LETTER TO THE EDITOR

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Surgical management of common femoral artery aneurysm thrombosis



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True common femoral artery aneurysms (CFAAs) are rare entities, accounting for 2–5% of all peripheral aneurysms [1]. They frequently coexist with aneurysms at other anatomical sites. The abdominal aorta is aneurysmal in up to 85% of these patients [2]. Conversely, approximately 14% of patients with an abdominal aortic aneurysm (AAA) have a concomitant common femoral or popliteal artery aneurysm [2–5]. Regardless of treatment, long-term surveillance is essential, as additional aneurysms may develop over time [2].

True aneurysms should be distinguished from pseudoaneurysms, which are typically of iatrogenic or traumatic origin. The main complications of CFAAs include thrombosis, rupture, and distal embolization [6, 7]. In cases of complicated aneurysms, urgent intervention is required due to the risk of limb-threatening ischemia [1, 8–12]. Reports of true CFAA thrombosis remain scarce in the literature.

Herein, we present 2 patients with thrombosed CFAAs. The first was a 79-year-old man who presented with acute limb ischemia of the right lower extremity due to CFAA thrombosis. The second was a 75-year-old man with critical limb ischemia of the right lower extremity, who underwent elective axillo-femoral bypass grafting.

Case 1. A 79-year-old man was admitted with acute limb ischemia of the right lower extremity. His medical history included smoking, arterial hypertension, benign prostatic hyperplasia, cholecystectomy, and peripheral arterial disease. During the preceding 6 months, he had experienced intermittent claudication of the right lower limb after walking approximately 100 m. On admission, acute limb ischemia was classified as Rutherford stage IIa. He also had a known abdominal aortic aneurysm measuring 4 cm in diameter, a thrombosed popliteal aneurysm of the left leg, and aneurysms of the right common femoral and popliteal arteries. Digital subtraction angiography (DSA) demonstrated thrombosis of a 3 cm right CFAA, as well as thrombosis of the superficial femoral artery (SFA) and the popliteal aneurysm, with poor distal run-off.

The patient was transferred to the operating theatre, where, under general anesthesia, the CFAA was exposed and proximal and distal vascular control was obtained (Figure 1). After vascular control, the aneurysm sac was opened and both chronic and fresh thrombus were evacuated. A 6 mm PTFE graft (W. L. Gore & Associates Inc., Flagstaff, AZ) was interposed between the proximal neck of the aneurysm and the distal profunda femoris artery, while the SFA was occluded. The graft size was selected to match the diameter of the profunda femoris artery (PFA) (approximately 6 mm), thereby facilitating an appropriately sized distal anastomosis, whereas the common femoral artery was of larger caliber. On postoperative day 1, a fasciotomy was performed due to compartment syndrome following revascularization. Additional calf muscle debridement was carried out on postoperative day 2. Limb salvage was successfully achieved. Postoperatively, the patient received prophylactic-dose low-molecular-weight heparin (enoxaparin sodium 40 mg once daily) during hospitalization. Upon discharge, lifelong single antiplatelet therapy with clopidogrel 75 mg once daily was prescribed. The patient was discharged on postoperative day 28 with an open calf wound, planned to heal by secondary intention. After discharge, the patient was transferred to a local rehabilitation facility but subsequently left voluntarily to continue recovery at home. Ac-

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cording to available information, approximately 3 months after the procedure, he suffered a myocardial infarction and died.

