Original Article

Extra-anatomical Transobturator Bypass, Modifications of the Technique 10 Cases Report and Review of Literature

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Abstract

Context: Transobturator bypass may be a good alternative or a good solution in hostile groin either scared or infected with severe sepsis in drug addict patients.

Aims: Evaluating the results transobturator bypasses in cases where groin cannot be addressed after 2 years follow-up.

Settings and Design: This is a personal experience using transobturator bypass as an alternative management in a patient with either groin infection or scared groin in recurrent occluded grafts.

Subjects and Methods: Ten cases in which transobturator bypass was performed; late graft occlusion was the indication in (five cases) while groin infection was the indication in the other (five cases).

In all patients, common iliac – popliteal bypass was performed. In drug addict patients; infected groin, the tunnel was fashioned in a plane deep to the adductor muscles to be rather away from the infected areas, while in cases of graft occlusion, the much easier subcutaneous plane was chosen to allow easier surveillance of the graft.

Results: Obturator bypass was performed in ten cases; five occluded grafts and five infected groin, four of them were addicts. One of the drug addicts presented with groin mass while three of them presented shocked and rupture infected pseudoaneurysm. One died of fulminant sepsis. Two years follow-up, seven grafts were patent. Only three experienced major amputations.

Conclusions: The proper timing of the procedure, use of endarterectomy as well as the proper choice of the plane of the tunnel is considered essential prerequisites for a successful outcome.

Key Words: Infected groin, obturator bypass, pseudoaneurysm

Introduction

Limb revascularization in cases of infected groin grafts is a challenging situation where both limb and life are threatened. The obturator bypass was introduced in 1962 for infected femoral grafts.[1]

The indications were broadened widely later to include the situations where the femoral triangle is unsuitable or unsafe for vascular grafting.[2,3]

Intra-arterial drug abuse in addicts represents a more recent and serious indication in relatively young patients. The infected pseudoaneurysms [Figure 1] in our experience and the experience of others[4,5] represents a challenge for proper management.

The present work represents our experience in obturator bypass in both situations of occluded vascular grafts and infected pseudoaneurysms with technical modifications.

Subjects and Methods

The present work included ten patients who underwent extra-anatomical transobturator bypass in Kasr Ani Cairo University Hospitals between 2007 and 2012.

Table 1 and Figure 1 show main data of the patients and operative procedures.

Critical limb ischemia was the main indication for surgery. For patient who presented with groin mass, obturator bypass was performed first followed by draining the groin abscess in the same operative setting.

Patients who presented shocked to casualty department managed primarily by ligating femoral vessels and resuscitation, and if the limbs survived the acute ischemia, obturator bypass was performed after the small interval when groin infection was controlled and those were excluded from this study.

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Patients who developed acute ischemia or critical limb ischemia in the form of rest pain underwent obturator bypass within 6–10 h.

**Operative technique**

After full preoperative assessment of inflow and outflow arteries, a lower oblique incision in the iliac fossa was used for extraperitoneal exposure of the iliac arteries.

Gentle sweeping of the peritoneum exposing the obturator membrane posterior to the superior pubic ramus was followed by a longitudinal incision in the thigh below the tendon of adductor longus muscle.

A tunneler was used to create a tunnel in a subcutaneous or deep intermuscular plane [Figure 2]. The index finger from above guided the tunneler, which was pushed into the pelvis through the obturator foramen at the exact bony angle between the superior and inferior pubic rami.

The common iliac artery (CIA) was chosen for inflow in all patients. In five patients with occluded grafts, endarterectomy was performed at the site of the proximal anastomosis [Figure 3].

An 8 mm ringed polytetrafluoroethylene (PTFE) grafts were used. The distal anastomosis was performed to the upper popliteal artery in 7 cases and to the lower popliteal artery in 3 cases.

**Follow-up**

Regular follow-up periods varied from 1 month to 2 years. The grafts were assessed clinically and by regular duplex scanning. Computed tomography (CT) angiography was done in four patients.

**Results**

Total numbers of patients were ten, all of them were males. These patients were divided into two groups; one included patients with occluded grafts (n = 5), the other had infected groin (n = 5).

The mean age of the patients with occluded grafts was 64.6 years whereas the mean age of addict patients with infected pseudoaneurysms was 32.66 years.

In addict patients, only one patient presented with groin mass (secondary infected pseudoaneurysm), n - 3 presented shocked due to ruptured pseudoaneurysm [Figure 4], and one presented with ruptured femoral arteriovenous fistula (AVF).

All patients had critical limb ischemia. CIA used as an inflow artery in all of them. One patient with infected pseudoaneurysms died 1 month after surgery due to fulminant sepsis. Two grafts were thrombosis, 2 months after surgery due to progressive ischemia, and above-knee amputation was done for both patients.

