

Primary Transobturator Bypass Grafting in Aortoileofemoral Arterial Occlusive Disease

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Abstract

Original Research Article

Vascular groin infection is a potentially serious complication after prosthetic bypass grafting in aortoileofemoral arterial occlusive disease. Groin graft infection after bypass grafting in patients with critical limb ischemia, may lead to sepsis, hemorrhage, even amputation of the limb. Therefore, both the affected limb and the patient's life are threatened. Moreover, unsuccessful primary procedure may further the already existed psychological burden. Groin infections are potentially lethal in patients with co-morbid conditions. Revascularization with an obturator bypass has been used as an extra anatomic bypass route as a potential alternative for restoration of circulation to local revision and arterial ligation alone in graft infections. This technique uses alternative route avoiding risk of vascular graft infection. Transobturator extra anatomic bypass technique can be a viable option for primary bypass grafting in aortoileofemoral arterial occlusive disease in high risk cases. This technique can be performed at ease without prolonging intraoperative time appreciably.

Key-words: peripheral arterial occlusive disease, groin infection, transobturator bypass grafting, ileofemoral crossover grafting.

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INTRODUCTION

Infections of both native and prosthetic vessels are most frequently seen in the region of the groin [1-3]. The main predisposing factors for vascular groin infection are infected lymphatics, the proximity of the groin to the perineum, bad personal hygiene, the superficial location of vascular grafts in the groin, and the development of wound infection adjacent to a vascular graft.

Presence of a groin incision, poor personal hygiene & groin infection, recent hospitalization, failed arterial reconstruction, age, diabetes mellitus are major risk factors for vascular graft infection. The risk of graft thrombosis is relatively high due to postural disadvantage and kinking of the graft at groin [3-5].

Vascular graft infection in critical limb ischemia may lead to massive hemorrhage, systemic sepsis, limb ischemia, and septic embolization [1, 2-6].

The successful treatment of prosthetic graft infection includes excision of the affected graft, adequate débridement of necrotic and infected tissues, and restoration of circulation. Vacuum suctioning or Sartorius myoplasty may be used for infected and exposed grafts in the groin [6, 7]. However, extended wound care was required for superficial skin infection with resultant delayed complete healing.

The restoration of arterial circulation can be achieved by use of in situ or extra-anatomic prosthetic bypass. Among the extra-anatomic bypasses, the obturator bypass is an acceptable alternative with favorable results [8-13].

Obturator bypass being a true extra anatomic has a relatively straight course and not affected by hip movements. It remains at a depth behind the pubic arch unaffected by outside pressure and inaccessible to intravenous injections. Considering vascular groin

infection, a catastrophic complication both in terms of morbidity and mortality and its management being expensive, we have used transobturator bypass primarily in high risk patients with aortoileofemoral arterial occlusive disease.

MATERIALS AND METHODS

Nineteen consecutive patients with aortoileofemoral arterial occlusive disease were retrospectively studied in our Institute of Nilratan Sircar Medical College who was operated over a period of nine years from 2009 to 2017 and Trans obturator

bypass grafting was done in all these cases. Demographic data, co-morbidities and clinical outcome were recorded. Colour Doppler study and angiography were done in all cases. This technique has been used in our institute as a primary procedure of bypass grafting with highly successful results in high risk individual with aortoileofemoral arterial occlusive disease. Obturator Bypass: - This technique is a viable option for bypass grafting in aortoileofemoral arterial occlusive disease using alternative route through obturator foramen and thus avoiding risk of infection (figure-1).

