CASE REPORT

DOI: 10.4274/csmedj.galenos.2026.2026-2-6

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Repair of a Giant Arteriovenous Fistula Aneurysm Using Autologous Aneurysmal Tissue in a Hemodialysis Patient: A Rare Surgical Approach

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What is known on this subject?

Arteriovenous fistulas (AVF) are the gold standard for long-term vascular access in hemodialysis patients. However, aneurysm formation is a well-recognized complication resulting from repeated cannulation, high flow rates, and venous wall degeneration. AVF aneurysms may lead to thrombosis, rupture, skin complications, and loss of vascular access. Standard surgical management typically includes aneurysm resection with interposition grafting, primary repair, or ligation in severe cases.

What this study adds?

This case report describes a rare and innovative surgical approach in which autologous aneurysmal venous tissue was utilized as a patch for reconstruction after excision of an AVF aneurysm complicated by thrombosis. The technique demonstrates that aneurysmal tissue, when appropriately selected, may serve as a viable reconstructive material, potentially preserving native vascular access and avoiding synthetic graft use.

ABSTRACT

Arteriovenous fistulas (AVF) remain the gold standard for long-term vascular access in patients undergoing hemodialysis. However, prolonged use, repeated cannulation, and high-flow hemodynamics may lead to aneurysmal degeneration of the venous segment. We report a case of a giant 8-cm cephalic vein aneurysm in a radiocephalic AVF, complicated by thrombosis and complete loss of fistula function. Doppler ultrasonography demonstrated a large thrombosed aneurysm with severely reduced flow. Surgically, after excision of the aneurysmal segment and evacuation of thrombotic material, the fistula was reconstructed with a venous patch fashioned from the patient's own aneurysmal tissue to repair a completely occluded proximal venous segment. This rare technique represents a potentially valuable option for vascular reconstruction using autologous tissue, avoiding prosthetic material and preserving dialysis access.

Keywords: Arteriovenous fistula aneurysm, 8 cm aneurysm, thrombectomy, autologous patch plasty

Introduction

Arteriovenous fistulas (AVF) are considered the preferred vascular access for patients with end-stage renal disease undergoing hemodialysis due to their superior long-term patency and lower infection rates compared to alternative access types (1,2).

However, long-term use is associated with progressive vascular remodeling. High-flow states, repeated needle punctures, and chronic wall stress may lead to structural weakening of the venous wall, resulting in aneurysmal degeneration (2,3).

AVF aneurysms are clinically significant and not merely cosmetic. They may result in thrombosis, infection, skin thinning, ulceration, and even life-

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Received: 26.02.2026 **Accepted:** 13.05.2026 **Epub:** 03.06.2026

Cite this article as: Guseinov Z, Öztemel B, Türe O, Kocaaslan C, Aydın E. Repair of a giant arteriovenous fistula aneurysm using autologous aneurysmal tissue in a hemodialysis patient: a rare surgical approach. Cam and Sakura Med J. [Epub Ahead of Print]

threatening rupture (3,4). Therefore, timely recognition and appropriate surgical management are essential.

Surgical options include aneurysmorrhaphy, interposition grafting, ligation with creation of a new access, or reconstruction using autologous tissue (4,5). However, in cases of giant aneurysms with associated thrombosis and venous occlusion, reconstructive options are limited.

Notably, the use of autologous aneurysmal tissue as a patch is rarely reported in the literature, and its clinical utility remains incompletely defined.

Case Report

A 58-year-old male patient, receiving maintenance hemodialysis for 3 years via a left forearm radiocephalic AVF, presented with progressive difficulty with dialysis access and reduced fistula flow.

On physical examination, a markedly dilated, pulsatile mass was observed in the left forearm. The overlying skin was thinned but intact, with no ulceration or signs of infection.

Doppler ultrasonography revealed a giant aneurysmal dilatation in the cephalic vein segment, measuring approximately 8 cm in diameter, with extensive intraluminal thrombus and severely diminished flow. Both proximal and distal flow velocities were significantly reduced.

Surgical exploration was performed. A transverse venotomy was initially made just proximal to the aneurysmal segment. Distal thrombectomy using 3F and 4F Fogarty catheters was attempted; however, no adequate thrombus retrieval was achieved due to organized chronic thrombosis.

