

Limb saving by profundoplasty in patients with no distal runoff

Hisham F. Desoky, Samir A. Zied, Ahmed G. Karmota

Department of Vascular Surgery, Kasr Al Aini Hospital, Faculty of Medicine, Cairo University, Cairo, Egypt

Correspondence to Hisham F. Desoky, MD, Vascular Surgery Unit, Faculty of Medicine, Cairo University, Manial Elroda, Cairo 11562, Egypt. Tel: +20 966 539 357 388; e-mail: hishamfathi30@gmail.com

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Background

With the great advancement of endovascular intervention in the management of both chronic and acute peripheral vascular disease, the need for open surgical intervention has markedly decreased over the past decade; however, in certain cases, a simple surgical intervention remains the only hope for limb saving. In this study, the authors presented a review for the effect of one of the oldest surgical vascular procedures, which is 'profundoplasty' and the authors focused on its role and outcome in cases presented with threatened limb with no distal runoff to the foot.

Patients and methods

This is a retrospective study conducted on 18 cases presented with 20 threatened limbs with no distal runoff and managed with either isolated profundoplasty or combined with other procedures in the period between May 2016 and May 2018 at the Vascular Surgery Department of Kasr Al Aini with the limb salvage as the end point.

Results

The study included 18 male patients with mean age of 50 years presented with 20 threatened limbs: 10 patients presented with critical limb ischemia classified according to Rutherford classification between class 4 and 6, and eight patients with 10 delayed acute limb ischemia category IIb (two patients presented with bilateral lower limb affection). Technical success was 100%; two cases of critical limb ischemia ended up with unilateral below-knee amputation, with limb salvage rate of 90%.

Conclusion

Profundoplasty remains a very effective procedure in the management of lower limb ischemia either acute or chronic, especially when other options cannot be performed and the case seems to be hopeless.

Keywords:

no distal runoff, profundoplasty, threatened limb

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Introduction

Profunda femoris artery (PFA) is an important collateral between iliac and femoral arteries and leg arteries especially in case of occluded superficial femoral artery (SFA) [1].

Profundoplasty is a well-established vascular procedure since 1961 that can be used as an alternative procedure if femoropopliteal bypass is not possible [1].

However, the need for this procedure has markedly decreased over the past two decades because of the advancement of endovascular technology and bypass surgery but is still indicated in some cases, as in this study [2–4].

Profundoplasty can be performed as an isolated procedure or combined with other procedures and can be proximal (to the second perforator) or extended (beyond the second perforator) [5].

Patients and methods

Patients

This is a retrospective study that included 18 male patients with mean age of 50 years who presented with 20 threatened limbs that were managed with profundoplasty either isolated or combined with other procedures in the period between May 2016 and May 2018 at the Vascular Surgery Department of Kasr Al Aini with the limb salvage as the end point.

Approval from Ethical Committee was obtained, and all patients gave consent for interventions after acknowledging the possible risks.

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Only patients with threatened limbs owing to acute or chronic ischemia with no distal runoff to foot were included in this study, as femorodistal bypass and endovascular intervention has no role in such cases.

Threatened limb is defined by our group as ischemic limb with high incidence of major amputation.

Patients were divided into two groups as follows:

- (1) Group A: eight patients presented with 10 lower limbs of delayed acute on top of chronic ischemia, category IIb, according to Rutherford classification.
- (2) Group B: 10 patients presented with critical limb ischemia (CLI) classes 4–6 according to Rutherford classification.

Preoperative preparation

On presentation, all patients were evaluated with the following: detailed history taking and full clinical examination, either general or local examination, with assessment of peripheral pulsations, motor power and sensation, color and temperature changes, in addition to presence of tissue loss.

Laboratory and radiological assessments with computed tomography angiogram (CTA) were done.

Findings, planning, and procedure

Group A patients

Two patients presented with bilateral delayed acute lower limb ischemia with past history of bilateral intermittent claudication of calf muscles. On examination, there was no femoral pulse bilaterally, and CTA showed distal aortic thrombosis till femoral bifurcation bilaterally with bilateral SFA occlusion with no distal runoff till feet. These patients were managed by bilateral femoral thromboembolectomy proximally till having good inflow with failed distal thrombectomy owing to distal occlusion in addition to bilateral extended profundoplasty.

The other six patients presented with unilateral delayed acute lower limb ischemia after thrombosed femoropopliteal bypass grafts with palpable femoral pulse at the groin, and CTA showed complete SFA occlusion with no distal runoff, and all cases were managed with femoral exposure and isolated extended profundoplasty.