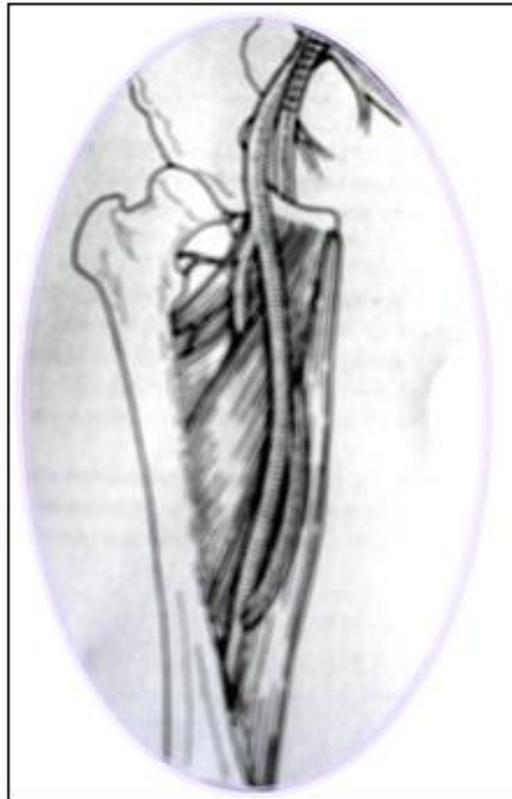


Fig-1: showing schematic diagram of right transobturator bypass

Operative procedure

The obturator fossa is located posterior to the superior pubic ramus and covered by thick aponeurosis. The obturator artery, vein, and nerve pass through the lateral superior margin of the obturator canal. Proper visualization of anatomical details is of paramount importance to avoid complications of surgery. We used magnifying loupe along with headlight for proper visualization. The obturator membrane was incised over the medial superior margin by means of electrocautery and enlarged by finger. A rectus sparing curved incision is made in the lower abdomen to expose the iliac arteries extraperitoneally. The incision is extended upwards along the lateral abdominal wall to expose common iliac and abdominal aorta when required. A distal incision was made medially in the mid thigh to

access the superficial femoral artery. If distal anastomosis needs to be made in the distal thigh, a small longitudinal incision is made in the mid thigh for negotiating the tunneling device and proper lying of the prosthetic graft. Before heparin administration, the tunneling device was passed through a plane between the adductor longus and magnus muscles to the obturator foramen. The inflow anastomosis to these grafts was placed to the aorta, common iliac artery, external iliac artery or opposite sided common iliac or external iliac artery (in case of crossover ileofemoral bypass grafting) in the retroperitoneal area. And the graft is guided through obturator foramen down to thigh superficial to the muscle plane. A proper sized endotracheal tube is used to bring down the graft from abdomen to thigh maintaining its orientation.

Table-1: showing anatomic data and clinical outcome of patients

Total number (n=19)		
Sex	Male (n=16; 84.2%)	Female (n=3, 15.78%)
Age(years)range(mean)	54-70(61)	56-64(60)
Hypertension	16(100%)	3(100%)
Diabeted Mellitus	12(75%)	3(100%)
Hyperlipidemia	13(81.2%)	3(100%)
COPD (chronic obstructive airway disease)	5(31.20%)	2(66.6%)
Coronary arterial disease(mild)	9(56.2%)	2(66.6%)
obesity	6(37.5%)	3(100%)
Active smoking	16(100%)	0
Right Ileo femora bypass	6(37.5%)	1(33.3%)
Left ileofemoral bypass	3(18.75 %)	2(66.6%)
Right aortofemoral bypass	2(12.5 %)	
Left aortofemoral bypass	1(6.25 %)	
Left ileal right femoral crossover grafts	3(18.75%)	
Bilateral aoro femoral bypass (all Transobturator bypass)	1(6.25%)	
Post-op complication		
1. Wound infection		
2. Delayed healing	2(12.5%)	0
3. Reoperation	2(12.5%)	0
4. Bleeding	1(6.25%)	0
	1(6.25%)	0
Patency (at the end of 2.5 years)	16(100%)	3(100%)

Preoperative angiography was done in all cases and postoperative angio was performed preoperatively

**Fig-2a: showing left ileofemoral arterial occlusion**

Follow-up: Regular follow-up periods varied from 2.5 years to 9 years. 3 male and 1 female patients were lost to follow-up after five years. The grafts were assessed clinically and by colour doppler study.

RESULTS

Total numbers of patients were nineteen, of them three were females. Mean age at operation was 60.84 years. All male patients were chronic smoker.

or at the time of discharge (figure-2a and 2b).

**Fig-2b: showing angiographic picture of left transobturator ileo femoral bypass**

Nine male and two female patients had ischemic heart disease. All our patients were hypertensive and seven of them also had chronic obstructive airway disease (COPD). 78.9 % of patients had diabetes mellitus and 84.2 % were hyperlipidemic. All of our patients underwent transobturator bypass grafting (figure-3a and 3b) .and 3(18.75%) patient had transobturator crossover grafts due to diseased aorta. One patient had bilateral aortofemoral bypass grafting.