The incision was therefore extended, and the entire aneurysmal segment was exposed. The cephalic vein was carefully controlled proximally and distally. The aneurysmal sac was opened, and large amounts of organized thrombotic material were completely evacuated (Figure 1).

Intraoperatively, complete proximal venous occlusion with dense fibrotic obliteration was identified, preventing standard reanastomosis.

The distal aneurysmal segment was then reduced and primarily closed with 4-0 polypropylene sutures when vessel quality was acceptable.

Because no usable proximal lumen was available, a segment of the distal aneurysmal venous wall with sufficient structural integrity was harvested and reshaped into an autologous venous patch (Figure 2). This patch was used to reconstruct the occluded proximal venous segment and restore the continuity of the fistula (Figure 3).

A strong, continuous thrill was palpated at the end of the procedure. Hemostasis was achieved, and the wound was closed in anatomical layers. The postoperative course was uneventful, and the patient was discharged with a functioning AVF suitable for hemodialysis.

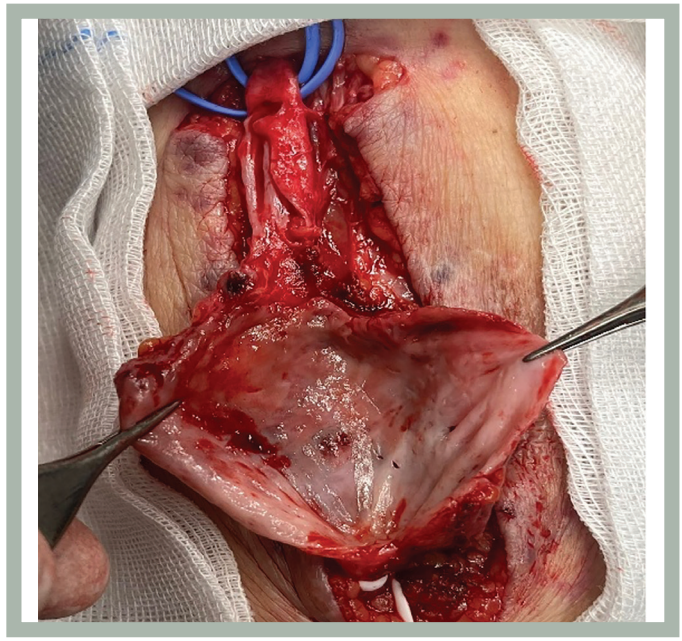

Figure 1. After performing the aneurysmotomy, the thrombotic material inside the 8 cm aneurysm was evacuated, and the lumen of the aneurysmal sac was thoroughly cleaned

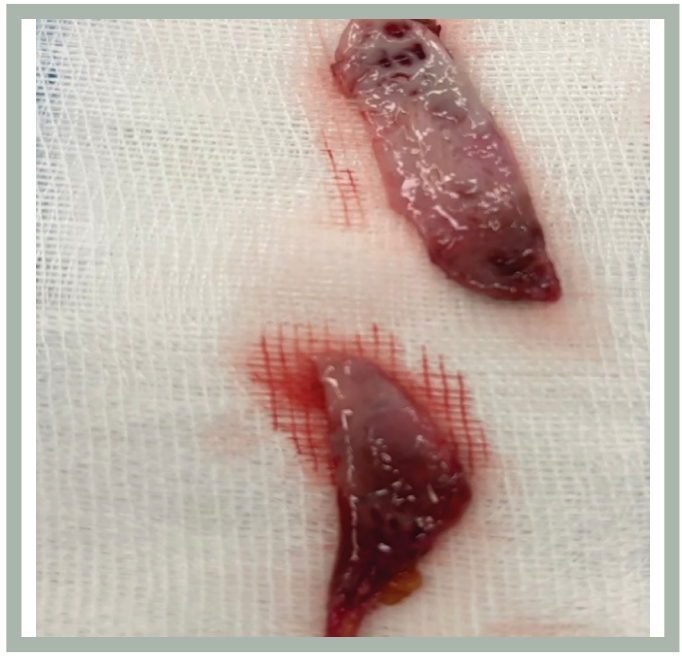

Figure 2. Since the lumen of the cephalic vein was completely occluded, a patch graft was prepared using the resected aneurysmal segment

