—Case Reports—

Surgical Management of a Deep Femoral Artery Aneurysm

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Abstract

Standard surgical methods for managing true aneurysms of the deep femoral artery have not been established because these aneurysms are rare. An 85-year-old man, who had a ruptured aneurysm of the deep femoral artery, underwent aneurysmectomy and distal reconstruction with a contralateral autologous vein graft. Three-dimensional computed tomography is a valuable diagnostic modality to evaluate synchronous aneurysms and peripheral arterial circulation for treatment planning. Because of their etiology, aneurysms of the deep femoral artery should be treated with revascularization when technically feasible, even if the superficial femoral artery is patent. A contralateral saphenous vein may be the preferred conduit because ipsilateral venous stasis is likely.
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Key word: deep femoral artery aneurysm

Introduction

True aneurysms of the deep femoral artery (DFA) are extremely rare[1,2]. They have a higher rate of rupture than other peripheral aneurysms, resulting in emergency surgical procedures with significant morbidity[1–4]. Consequently, standard surgical methods for managing DFA aneurysms have not been established because of limited surgical experience. We successfully treated a patient with a ruptured DFA aneurysm who underwent aneurysmectomy and revascularization to the distal DFA using a contralateral saphenous vein graft.

Case Report

An 85-year-old man presented with acute onset of pain and paresthesia of the right thigh. Physical examination revealed progressive swelling of the entire right thigh with a pulsatile mass of the right groin (**Fig. 1**). All peripheral pulses were palpable,

Fig. 1 Physical examination reveals a swelling of the entire right thigh with a pulsatile mass in the right groin.

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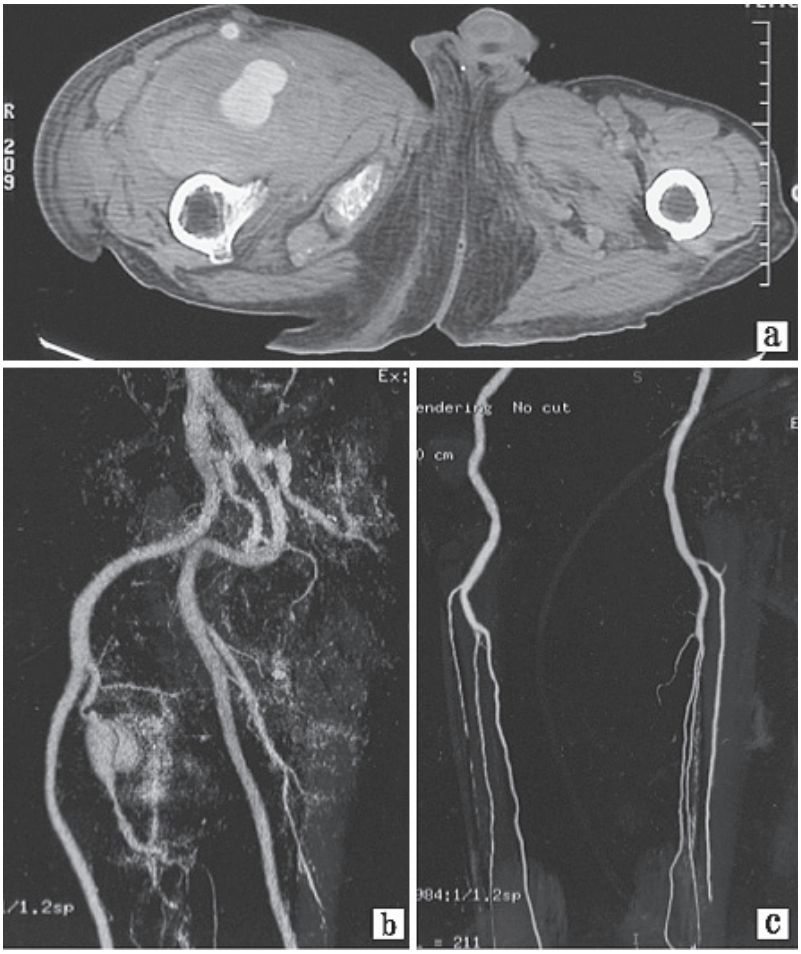

Fig. 2 Preoperative 3-dimensional computed tomography shows a right deep femoral artery aneurysm with surrounding massive hematoma (a), a patent right superficial femoral artery (b), and an occluded right anterior tibial artery (c).

and the ankle brachial pressure index was normal. He had a history of hypertension and smoking, but no history of trauma, previous operations, or interventions. Three-dimensional (3D) contrast-enhanced computed tomography (CT) showed a true aneurysm of the right DFA, just distal to its first major branch, with leakage of contrast agent into the soft tissues **(Fig. 2-a, b)**. The 3DCT excluded a synchronous aortoiliac, femoropopliteal, or contralateral aneurysm and confirmed a patent superficial femoral artery (SFA) and occlusion of the right anterior tibial artery **(Fig. 2-c)**.