Case 2. A 75-year-old man was admitted with critical ischemia of the right lower extremity. He reported intermittent claudication over the preceding year, which had progressed to rest pain 3 months prior to admission. His medical history included coronary artery disease, arterial hypertension, dyslipidemia, and benign prostatic hyperplasia. Computed tomography angiography (CTA) demonstrated a thrombosed right CFAA measuring 2.1 cm in diameter, with thrombotic extension into the external iliac artery (Figure 2). The SFA was also thrombosed, with distal reconstitution at the popliteal level. Under general anesthesia, the patient underwent a right axillo-femoral bypass using an 8 mm ringed PTFE graft (W. L. Gore & Associates Inc., Flagstaff, AZ). Following partial aneurysmectomy, the distal anastomosis was performed end-to-side to the common femoral artery extending to the PFA (Figure 3). Given the patient's significant comorbidities, particularly coronary artery disease, he was considered at high risk for extensive anatomical reconstruction. Therefore, an extra-anatomical axillo-femoral bypass was selected as a less invasive alternative to iliofemoral or hybrid approaches, aiming to reduce operative stress and perioperative cardiovascular risk. Limb salvage was successfully achieved. The postoperative course was uneventful, and the patient was discharged on postoperative day 3. Postoperative antithrombotic management included prophylactic-dose low-molecular-weight heparin (enoxaparin sodium 40 mg once daily) during hospitalization. After discharge, lifelong single antiplatelet therapy with clopidogrel 75 mg once daily was prescribed. At 6-month follow-up, the patient demonstrated a satisfactory clinical outcome with no evidence

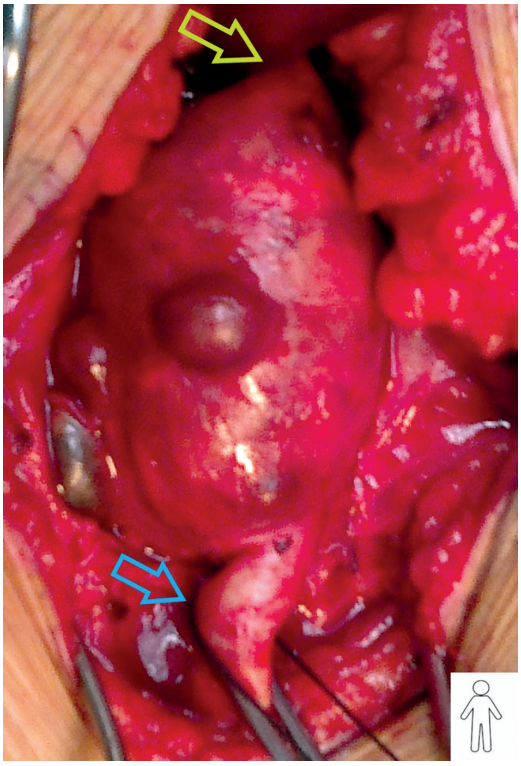


Figure 1. Intraoperative photograph depicting the thrombosed common femoral artery aneurysm (light green arrow: aneurysm neck, blue arrow: profunda femoris artery)

