



Case Report

Banding technique with aneurysm resection to preserve vascular access and distal perfusion

Resolución del síndrome de robo por degeneración aneurismática de fístulas arteriovenosas braquiocéfálicas

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Abstract

Introduction: steal syndrome associated with arteriovenous (AV) accesses for hemodialysis is an uncommon ischemic complication that can compromise limb viability.

Case report: we present the experience with two cases of brachiocephalic fistulas complicated by aneurysmal degeneration and steal syndrome. Resection of the aneurysmal segments and flow restriction using a controlled banding technique with interposition of a polytetrafluoroethylene (PTFE) graft were performed. Both patients showed complete resolution of ischemic symptoms and functional preservation of the vascular access during follow-up.

Discussion: Controlled banding combined with aneurysmal exclusion is an effective technique to improve distal perfusion while preserving hemodialysis access.

Resumen

Introducción: el síndrome de robo asociado a accesos arteriovenosos (AV) para hemodiálisis es una complicación isquémica infrecuente que puede comprometer la viabilidad de la extremidad.

Caso clínico: se presenta la experiencia de dos casos con degeneración aneurismática de fístulas braquiocéfálicas complicadas con síndrome de robo. Se realizó resección de las zonas aneurismáticas y restricción del flujo mediante técnica de ligadura controlada (banding) con interposición de injerto de politetrafluoroetileno. Ambos pacientes presentaron resolución completa de los síntomas isquémicos y la preservación funcional del acceso vascular durante el seguimiento.

Discusión: la ligadura controlada combinada con exclusión aneurismática es una técnica eficaz para mejorar la perfusión distal y conservar el acceso para hemodiálisis.

Keywords:

Arteriovenous fistula.
Steal syndrome.
Vascular access.
Hemodialysis.
Aneurysm.

Palabras clave:

Fístula arteriovenosa.
Síndrome de robo.
Acceso vascular.
Hemodiálisis.
Aneurisma.

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INTRODUCTION

Hemodialysis access-induced distal ischemia (HAIDI) syndrome is a complication that affects approximately 4% to 10% of patients with hemodialysis accesses, most commonly those with brachiocephalic fistulas (1-3). It results from diversion of arterial flow into the fistula, reducing distal perfusion and causing symptoms ranging from mild discomfort to critical ischemia (Table I) (4). The aneurysmal degeneration of the fistula vein increases flow, thereby exacerbating the syndrome. We present 2 cases with this complication and their surgical management using aneurysm resection and controlled banding (1-5).

Table I. Clinical Classification of Steal Syndrome Associated with Arteriovenous Fistulas for Hemodialysis (7)

Grade	Clinical Symptoms
I	Asymptomatic, no hemodynamic or distal clinical changes
Ila	Mild symptoms, discomfort, or paresthesias
Ilb	Moderate ischemia, pain, or mild trophic changes
III	Severe ischemia, ulceration, or gangrene

Source: adapted from Beathard GA, Spergel LM. Semin Dial. 2013;26(3):287-314.

CASE REPORTS

Case report 1

A 72-year-old man with end-stage renal disease on hemodialysis presented with severe pain and pallor in the right hand, worsening during dialysis sessions. Physical examination revealed the presence of a venous aneurysm at the brachiocephalic fistula and diminished distal pulses. Temporary occlusion testing of the fistula improved perfusion. Surgery was planned (Fig. 1).

Case report 2

A 38-year-old man on hemodialysis presented with similar symptoms in the left hand. Examination revealed an aneurysm in the cephalic vein of the brachiocephalic fistula. Steal syndrome was confirmed with occlusion testing and surgery was planned.

Surgical procedure

In both cases, hydrodissection was performed to release the subcutaneous tissue. An incision was performed along the venous tract, followed by blunt

