is the report of three IFAPs in the Profunda femoral artery, bleeding from anastomoses that became torn immediately after the procedure. Returning the patient to theater is a serious risk.²⁰ The risk of rupture is present in all revascularization methods and is related to local and systemic infection. Defenders of revascularization suggest that a bypass procedure should be used if infection is limited. In our patients who underwent ligation-excision, one below-knee amputation was necessary; this seems to be an acceptable outcome. One potential problem after ligation-excision is claudication, but this complication could not be detected because of poor follow-up of patients.

Although assessment of the type of microorganisms and their sensitivity to different antibiotics was very important, there was no reliable information in the hospital records of these cases. In addition, because of their special situation of this group, subjects did not have any interest to follow their treatment actively after their hospitalization. Therefore, the records after their discharge were not completed.

The fear of limb loss has led authors to recommend observation with Doppler ultrasonography after ligation and revascularization in limbs at the risk of ischemia. Recognition of ischemia in the first 6 hours is very crucial, and bypass after 6 hours is not associated with good outcome.^{21,22}

CONCLUSION

Ligation of IFAPs is an effective, safe and simple management option. Primary repair with preservation of the native vessel is appropriate if infection is limited.

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