Obturator Bypass as an Alternative Technique for Revascularization in Patients with Infected Femoral Pseudoaneurysms

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Background: Management of the infected femoral artery pseudoaneurysm has remained controversial. Although common femoral artery ligation and local debridement is an acceptable approach, some patients need revascularization for the treatment of leg ischemia or intermittent claudication. In this study, we report obturator bypass as an alternative technique that has been done at Sina Hospital, Tehran, Iran during a 10-year period.

Methods: This was a retrospective study and the data were obtained from the patients’ medical records.

Results: Ten obturator bypasses were done on nine patients. Two cases had previous history of ligation of the femoral artery branches. One death and two forefoot amputations occurred.

Conclusion: Femoral artery ligation has been suggested as the treatment of choice for the management of infected femoral artery pseudoaneurysms. Among the extra-anatomic bypasses, the obturator bypass is an acceptable alternative with favorable results.

Keywords: Femoral artery • pseudoaneurysm

Introduction

Pseudoaneurysms result from a variety of mechanisms including infection, trauma, intra-arterial injection of illegal substances, arterial access for diagnostic and endovascular procedures, closure device infections, and synthetic graft infections. Intra-arterial drug abuse is the most common cause of infected femoral artery pseudoaneurysms. This complication of intravenous (IV) drug abuse is not only limb threatening but also life threatening which poses a difficult management problem for surgeons.

Although ligation and excision of the pseudoaneurysm along with debridement and drainage of the associated abscess comprise the standard primary treatment of the infected femoral artery pseudoaneurysms (Figures 1 and 2), the time of revascularization remains controversial. Some advocate immediate vascular reconstruction via an extra-anatomic route, while others prefer delayed revascularization.

In this paper, we report the results of

Figure 1. Physical appearance of an infected false aneurysm.
management of the patients who were referred to our center because of infected femoral artery pseudo-aneurysms and underwent obturator bypass (Figures 3 – 5), which is a type of extra-anatomic iliofemoral or iliopopliteal bypass.

**Patients and Methods**

This was a retrospective study and covered the period from March 1996 through April 2006. It was performed at Sina Hospital affiliated to Tehran University of Medical Sciences. The patients who had undergone obturator bypass were selected and the data were collected from the patients’ medical records. Mechanism of pseudoaneurysm formation, history of previous surgical repair, and details of revascularization surgery were obtained. Parenteral drug abusers had no stable familial relationship and all of them were not available at the time of this study. However, all of the patients had been followed up at least for one month after revascularization.

**Surgical technique**

The patients were placed on the operating table in supine position, with the entire leg prepared and draped so that it could be rotated laterally and abducted. In this position the hip can be flexed to relax the thigh musculature. Abdominal exposure may be gained through a right paramedian or a transverse retroperitoneal approach if preoperative angiography has confirmed that an iliac artery is suitable as a donor vessel for the graft. Retroperitoneal approach allows adequate exposure of the obturator membrane for perforation under direct vision. If neither the common iliac artery nor the aorta has been previously grafted, either may be selected for the proximal anastomosis. The site selected for anastomosis, of course, depends on the extent of the disease, as determined by palpation and accurate preoperative arteriography. For obturator bypass, we usually use an eight-millimeter ringed polytetrafluoroethylene (PTFE) graft. The proximal anastomosis is constructed by the end-to-side technique. Cross-clamping of externally
supported grafts is not advisable. Subsequently, the obturator foramen is visualized and its contours established. Gentle sweeping of the peritoneal sac, ureter, and bladder to the midline gives access to the obturator foramen. It lies just posterior to the superior ramus of the pubis. Subsequently, the obturator foramen is approached with fingers from its proximal aspect towards the medial aspect of the thigh. The surgeon now selects an area for making a tunnel through the foramen. This tunnel should be located away from where the obturator artery, vein, and nerve pass through, to avoid injury to these structures. In order to avoid blind tunneling in a heparinized patient, systemic heparin (100 IU/kg) is administered after graft placement. The optimal site for the distal anastomosis depends on the specific patient’s diseases and other considerations. We prefer the intact proximal popliteal artery. After completion of the distal anastomosis, the vascular clamps are released. After restoration of blood flow to the extremity, the peritoneum is closed carefully over the graft. The abdominal and thigh incisions are closed, and dressings are applied.

