Saphenous vein graft aneurysm formation in a patient with idiopathic multiple aneurysms

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ABSTRACT

True aneurysmal vein graft dilation is rare, and its etiology remains speculative. However, systemic dilation diathesis is regarded as a risk factor. We herein report a case of a rapidly expanding aneurysm in a great saphenous vein graft, resulting in distal malperfusion in a patient who had previously undergone open repair of multiple popliteal artery aneurysms. After an unsuccessful endovascular intervention, the dilated section was eventually replaced by a reversed segment of the contralateral great saphenous vein. Subsequent whole-exome sequencing identified no relevant mutations. This case provides further evidence that aneurysmal disease may be associated with systemic dilation diathesis. (J Vasc Surg Cases and Innovative Techniques 2018;4:197-200.)

Keywords: Vein graft; Systemic dilation diathesis; Etiology

Anastomotic aneurysms are well described in patients with a reversed great saphenous vein (GSV) for peripheral arterial disease.[1] However, true aneurysmal graft dilation of an autologous vein graft is rare, and its etiology is not completely understood. Possible pathogeneses include atherosclerotic degeneration, systemic dilation diathesis, venous graft varicosities, infection, and poststenotic dilations.[2-6] Plaque and cholesterol depositions are common in bypass grafts, suggesting that atherosclerosis may be the main factor in this process. We herein describe a case of a rapidly expanding nonatherosclerotic aneurysm in a GSV graft, resulting in distal malperfusion. The patient's history of multiple aneurysms prompted us to search for potential genetic factors. Although no exact gene mutation was found, this case provides further evidence that aneurysmal disease may be associated with systemic dilation diathesis. Informed consent was obtained from the patient for the publication of the case details and images.

CASE REPORT

A 46-year-old man presented at our institution with a growing pulsatile mass in his right knee. The mass had rapidly expanded during a 2-week period, causing extreme discomfort because of tension of the overlying skin. Computed tomography angiography (CTA) revealed multiple aneurysms in the thoracic aorta, abdominal aorta, bilateral common femoral arteries, and right popliteal artery (Fig 1). The patient's medical history included asymptomatic left popliteal artery occlusion and cerebral infarction. The patient had no hypertension, hyperlipidemia, or any other systemic inflammatory diseases. The multiple popliteal artery aneurysms (PAAs) were successfully excised. A reversed segment of the ipsilateral GSV was implanted for reconstruction through a medial approach. Postoperative recovery was uneventful, and the ankle-brachial index was 0.9 after the operation. The patient was lost to follow-up.

Three years after the first intervention, the patient developed a rapidly expanding pulsatile painless mass in the right popliteal fossa region. Repeated CTA demonstrated a saphenous vein graft aneurysm (Fig 2). Infection was ruled out, as the patient had no fever, and the serum white blood cell count and procalcitonin concentration were within normal ranges. The serum C-reactive protein concentration was 6.10 mg/L (normal range, 0-5 mg/L). Two days after admission, the patient developed rest pain, and the dorsalis pedis artery pulse was impalpable at that time. Emergency angiography through the contralateral common femoral artery showed distal embolization of the graft aneurysm but not of the infrapopliteal runoff (Fig 3). We planned to reconstruct the popliteal artery using a covered stent but were unable to recanalize the occlusion. The patient then underwent resection of the initial vein graft, using a posterior approach to perform the reconstruction with a reversed segment of the contralateral GSV. Resection and repair were exceedingly difficult as the aneurysm was adherent to the adjacent tissues and ruptured during the operative process. Histopathologic examination of a segment of the aneurysmal vein graft revealed intimal thickening without atherosclerotic change and medial thinning. Postoperative recovery was uneventful, without infection or hematoma development. Repeated CTA performed 1 year after the second intervention