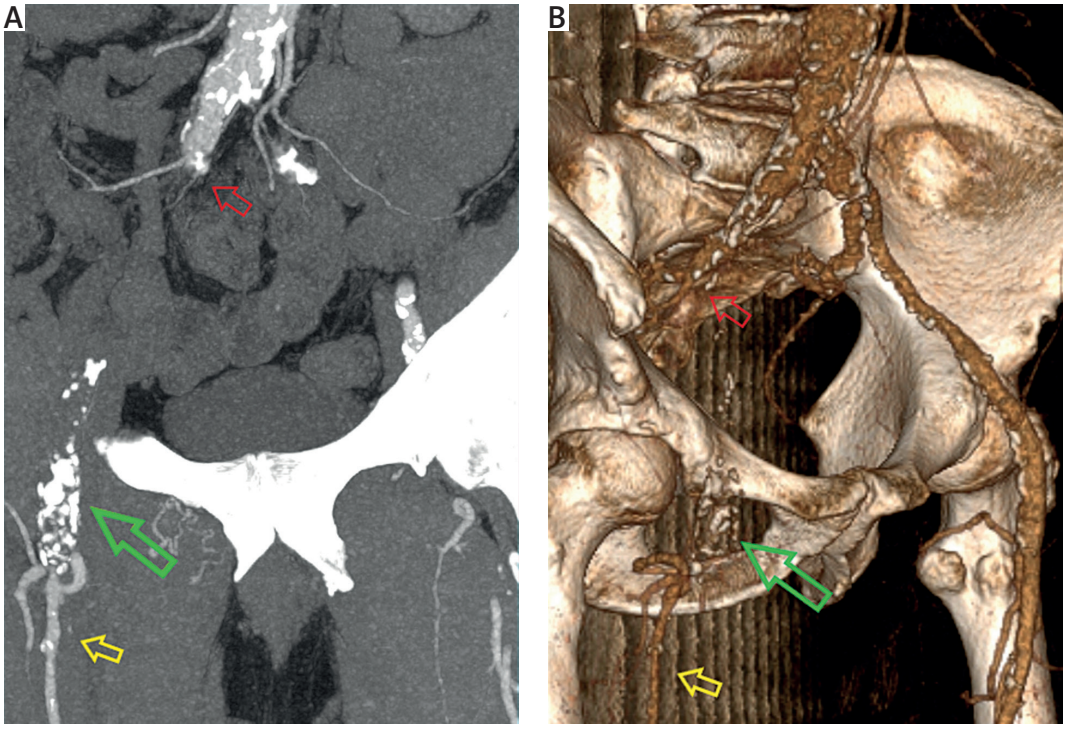


Figure 2. Computed tomography angiography depicting the thrombosed common femoral artery aneurysm and the distal iliac axis. **A** – Multiplanar reconstruction; **B** – three-dimensional reconstruction (green arrow: atheromatic plaques in the thrombosed sac; red arrow: stump of the right common iliac artery; yellow arrow: profunda femoris artery)

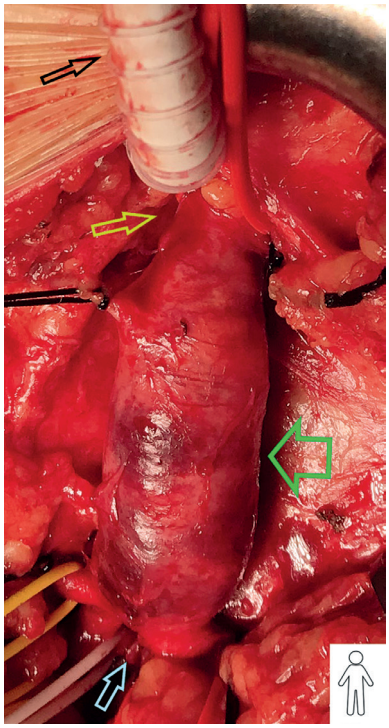


Figure 3. Intraoperative photograph (green arrow: thrombosed common femoral artery aneurysm; light green arrow: neck of the aneurysm; light blue arrow: common femoral artery bifurcation; black arrow: prosthetic graft as it exits the subcutaneous tunnel, before distal anastomosis reconstruction)

of graft-related complications. No further follow-up data are available.

True CFAAs predominantly affect older men (> 70 years), most commonly smokers, and are typically associated with a positive family history or atherosclerotic risk factors [1, 13, 14]. They remain asymptomatic in 30–66% of patients [15]. When symptomatic, they usually present as a palpable mass, localized pain, or claudication, rather than rupture or acute thrombosis [8, 15]. Nevertheless, clinically silent CFAAs may first present with thrombosis or rupture [1].

Rupture has not been reported in CFAAs measuring less than 5 cm in diameter [1, 9, 10, 14], whereas aneurysms larger than 5 cm are associated with an annual rupture rate of approximately 16% [8, 9]. Earlier studies reported rates of thrombosis and embolization of 15% in the common femoral artery, 45% in the PFA, and 26% in the SFA [16]. However, more recent data suggest lower rates, with thrombosis occurring in approximately 3% and rupture in 4% of cases [1, 10–12]. These findings were consistent with a recent study of 49 femoral artery aneurysms, in which 3 ruptured, 4 thrombosed, and 2 presented with distal embolization [6].