Results

Totally, 10 obturator bypasses had been done at that period on nine patients (eight males). All of them were young and the mean age was 34 years. In six cases pseudoaneurysm was at the left side and the right side was less affected (n=4). Five patients presented with ruptured pseudoaneurysm and massive bleeding while groin mass was in the next rank. Angiography was performed in patients who underwent elective revascularization. The mechanisms of femoral artery pseudoaneurysm formation were intra-arterial injection of drugs (n=8) and stab wound of the groin (n=1). The eight-millimeter ringed PTFE was used for eight patients, while autologous graft (saphenous vein) was used for one. Iliopopliteal and iliofemoral bypasses were done in six and four cases, respectively. One death due to uncontrolled sepsis and two forefoot amputations occurred in those who were IV drug abusers. In order to give adequate coverage for common organisms such as Pseudomonas aeruginosa in all of the patients, clindamycin and ceftazidime were prescribed preoperatively and continued for ten days postoperatively or until the infection was controlled.

Discussion

Common femoral artery ligation and local debridement is the treatment of choice for the management of infected femoral artery pseudoaneurysms. However, some patients will need an extra-anatomic bypass because of the development of lower limb ischemia. On the other hand, some patients present with lower limb ischemia and vascular surgeons are obliged to perform an extra-anatomic bypass with femoral artery ligation at the first operation simultaneously.

In IV drug abusers, we performed seven extra-anatomic bypasses with femoral artery ligation simultaneously. Despite the immediate revascularization, in two cases forefoot amputations were performed (both had severe ischemic signs and forefoot gangrene before operation).

In one case, we used autologous graft (saphenous vein) the result of which was not favorable. After revascularization, an anastomotic pseudoaneurysm developed and in spite of surgical repair of the anastomotic pseudoaneurysm the patient died. In addition, although autologous grafts give the most satisfying long-term results, the limited diameter and chronic thrombosis of these conduits in IV drug abusers often preclude their use.

It is known that bridging a greater distance usually requires the use of fabric grafts. PTFE grafts have been the most satisfactory prostheses. Thus, we used PTFE grafts more than autologous grafts. In our one-month follow-up there were no occluded grafts. On the contrary, ringed PTFE grafts are expensive and are not available for most of IV drug abusers. We prefer to do iliopopliteal bypass rather than iliofemoral ones which require synthetic grafts because of the greater distance. In addition, two cases underwent revascularization a day after surgery due to the development of lower limb ischemia. In brief, we prefer to manage these patients by ligation of common femoral artery or even triple-vessel ligation at the first operation. If the signs of ischemia develop, they will undergo extra-anatomic bypass as an elective operation. In our experience the elective revascularization is accompanied by better results than urgent operation.

Infection is a major problem, which has been encountered in the early revascularization of infected pseudoaneurysms in IV drug abusers. The
presence of extended infection in the location of pseudoaneurysm threatens the artificial graft used for revascularization, specially when the graft is located near the site of infection. Extra-anatomic iliofemoral or iliopopliteal bypass through the obturator foramen is deep and far from the infection site.

In our study, we had no graft infection except one, which was accompanied by an extensive soft tissue infection. The patient had severe ischemic signs and an autologous saphenous vein graft was used for revascularization.

Reuse of the graft for injection is another problem, which is common in IV drug abusers especially when the graft is located in a subcutaneous location. In obturator bypass, the graft is located deep and is not accessible for injection.

Patency rates for obturator bypass range from 66 to 89%. The review by Sautner et al reported a five-year patency rate close to 60%.

In brief, except for the expected higher risk of graft infection, complications for obturator bypass have been, for the most part, similar to those experienced with distal bypass. Thus, according to these facts it seems that obturator bypass is more appropriate than other kinds of extra-anatomic bypasses for the management of infected femoral artery pseudoaneurysms.

References