Group B patients

Four patients presented with rest pain (class 4), four patients presented with nonhealing ulcers over the

dorsum of the foot (class 5), and two patients with toe gangrene (class 6); six patients' CTA showed complete SFA occlusion with no distal runoff and patent PFA and managed with isolated extended profundoplasty, and two patients of class 5 had a combined long occlusion of common and external iliac artery with patent common femoral artery (CFA) and PFA with SFA occlusion with no distal runoff and managed by left axillofemoral bypass with extended profundoplasty. The two patients of class 6 presented with popliteal occlusion starting from P2 level with no distal runoff and proximal stenosis of PFA and were managed with isolated profundoplasty.

Technique

Profundoplasty was performed through anterior femoral artery exposure, then exposure of PFA beyond the second perforator, then opened by longitudinal arteriotomy starting from CFA till beyond the second perforator of PFA (some cases required CFA endarterectomy), and then closure of the arteriotomy without endarterectomy of PFA with PTFE patch or with the distal end of the bypass graft.

Postoperative care and follow-up

All patients continued on postoperative anticoagulation for one week then discharged on dual antiplatelets for 6 months and then low-dose aspirin forever and regular daily exercise program of walking with follow-up every 3 months for 1 year.

Results

Within 24 months, 18 patients with 20 threatened limbs were managed with extended profundoplasty with good results, when other interventional options seemed of no value as the CTA findings of most of them shared SFA occlusion with no distal runoff to foot with high incidence of major limb amputation.

Eight (44.5%) patients presented with delayed acute on top of chronic lower limb ischemia category IIb, and 10 (55.5%) patients presented with CLI class 4–6.

The end point in this study was the limb salvage that represented 90% for the first year, with the following details.

Group A patients showed marked improvement of symptoms with good capillary refill and warm feet and disappearance of the pain on the next day postoperatively, in addition to more gradual

improvement on follow-up with continued exercise program, and antiplatelets.

In group B patients, class 4 patients showed marked improvement of rest pain with better capillary refill and temperature, class 5 patients showed gradual healing of ulcers over 3 months, whereas the two patients of class 6 ended with below-knee amputation (BKA) with healed suture line within 10 days; one of them developed acute myocardial infarction and died in ICU.

Discussion

Profundoplasty is a well-established vascular procedure for peripheral revascularization, but its contribution is markedly decreased nowadays owing to the great advancement in endovascular technology and bypass grafts. However; according to Totolici *et al.* [5], it can be used when endovascular intervention fails and femoropopliteal bypass is not possible owing to absent saphenous vein or unfavorable general conditions for extended procedures, which is in contrast to our study, as profundoplasty was used because it was the only hope for limb saving as there was arterial occlusion with no distal runoff to the feet, making bypass or endovascular options of no value.

PFA is the main arterial supply of the thigh [6], and the main arterial supply to leg and foot in case of SFA occlusion, so in such cases, its trunk represents ~50% stenosis between CFA and the collateral circulation of branches of PFA [5], so profundoplasty can be performed in such cases even with absence of significant stenosis of proximal PFA aiming to increase blood inflow and pressure through its collateral circuit to distal leg and foot, as we performed in our study, and matched with that published by Totolici *et al.* [5]. This is in contrast to other literatures that stipulate presence of proximal PFA stenosis to ensure effectiveness of profundoplasty [7].

In our study, we proved that even with no good distal runoff, profundoplasty will be effective in increasing blood flow to distal collaterals and be effective for distal revascularization.

Profundoplasty can be proximal or extended. In this study, we performed extended profundoplasty in all cases that proved its effectiveness in improvement of symptoms of both acute and chronic ischemia, with high incidence of limb salvage for threatened limbs as believed by TE. David and AD. Drezner in their study [8].

Results of profundoplasty in CLI were favorable in patients with rest pain and minor tissue loss such as ulcers but not in the patient with gangrene, like the results of Jamil *et al.* [9]. However, we believed that with profundoplasty we succeeded to lower the level of amputation to BKA, which agreed with the results of Cnotliwy *et al.* in their study [10]. Profundoplasty is a safe and short procedure with low mortality rate in high-risk patients, as in our study, which was 5%, similar to that mentioned by Witz *et al.* [11].

Conclusion

Profundoplasty is a very effective procedure for limb revascularization in both acute and chronic limb ischemia when endovascular intervention and femoropopliteal bypass become not possible.

Amputation decision should not be rushed if there is no distal runoff, and the patient should be given a chance with profundoplasty, even with no significant stenosis of PFA.

Profundoplasty is a safe and short procedure with low rate of complication, so it should be performed without hesitation for limb saving, especially in cases that may seem hopeless for other intervention procedures, as at least it can lower the level of amputation to BKA, with lower mortality rate compared with above-knee amputation.

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Conflicts of interest

There are no conflicts of interest.

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