The current threshold for repair is generally considered to be a diameter of 3.5 cm [10]. Open surgical repair remains the most commonly employed treatment modality for CFAAs, although hybrid techniques have increasingly been adopted for large aneurysms in high-risk patients. Thrombosed aneurysms may result in limb-threatening ischemia, necessitating urgent intervention to prevent limb loss [17].

Open repair. Open repair of CFAAs was first reported by Fagg in 1908 [18]. Aneurysmectomy (total or partial) with interposition grafting remains the mainstay of treatment [16, 19]. In selected small aneurysms, excision with end-to-end anastomosis may be feasible [4, 20]. Due to the relatively large diameter of the common femoral artery, prosthetic grafts are generally preferred over vein grafts [13]. Various reconstructive configurations may be employed depending on the Cutler and Darling classification of the aneurysm [17, 20].

In cases of thrombosed CFAAs with proximal extension involving the iliac axis, an extra-anatomical bypass, such as an axillo-femoral bypass, may be required, as illustrated in our second patient. In complex anatomical scenarios, segments of a bifurcated graft (traditionally used for axillo-bifemoral bypass) have been utilized to reconstruct the CFA bifurcation [4, 15].

Open repair, consisting of aneurysmectomy and interposition grafting, remains the standard treatment for both uncomplicated and thrombosed CFAAs. Proximal control is typically achieved by clamping the distal external iliac artery or proximal CFA through a longitudinal groin incision. In large or proximally extending aneurysms, suprainguinal retroperitoneal exposure of the external iliac artery may be required to obtain adequate proximal control. Alternatively, hybrid techniques may be used, including proximal balloon occlusion via a contralateral femoral approach or balloon catheter placement under fluoroscopic guidance through the opened aneurysm sac [21, 22].

Type II aneurysms are associated with higher complication rates and pose technical challenges due to the need for reconstruction of the CFA bifurcation [4]. When the PFA arises at an acute angle or has a medial course, conventional bifurcated grafts may be prone to kinking and compromised flow. In such cases, the use of a segment of a bifurcated graft has been shown to yield satisfactory outcomes [4]. Depending on the anatomical configuration, alternative techniques include interposition grafting to the PFA with reimplantation of the SFA onto the graft [23, 24], or the construction of a custom-made synthetic bifurcated graft [25], a technique also described in aortoiliac reconstruction [26].

Endovascular repair. Endovascular and hybrid (combined open and endovascular) approaches for the treatment of CFAAs are rarely reported in the literature [21, 27–29]. Open surgical repair offers the advantage of mass decompression, which is particularly relevant when compressive symptoms affecting adjacent nerves or veins are present [6]. In contrast, endovascular techniques do not alleviate such compressive effects [21].

Standard endovascular repair. Standard endovascular repair of CFAAs is not widely adopted due to several limitations, including the absence of an adequate landing zone at the femoral bifurcation, significant groin mobility, and the risk of stent migration, fracture, or thrombosis secondary to neointimal hyperplasia [8, 13, 30, 31]. Preservation of the PFA is essential, as it serves as a critical collateral pathway in cases of SFA stenosis or occlusion [2, 16, 17].

Endovascular repair has been increasingly utilized in isolated aneurysms of the superficial femoral and profunda femoris arteries [32–35]. Some authors suggest that endovascular treatment for femoral artery aneurysms should be reserved for high-risk patients, particularly for aneurysms smaller than 5 cm and primarily involving the mid-segment of the SFA [19, 33].

Endovascular repair of common femoral artery pseudoaneurysms using stent grafts has also been described [36, 37]. Access is typically obtained via the contralateral common femoral artery; however, when this is not feasible, alternative access routes such as the brachial or axillary artery may be used [33, 36]. In selected cases, ipsilateral access through the SFA or PFA has also been reported as a viable option [36, 37].

