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STUDYING THE RESULTS OF FEMORAL ARTERY LIGATION IN 65 PATIENTS WITH INFECTED PSEUDOANEURYSM DUE TO IV–DRUG ABUSE

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ABSTRACT

Regarding the increasing numbers of IV drug addicts, the incidence of infected pseudoaneurysm is increasing. So far, different therapeutic strategies have been tried, but each method has its own drawbacks. Therefore, discovering an appropriate therapeutic method is necessary.

65 patients with infected pseudoaneurysm due to drug injection referred to Shohada Medical Center from Feb 1994 till Oct 2003 were chosen. After obtaining proximal control of the external iliac artery, femoral artery ligation was performed in all patients. The patients were observed for signs and symptoms of ischemia.

After primary ligation of the involved artery, acute ischemia occurred in only 6 patients who later underwent extra-anatomical bypass. Only 3 patients underwent amputation. One of them was performed after extra-anatomical bypass and two cases after arterial ligation, as ischemia and gangrene had been present on admission. During patient follow up (minimum 3 months, maximum 3 years and average 12 months), 8 cases of slight claudication (9.3%) and 3 cases of severe claudication were reported and the rest have been symptom-free.

Various treatments have been used for infected pseudoaneurysm, but none of them are faultless. According to infection of the site and existence of extensive necrosis and inflammatory tissue, anatomical and even non-anatomical bypasses are almost improbable. The results of this study indicate that arterial ligation could be the first and probably the best choice of treatment in such patients with less cost and also without mentionable morbidity or mortality. This procedure must be performed in a vascular surgery center to perform vascular bypass if needed.

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INTRODUCTION

Pseudoaneurysm is a common vascular disease. It might happen as a result of progressive technology and increasing use of femoral artery catheterization (diagnostic or therapeutic).

Nowadays, we encounter more cases of the infected type which is caused by an increase in IV-drug addiction. According to the prevalence of pseudoaneurysm an appropriate plan must be pursued for the treatment of these patients. Several therapeutic methods have been sug-

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gested, such as:

1. Excision of the aneurysm and extra-anatomical vascular bypass[1,2]

2. Vascular ligation and debridement followed by delayed bypass if needed[2]

3. Embolization through angiography[3,4]

4. Non - surgical methods like thrombin injection[5]

Is it possible to excise an infected femoral pseudoaneurysm concomitant with performing primary anastomosis (as an extra anatomical means of autologous vein or synthetic graft) while infection is present? A lot of research has been conducted to answer this question.

Moreover, some studies have compared each of these methods accompanied by ligation of one or all three main arteries of the limb (common femoral, superficial femoral and deep femoral arteries).[1,6,7]

Primary anastomosis may lead to disruption of the anastomosis (due to localized infection) or thrombosis.[8,9,10]

In a prior study, among 16 patients enrolled, early amputation was done in one case on the first day because of diffuse infection. The other 15 patients underwent primary revascularization. In 10 patients, bypass was performed through the obturator foramen. Iliofemoral (3 cases), axillopopliteal (one case) and external iliac to popliteal anastomosis were done for the other ones. Among those 3 cases of iliofemoral anastomosis, above knee amputation was required for one patient arising from postoperative thrombosis. The rest of the patients experienced mild and ordinary complications. Finally, the authors of the article suggested early revascularization according to complications like ischemia and claudication following vascular ligation.

However, during previous investigations, those researchers who agree with primary anastomosis, admit that artificial graft anastomosis will have a greater risk of infection compared to autologous vein.[11]

Another study showed that if the situation of infected pseudoaneurysm let us treat it only by ligation of one of the three main vessels, the complications will reduce.[12]

Vascular ligation and primary revascularization were compared in a series of studies and they came to this conclusion that on the whole, ligation is more comfortable and safer.[7,13] In a comparative surgery researchers who are in agreement with ligation, suggested that primary anastomosis should be performed only for the superficial femoral artery.[14]

As the number of IV drug abusers has been increasing during recent years and the patients refer to the emergency room because of a pulsatile mass of the thigh and symptoms of infection, the importance of finding a low-risk and suitable way to manage these cases is obvious.

MATERIAL AND METHODS

Patients, who were hospitalized as emergency cases with a diagnosis of infected pseudoaneurysm of the femoral artery from Feb 1994 till Oct 2003, participated in this study. All these patients were IV drug abusers, all of them were male with mean age of 44 years. The period between beginning of symptoms and reference time was 1-31 days with an average of 15 days. Primitive complaints and symptoms are shown in Table I.

Table I. Patients' chief complaints.

Percentage	Number	Chief complaint
Pain	1	1.5
Anesthesia	3	4.6
Mass	29	44.6
Suppurative discharge	10	15.3
Bloody discharge	18	27.6
Change in skin color	4	6.1

All the 65 patients were smokers (100%). There were 12 HIV positive (18%) and 26 HBsAg positive cases (23%). Patients who presented with shock upon admission were resuscitated immediately. Afterwards, they all provided an exact medical history and underwent physical examination. Positive points of examination are mentioned (Table II).