Fig-3a: Showing proximal anastomosis of left transobturator ileofemoral bypass



Fig-3b: Showing distal anastomosis of left transobturator ileofemoral bypass

The hemodynamics of the patients was stable postoperatively. None of them required emergency re-operation. There were no major bleeding episodes. Postoperatively peripheral pulses were palpable in the leg and there was symptomatic improvement with healing of ulcers in all cases. Post-operatively all patients received antiplatelet therapy and anticoagulation. Mild bleeding due to anticoagulation was noted in one patient. Limb wound infection was noticed in two (12.5%) patients and all were diabetic. These two patients had delayed healing of wounds. There was no infection of grafts in our cases except in one elderly malnourished patient with crossover left ileo right femoral bypass grafting who developed wound infection and exposure of the graft in the thigh at the end of 4 years. He was operated for removal of the graft. All patients showed patency at the end of 2.5 years (minimal follow-up). Maximum follow-up was nine years. They were symptom free and able to walk without support. Four patients were lost to follow up after 5 years of follow-up.

DISCUSSION

Engin C, Hodgkiss-Harlow KD, Patel A *et al.* [1-3]. Despite use of prosthetic grafts of different kind since decades and refinements of techniques graft infections in the groin remain a serious clinical problem. It is the most common nosocomial vascular infection and an important cause of postoperative morbidity accounting for huge financial burden and psychological burden on the patients and their families [4-7]. There may be wound disruption, perigraft discharge, discharging sinus, subsequent graft thrombosis and systemic sepsis.

Recent hospitalization, failed arterial reconstruction, advanced age, immunosuppression, diabetes mellitus, bad personal hygiene, obesity, and emergency surgery are major risk factors for vascular graft infection. Our patients had multiple such comorbidities and seven out of nineteen cases had recent hospital admissions for associated ailments.

Sen and colleagues [10], Campbell [5],

Antonios [11] and associates reported significant occurrence of infection in conventional aortobifemoral bypass grafting and groin wound complications.

The successful treatment of arterial or prosthetic graft infection requires removal of the graft, thorough debridement, and restoration of circulation as feasible. Some author⁷ suggested use of Sartorius myoplasty for infected and exposed grafts in the groin. However, extended wound care was required for superficial skin infection with resultant delayed complete healing.

Shaw and Baue in 1963 first reported rerouting of arterial flow bypassing an area of sepsis in the groin, by insertion of an arterial graft through the obturator foramen. Obturator bypass route avoids a groin incision in aortoileofemoral arterial occlusive disease [4]. Donahoe and colleagues successfully removed a groin tumour with an arterial bypass procedure, utilizing the obturator foramen.

Since then, indications for the procedure have broadened to include many conditions where it was not possible earlier implantation of an arterial prosthesis such as infected false aneurysms or prostheses, groin tumour, radiation necrosis, dense scarring or skin ulceration from any cause or as a result of carcinoma, or trauma with extensive soft-tissue loss [7,12-16].

Obturator bypass grafting can be done avoiding a groin incision and thus reducing risk of infection and it is a viable option for alternate bypass grafting route. According to Tawfik and colleague [14]. The technique of obturator bypass should be employed early before irreversible ischemic damage or lifethreatening infection occurs. They used obturator bypass in occluded and infected previous grafts with chronic limb ischemia.

Sautner *et al.* [13] in their review article on obturator bypass showed 56.9% of graft patency at the end of 5 years with postoperative mortality rate of 14.7%. Many other authors [14-16] had shown encouraging results. We had excellent short and early

long term results in our selected group of patients with aortoileofemoral arterial occlusive disease.

Many authors [13-16] mentioned complications of pseudoaneurysm of the graft, hemorrhage from the obturator vein, and obturator nerve injury after the procedure but none of our patients developed these complications.

This technique can be performed at ease without prolonging intraoperative time appreciably. Obturator bypass might not be possible when the deep layers of adductor muscle are involved with an infection or with severe radiation-induced scarring of the pelvic region or groin. In presence of scarring, considerable venous bleeding usually occurs during graft tunneling. In our case, the procedure could be performed uneventfully without causing any injury to neurovascular structures. There was no appreciable venous bleeding during tunneling. The whole procedure could be completed in about three hours' time (mean duration 165 min).

CONCLUSION

Transobturator bypass grafting is a safe and reproducible technique and can be used in selective group of patients with high risk of graft infection as primary procedure reducing risk of postoperative infection and associated morbidities considerably. Clear visualization and proper understanding of the anatomy of this region (obturator fossa) is important. Accurate identification of the obturator vessels and obturator foramen with adequate illumination (preferably with a headlight) is mandatory to avoid unnecessary complication. Inadequate outflow can compromise any inflow procedure. Three of our patients required cross iliofemoral grafting to avoid diseased aorta. Being a long prosthetic graft, aorto popliteal grafts may not show good long term results especially if the quality of flow in distal run-off vessel is not adequate with subsequent graft failure. So this procedure has to be selective and individualized.

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