Hybrid repair. Endovascular stent grafting under local anesthesia may be feasible in selected high-risk patients and can be applied to aneurysms up to 5 cm in diameter, particularly in CFAAs extending above the inguinal ligament into the external or even the common iliac artery [4, 21]. More complex hybrid endovascular techniques have also been described for the management of CFAAs [22]. In most cases, contralateral femoral access is required for endograft delivery [13].

A specialized hybrid technique was described by Bakoyiannis *et al.* in 2008 for a CFAA extending above the inguinal ligament. Following surgical exposure of the aneurysm, endovascular repair was performed with deployment of two stent grafts in the external iliac artery via access through the CFA bifurcation. Proximal control was subsequently achieved using a balloon catheter. The procedure was completed with open interposition grafting from the distal end of the stent graft to the PFA, followed by placement of a jump graft to revascularize the SFA [22].

Hybrid approaches combining open and endovascular techniques offer several advantages, including limited groin dissection (restricted to the anterior wall of the CFA), avoidance of arterial cross-clamping, reduced need for extensive circumferential or retroperitoneal dissection, and the potential to perform the procedure under local anesthesia [21]. These factors may contribute to shorter operative times and reduced complication rates [4, 21].

Rancic *et al.* reported a series of 6 patients (4 with true and 2 with anastomotic CFAAs) extending above the inguinal ligament, treated with a minimally invasive hybrid technique under local anesthesia (with 1 case performed under spinal anesthesia) [21]. After limited groin dissection, the anterior wall of the CFAA was punctured, and a self-expanding endograft was deployed into the proximal healthy arterial segment. Proximal control was achieved using a balloon catheter inserted through the endograft. The aneurysm sac was then opened, and distal control was obtained with occlusion balloons. The distal end of the stent graft was sutured either to distal native arteries or to additional stent grafts (e.g., Viabahn stents) placed within them [21].

In one complex case involving a 6.1 cm CFAA affecting the bifurcation, an end-to-end anastomosis was performed between the endograft in the external iliac artery and a second endograft in the SFA, while a third endograft placed in the PFA was anastomosed in an end-to-side fashion to the SFA endograft [1]. In this patient, delayed wound closure was performed after 5 days of negative pressure wound therapy using a vacuum-assisted closure (VAC) system [21]. The use of endograft connectors yielded favorable results, with a reported 30-day patency rate of 100% and no evidence of migration [21].

A bifurcated abdominal endograft has also been used to treat a 7 cm CFAA involving the bifurcation under general anesthesia [28]. In this approach, access was obtained via the exposed mid-thigh ipsilateral SFA, with distal landing zones in both the SFA and PFA. An Excluder C3 endograft (W. L. Gore & Associates) was deployed from the distal external iliac artery to the SFA, with the flow divider positioned within the CFA and the contralateral gate oriented toward the PFA. Following wire manipulation and PFA cannulation, a self-expanding Viabahn stent graft and an Excluder Iliac Branch Endoprosthesis (IBE) component were deployed sequentially from the distal PFA to the contralateral gate of the bifurcated graft [28]. This technique is feasible in patients with sufficiently large arterial diameters to accommodate the device.

Hybrid techniques have also been applied in thrombosed CFAAs in high-risk patients, potentially avoiding the need for iliofemoral bypass. In such cases, open interposition grafting may be combined with endovascular thrombectomy and external iliac artery stenting under fluoroscopic guidance, thereby restoring perfusion and alleviating critical limb ischemia [38].

Overall, hybrid approaches may reduce the risk of complications such as lymphorrhea, skin necrosis, and infection, which may occur in up to 19% of cases following open repair [21, 25, 38–40]. Furthermore, the early postoperative bleeding risk of 3.4–7% reported for standard open repair may be lower with hybrid techniques [16, 41, 42].

In conclusion, open surgical repair remains the most widely used treatment modality for CFAAs. Hybrid techniques have increasingly been adopted for the management of large aneurysms in high-risk patients. Thrombosed CFAAs may present with limb-threatening ischemia, necessitating urgent intervention to prevent limb loss.

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Ethical approval

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Disclosures

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