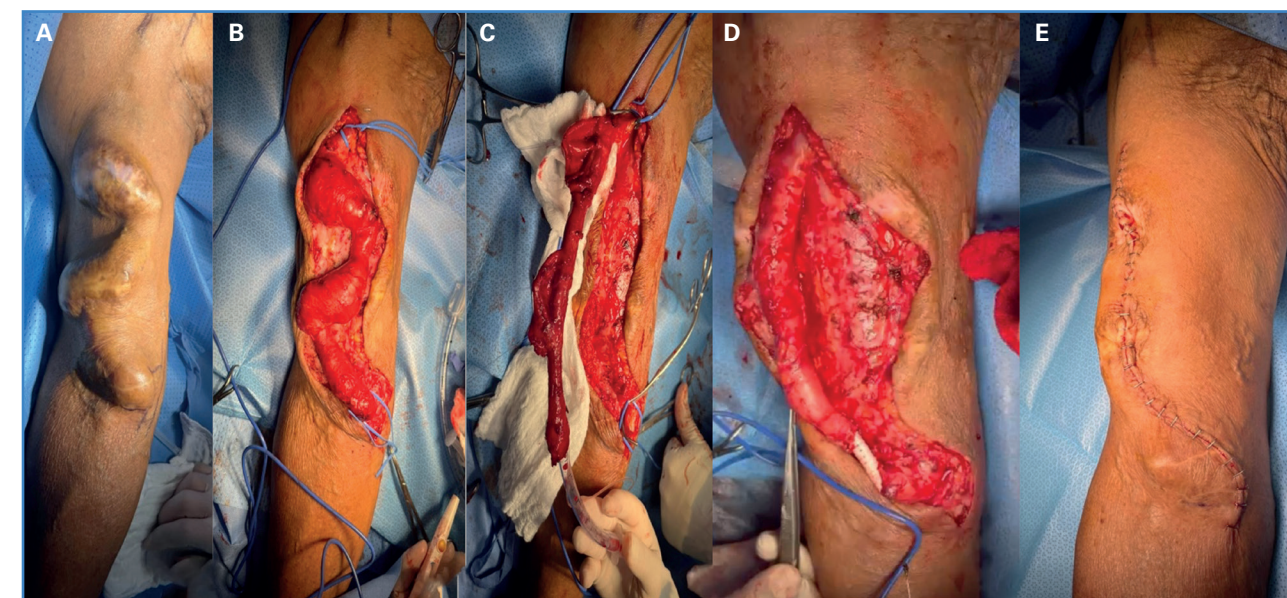


Figure 1. Surgical sequence of case report #1. A. Right upper limb with brachiocephalic arteriovenous fistula and aneurysmal degeneration. B. Dissection and exposure of aneurysmal venous segment. C. Exclusion of arterial segment; exposure of aneurysmal degeneration and cannulation of venous segment of the fistula; marking of remodeling site. D. Banding procedure with PTFE graft interposition. E. Wound closure.

dissection to expose the cephalic vein and aneurysmal segments (Figs. 1B and 2B). Afterwards, the proximal and distal vein segments were isolated, preserving the juxta-anastomotic portion. The lumen of the brachio-cephalic vein was cannulated with an endotracheal tube No. 8 (Fig. 1C). Partial resection of the aneurysmal segments was performed using a 45-mm vascular stapler, remodeling the vein. Controlled banding was then applied with interposition of a 6-mm polytetra-fluoroethylene (PTFE) graft between the arterial and venous segments, placed at the juxta-anastomotic vein (Figs. 1D and 2C). This limited venous flow without compromising fistula function. Both patients had uneventful recovery, with clinical improvement and preservation of dialysis access.

DISCUSSION

HAIDI is a multifactorial complication. The main cause is excessive flow into the fistula, which diverts circulation from the distal limb. Aneurysmal degeneration increases venous diameter and flow, thereby raising the risk of ischemia. Controlled banding or restriction with a cuff is an effective technique that preserves access function by reducing excessive flow (5-8).

Other techniques for HAIDI include definitive ligation, distal revascularization with interval ligation (DRIL), revision using distal inflow (RUDI), and proximalization of arterial inflow (PAI); however, controlled banding is less invasive and particularly suitable in cases with venous aneurysms. Successful treatment requires balancing distal perfusion with preservation of dialysis access, as achieved in our patients (9,10).

CONCLUSIONS

Aneurysmal degeneration of brachiocephalic arteriovenous fistulas can trigger or worsen steal syndrome, jeopardizing the limb. The combination of aneurysm resection and controlled banding with PTFE graft interposition is an effective method to resolve distal ischemia while maintaining a functional vascular access for hemodialysis. This approach should be considered in patients with HAIDI and venous aneurysms.

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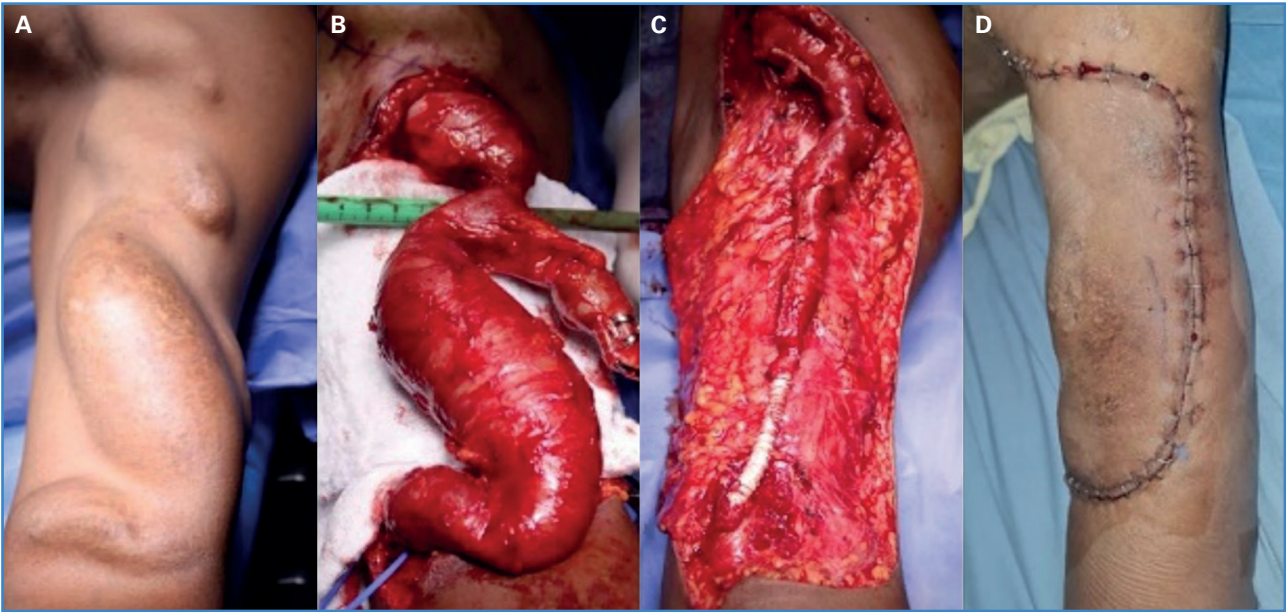


Figura 2. Surgical sequence of case report #2. A. Left upper limb with brachiocephalic arteriovenous fistula and aneurysmal degeneration. B. Dissection and exposure of aneurysmal venous segment. C. Banding procedure with PTFE graft interposition. D. Final control with tumor devascularization.

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