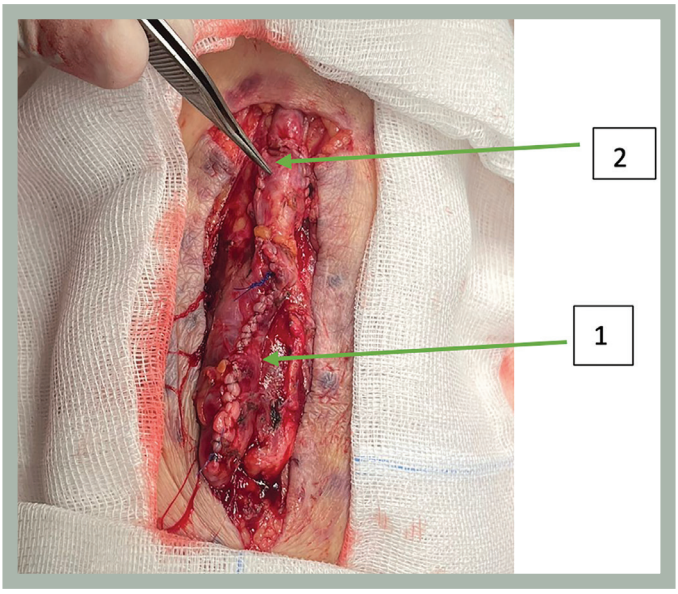

Figure 3. The proximal segment (1) of the aneurysmal cephalic vein was reduced in size and repaired with 4/0 Prolene. A patch plasty was performed over the distally occluded segment, and the lumen was successfully widened (2)

Discussion

Aneurysmal degeneration of AVFs is a well-recognized complication in long-term hemodialysis patients and is primarily related to hemodynamic stress, repeated cannulation trauma, and progressive venous wall weakening (3).

Surgical management depends on anatomical conditions, aneurysm size, and the presence of thrombosis or venous occlusion. Commonly used techniques include aneurysmorrhaphy, interposition grafting, and ligation with new access creation (4).

In the present case, the main challenge was a complete fibrotic occlusion of the proximal cephalic vein, which rendered conventional reconstructive strategies infeasible.

Therefore, an alternative approach was used: the aneurysmal segment was partially resected and reconstructed using an autologous patch derived directly from the aneurysmal venous wall.

Although autologous venous patching has been described, the use of tissue harvested from a giant 8-cm aneurysm for direct reconstruction is extremely rare.

Kakkos et al. (5) reported the use of autologous venous patches for AVF outflow obstruction; however, the patch was not derived from aneurysmal tissue itself. Therefore, the present case represents a particularly distinctive application of this concept.

The main advantage of this technique is the complete avoidance of synthetic graft material, thereby reducing infection risk and foreign body-related complications (6). Additionally, preservation of the existing AVF eliminates the need for new vascular access creation.

However, limitations exist. Aneurysmal venous tissue may exhibit heterogeneous histological features, including fibrosis and medial degeneration; these changes can compromise long-term durability. Moreover, long-term patency outcomes of this technique remain unknown and require further study (6).

Conclusion

This case demonstrates that even in the presence of a giant 8-cm AVF aneurysm with complete proximal venous occlusion, reconstruction using autologous aneurysmal tissue may be a feasible salvage option when conventional techniques are not applicable. Although promising, this technique should be further evaluated in larger case series and long-term follow-up studies to determine its durability and safety.

Ethics

Informed Consent: The patient provided written informed consent for the use of his clinical data and operative findings for academic publication, scientific presentation, and educational purposes.

Footnotes

Authorship Contributions

Surgical and Medical Practices: Z.G., B.Ö., C.K., Concept: Z.G., O.T., C.K., E.A., Design: Z.G., B.Ö., O.T., C.K., Data Collection or Processing: Z.G., B.Ö., O.T., C.K., E.A., Analysis or Interpretation: Z.G., B.Ö., O.T., C.K., Literature Search: Z.G., O.T., C.K., E.A., Writing: Z.G., B.Ö., O.T., C.K.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study received no financial support.

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