Emergency surgery was performed via a longitudinal groin incision. The proximal neck of the DFA aneurysm was isolated 3 cm distal to the bifurcation. Dissection continued into the aneurysm, but the distal neck could not be identified because of its deep anatomical position and the surrounding massive hematoma. The superficial femoral vein was compressed by the DFA aneurysm. After the proximal neck of the aneurysm was clamped, it was opened, and a small orifice of the distal neck was eventually identified in the deep position after a large amount of hematoma had been removed. The saphenous vein was harvested from the left thigh via a skip incision and reversely interposed in the DFA. The flow volume in the saphenous vein graft, measured intraoperatively with transit-time flow measurement (VeriQ flowmeter, MediStim ASA, Oslo, Norway), was 47 mL/minute. Pathologic examination of the aneurysm showed atherosclerotic changes.

Patency of the saphenous vein graft was confirmed with postoperative 3DCT **(Fig. 3)**. The

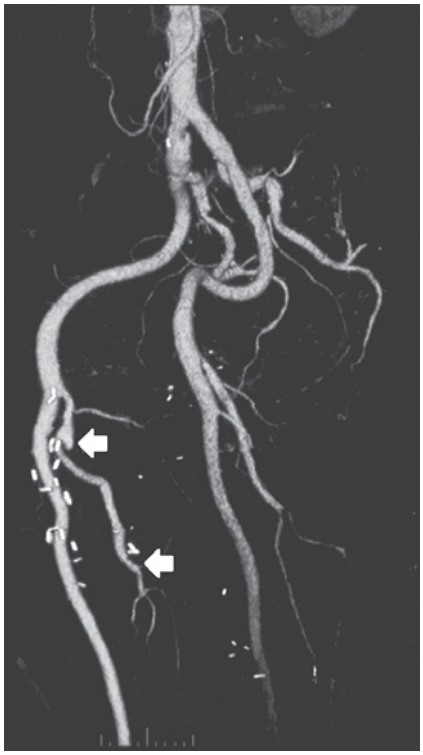

Fig. 3 Postoperative 3-dimensional computed tomography shows a patent saphenous vein graft (**white arrows**).

patient was discharged after an uneventful postoperative recovery and is doing well 2 years later.

Discussion

True aneurysms of the DFA are exceptionally rare and estimated to account for only 0.5% of peripheral artery aneurysms[1]. DFA aneurysms are most often seen in patients older than 70 years, with a preponderance in men and in association with arteriosclerosis[1–4]. These aneurysms are often associated with other peripheral aneurysms[1–4]. Up to 50% of patients with DFA aneurysms have a peripheral occlusive disease involving femoropopliteal segments[1–3]. Preoperative 3DCT is a valuable, noninvasive diagnostic modality to confirm the presence of synchronous aneurysms and evaluate peripheral arterial circulation. Assessment of these factors is essential before treatment planning.

Aneurysms of the DFA are difficult to identify on physical examination because of their anatomical locations. This difficulty allows DFA aneurysms to become larger or to potentially rupture. They are more likely to rupture than other peripheral arterial aneurysms, resulting in emergency surgical procedures with significant morbidity; however, the incidence of thromboembolism in the DFA aneurysms is low[1–6]. Presumably, because reconstruction of the distal DFA is complicated by anatomical distortion by hematoma and inadequate evaluation of the peripheral arterial circulation, the rate of amputation due to ruptured DFA aneurysms is high. Additional complications include distal venous stasis related to local venous compression and neurologic symptoms from compression of the femoral or tibial nerve[1,2,6].

Standard surgical methods for managing true DFA aneurysms have not been established because of their rarity and surgeons' limited experience. There are several treatment options, including simple ligation, reconstruction of the distal DFA, bypass grafting to the popliteal artery, and coil embolization. In previous reports, simple ligation with aneurysmectomy has been recommended when the femoropopliteal segments are patent; however, reconstruction of the distal DFA is essential for maintaining limb perfusion if these segments are occluded[2,3,5,6]. Surgeons should consider that the DFA plays an important role in the collateral circulation of the lower limb and that peripheral atherosclerotic occlusive disease progresses with age. Therefore, we believe that revascularization to the distal DFA should be pursued whenever technically feasible, even when the SFA is patent. In fact, a patient who had been treated with aneurysmectomy and ligation for a ruptured DFA aneurysm was reported to have required an above-knee amputation 2 years later due to progression of peripheral occlusive disease[1]. Dacron or expanded polytetrafluoroethylene grafts, 8 to 10 mm in diameter, have been used[1–4,6]; however, the autologous vein graft may be the preferred conduit for a distal DFA with a small diameter. In addition, a contralateral saphenous vein is favored when there is ipsilateral venous stasis. If the distal DFA is difficult to reconstruct in patients with an occluded SFA, bypass grafting to the popliteal or tibial vessels should be attempted simultaneously.

Transcatheter coil embolization is an option, especially in high-risk patients with an aneurysm on the distal portion or a branch of the DFA[1].

In conclusion, preoperative assessment of peripheral arterial circulation with 3DCT is essential during treatment planning for patients with DFA aneurysms. Revascularization to the distal DFA is recommended in all cases, regardless of the patency of the SFA. A contralateral saphenous vein is a suitable conduit for a small-caliber DFA if ipsilateral venous stasis is suspected.

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