Table II. Patients' signs and symptoms in first physical examination.

Sign/Symptom	Number	Percentage
Pulsatile mass	65	100%
Limb anesthesia	9	13.8%
Limb edema	20	30.7%
Suppurative discharge	36	55.4%
Subcutaneous emphysema	2	3%
Popliteal pulse	52	80%
Murmur	65	100%

In all patients, probable underlying diseases were recognized, blood samples were taken and pelvic X-ray was performed in order to consider the possibility of anaerobic infection. After receiving the first dose of wide-spectrum antibiotics (first generation cephalosporin, aminoglycoside and clindamycin) the patients were trans-

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ferred to the operating room right away. Under general anesthesia, arterial control was obtained proximally (external iliac artery) as the first step. Then, the mass was incised and the pseudoaneurysm was exposed inside necrotic tissues.

Table III. Techniques used according to the extent of involvement.

Type of ligation	Number	Percentage
Ligation of 2 arteries	25	38%
Ligation of 3 arteries	25	38%
Ligation of 3 arteries in addition to proximal ligation	15	23%
Ligation of both artery and vein	16	25%

After removal of clot and necrotic tissue, ligation was conducted due to the condition of the aneurysm as shown in Table III.

After double ligation of the artery by polypropylene sutures, the wall of the aneurysm was excised and sent for pathological examination and culture. Then, debridement of tissues was done to the extent not to damage the adjacent structures and the wound was irrigated.

Table IV. Comparision of the outcome of patients with or without heparin therapy.

	No. of patients	Claudication	Amputation
With Heparin	35	3	2
Without Heparin	30	4	1
Total	65	7	3

Then the skin, if necrotic, was removed. If necrosis of the skin didn't exist, it was approximated by means of one suture. The secondary closure of the incision was postponed until the wound was clean.

Among 65 patients, 35 received intravenous heparin (5000 IU every 6 hours) postoperatively. While hospitalized in the surgery ward, the patients were observed for ischemic signs. In 6 cases ischemia occurred immediately and these patients underwent extraanatomic bypass operation through the obturator foramen.

All the patients received antibiotics on the average of 21 days. Irrigation and dressing of the wound were performed twice a day.

RESULTS

Unlike previous statistical findings about the prevalence of limb gangrene and amputation, there were only 3 cases (4.6%) of gangrene and amputation following arterial ligation. One of these cases occurred after extraanatomical bypass. The site of amputation was above-knee in 2 patients and below knee in one case.

The patients were followed during the period of 3 months to 3 years with 12 months as the mean time. All of them referred to the surgery clinic to be examined carefully. During follow up, 11 patients experienced claudication. It was severe (walking less then 150 meters) in 3 cases and anatomic bypass was performed for them after controlling local infection. There was no mortality in this study.

DISCUSSION

There are several reports and articles concerning the treatment of aneurysms by means of radiological instruments which is a new method. But exact results of its success and approval have not been achieved completely up to now. This method is of course used for noninfected pseudoaneurysms.[15,16]

Thrombin injection may be helpful in non-infected pseudoaneurysm treatment, but it won't work in infectious situations as evacuation of pus and necrotic material is not done in this method. Probable anaphylactic reaction is one of the disadvantages of this technique. So, it has been recommended to do skin tests before injection.[3,4,5]

Another way is to place a percutaneous stent graft through sonographic guidance. It can be used for infected pseudoaneurysm as well, but the long term efficacy of placing a foreign body in the focus of infection is unknown.[10,17]

There are some reports which shows the accompaniment of ligation and excision of involved vessels with high possibility of amputation.[18]

Excision and artificial grafting has been suggested by some researchers, but on one hand probable infection of the graft has been reported from 7-83% and on the other hand, amputation might be required after anastomosis in up to 33%.

As addicts are not active persons and they may stay immobile for hours and also because of continuous injection in the inguinal region, the vessel may become sclerotic, the following chronic ischemia will cause the distal part of the limb to obtain its blood supply from the collateral vessels between gluteal and femoral arteries. So these patients have a better response to vascular ligation and debridement and can be adapted to it. Also, the extension of infection and inflammation is often too

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much to allow an artificial or venous graft to pass through intact tissue. The appropriate way is vascular ligation, debridement and keeping the wound open which was conducted for 65 patients in our study. Some patients face intermittent claudication and some experience severe ischemia following ligation of the 3 vessels, but the probable need for delayed amputation is still low. In our study there was no significant difference between the outcome of patients who received heparin and the others who did not (Table IV) ($p>0.05$).

CONCLUSION

According to some results of previous articles and texts and also our study's finding, ligation, excision and debridement can be considered as the primary method of treatment as it is easier, safer and more reliable and moreover it doesn't entail significant mortality and can be suggested as the method of choice to save the patient's limb and increase survival.

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