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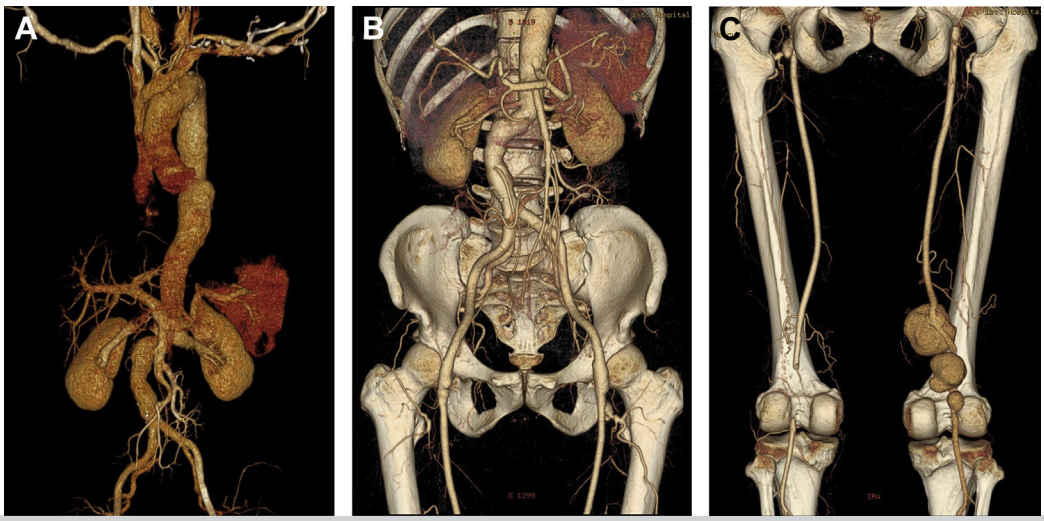

Fig 1. Computed tomography angiography (CTA) revealed formation of multiple aneurysms in thoracic aorta (**A** and **B,** maximum diameter, 45 mm), abdominal aorta (**A** and **B**; maximum diameter, 32 mm), bilateral common femoral artery (**B**; maximum diameter, 15 mm), and right popliteal artery (**C**; maximum diameter, 60 mm).

showed a generally patent graft with mild proximal anastomotic stenosis (Fig 4). However, the left femoral artery was newly occluded, which might have been related to the previous puncture and compression. As the patient was asymptomatic and the ankle-brachial index was 0.7, no further intervention was conducted. The patient's history of multiple aneurysms prompted us to search for potential genetic factors. However, subsequent whole-exome sequencing identified no relevant mutations.

DISCUSSION

Although true infrainguinal vein graft aneurysms are infrequently reported in the literature, a recent study suggested that the incidence may be as high as 8.8%.[7] Dilations in venous bypass grafts may rupture, causing acute ischemia and hemorrhage that require urgent surgical treatment; however, treatment of dilated venous bypass grafts can be challenging because of the presence of extensive scar tissue and a high risk of infection. Despite advancements in endovascular repair for initially untreated PAA, the use of an endoprosthesis to treat a dilation in a venous bypass graft has rarely been reported. In 2009, van Vugt et al[8] described two cases in which covered stents were used. To the best of our knowledge, no similar reports have subsequently been published. In this case, the rapidly emerging distal embolization ultimately resulted in unsuccessful endovascular treatment. Prompt intervention through either an open or endovascular procedure is warranted for rapidly growing or symptomatic defects as well as for those resulting in distal malperfusion.[9]

Aneurysmal disease is associated with several inherited connective tissue disorders, such as Marfan syndrome, Loeys-Dietz syndrome, and some cases of Ehlers-Danlos syndrome.[10] Marfan syndrome is caused by mutation of

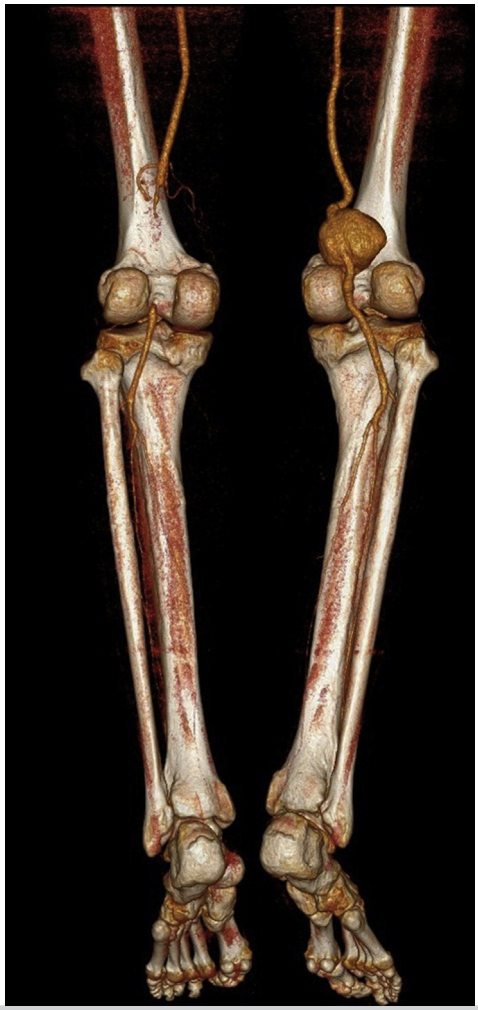

Fig 2. Computed tomography angiography (CTA) showing saphenous vein graft aneurysm formation (maximum diameter, 56 mm).