Below knee amputation was done to one patient of the addict group. This patient was presented with ruptured

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**Table 1: Illustrate main criteria of our patients**

| Case | Age | Sex | Main indication                                      | Depth of tunnel | Site of distal anastomosis |
|------|-----|-----|-----------------------------------------------------|-----------------|-----------------------------|
| 1    | 58  | M   | Occluded ilio-femoral graft                         | Subcutaneous    | Upper popliteal artery      |
| 2    | 72  | M   | Occluded femoro-popliteal graft                     | Subcutaneous    | Upper popliteal artery      |
| 3    | 66  | M   | Occluded femoro-popliteal graft                     | Subcutaneous    | Lower popliteal artery      |
| 4    | 62  | M   | Occluded femoro-popliteal graft                     | Subcutaneous    | Upper popliteal artery      |
| 5    | 71  | M   | Occluded femoro-popliteal graft                     | Subcutaneous    | Lower popliteal artery      |
| 6    | 32  | M   | Addict; infected left femoral pseudo aneurysm       | Intramuscular   | Upper popliteal artery      |
| 7    | 41  | M   | Addict; infected left femoral pseudo aneurysm       | Intramuscular   | Upper popliteal artery      |
| 8    | 28  | M   | Addict; infected left femoral pseudo aneurysm       | Intramuscular   | Upper popliteal artery      |
| 9    | 57  | F   | Groin infection; infected pseudo aneurysm after femoro-popliteal bypass | Intramuscular | Lower popliteal artery      |
| 10   | 24  | M   | Addict rupture femoral pseudo-aneurysm              | Intramuscular   | Upper popliteal artery      |
femoral AVF for which both common iliac vein and distal external iliac artery were ligated; then patient develop venous gangrene in the foot. After 2 years of follow-up, seven grafts were patent [Figure 5].

Discussion
The extra-anatomical transobturator bypass represents a viable option in situations where the groin is no longer safe for revascularization. A few modifications of the published techniques were followed. Whenever the groin infection was marked, a deeper tunnel in the thigh was created where the graft was routed deep to the adductor magnus tendon to be away from the infected areas. A more superficial subcutaneous tunnel was chosen whenever mild or no infection existed. In many published reports, no relationship between the choice of the depth of the graft and the degree of infection was mentioned.

A few authors pertained that a subcutaneous tunnel should better be avoided in drug abusers who may re-inject themselves through the graft.

In the present work, a tunneler was used from the thigh incision guided via the index finger in the obturator foramen [Figure 2]. A DeBakey clamp was used for that purpose by other surgeons.

Extraperitoneal exposure of the iliac vessels was also done by many authors. We stressed the importance of minimal retroperitoneal lymphatic dissection to avoid exacerbation of the infection. Endarterectomy which was done in five patients with occluded grafts in the present work was believed to widen the surface area of the anastomosis and improve the inflow. The use of the CIA for inflow was also suggested by other workers. They pertained that maximum inflow can be obtained to such a rather long graft. In our patients, selection of the CIA for inflow as well as endarterectomy both helped maximize the inflow to the long graft.

The patient who developed venous gangrene underwent trail of tibial arterial and venous thrombectomy 48 h after the obturator bypass aiming to salvage the foot which was partial improving the outcome; anterior and posterior tibial vessels were patent during postoperative follow-up by CT angiography and later during amputation.

Attention to technical details was important, assuring a straight course of the graft. This could be seen in follow-up CT angiographies. An 8 mm PTFE graft was also used by other authors. No kinks of the graft or change of the ankle/brachial index occurred with flexion of the hip joint.

The mortality in the present work was 10%. It is advised to do the bypass before fulminant sepsis occurs. Though controversial, a lower threshold for doing the bypass is considered in such infected cases. The technique has been simplified encouraging the vascular surgeon to do it more frequently. At 2 years, seven grafts were patent making a patency rate of 70%. In a large series, a postoperative mortality rate of 14.7% and a limb salvage rate of 76.5% at 5 years were documented.

In a retrospective analysis of the data of 300 obturator bypass grafts, 1-year and 5-year patency rates for all indications were 71% and 60%, respectively.
Conclusions
The technique of obturator bypass has been simplified. It is recommended to be done early before irreversible ischemic damage or life-threatening infection occurs. Proper choice of the anatomical depth of the tunnel in the thigh, endarterectomy, minimal retroperitoneal lymphatic dissection, and long-term surveillance are essential. Graft patency is comparable to previously published reports. The procedure should not be omitted from the armamentarium of any vascular surgeon.

We try to establish solid indications for such bypasses in addicts whom groin severely infected at first surgery according to the measurement of the back-flow arterial.

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Conflicts of interest
There are no conflicts of interest.

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