

Short interposition grafting for dialysis-access steal syndrome treatment

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DESCRIPTION

A 60-year-old man on chronic haemodialysis presented with access-related severe ischemia of the hand 4 years after the creation of a left brachiocephalic arteriovenous fistula. The fingers were painful, he was pale, and skin ulceration was evident on the thumb. Concomitant diseases included arterial hypertension and diabetes. Doppler signals were severely attenuated in the forearm arteries but returned to normal after digital compression of the fistula. He underwent colour duplex examination, which revealed brachial artery flow of 2600 mL/min. The anastomosis was 8 mm wide, and the diameter of the proximal cephalic vein was approximately 1.5 cm. A diagnosis of access-related steal syndrome (grade 4a) due to hyperfunctioning brachiocephalic fistula was made. Digital subtraction angiography (DSA) ruled out the presence of arterial stenoses proximal to the fistula that could affect inflow. In addition, no stenoses were detected distally that could increase peripheral resistance. We performed ligation of a major cephalic side branch to restrict overflow from the fistula, but without apparent benefit. We then subjected the patient to a more invasive procedure to restrict flow. Under local anaesthesia, we inserted a short expanded polytetrafluoroethylene (ePTFE) graft (Gore Intergring) with a diameter of 6 mm and a length of 3 cm extending 1 cm beyond the anastomosis (figure 1A,B). Because of the discrepancy

between the diameters, the anastomoses were created obliquely and performed, so that the resulting angles in the anastomoses corresponded to the upward rotation of the cephalic vein. Postoperatively, brachial flow decreased to 1000 mL/min, the patient's symptoms disappeared and the ulcer eventually healed. Three weeks later, the patient began haemodialysis through the fistula. For the next 7 years, the fistula was used for haemodialysis without recurrence of steal until the patient died of cancer.

A 'steal phenomenon' is usually present in nearly 80% of arteriovenous accesses (AVAs), but patients remain asymptomatic, mainly because of compensation by dilation of the collateral vessels. This compensation is impaired in the presence of diabetes or atherosclerosis and may lead to 'steal syndrome' in 4%–8% of AVAs. In this case, symptoms of distal ischemia occur, ranging from coolness and numbness in the fingers to ischaemic pain or gangrene. Severe symptoms require intervention to resolve the ischemia. Treatment may include several options depending on the flow measurement. Fistulas with a high flow are classically corrected with flow-limiting procedures such as banding or Revision Using Distal Inflow (RUDI) procedures. Fistulas with a normal flow have been treated with Distal Revascularisation-Interval Ligation or Proximalisation of Arterial Inflow.¹ Several additional techniques have been reported in the literature, with ligation being the last option.^{2–6} Prior DSA with correction of critical stenosis is mandatory and can eliminate the steal in many cases. There are little data in the literature on short interposition grafts for the treatment of dialysis access steal syndrome.⁷ The goal is to restrict flow by narrowing the wide vein lumen. In our case, although we interposed a 6 mm graft, after a month, the diameter would be only 4 mm because the neointima normally covers the wall. Consequently, we created short stenosis of 4 mm in a large outflow vein of 12–15 mm, achieving a flow reduction of approximately 60%.

We did not prefer external banding with a PTFE strip around the vein because we were concerned that banding would lead to severe internal folds due to the large vein diameter, which could compromise the longevity of the procedure. In addition, we did not use the RUDI technique because of its complexity. In this case, the fistula is ligated and blood flow is restored with a venous bypass from the proximal radial or ulnar artery.¹ In conclusion, we believe that our technique represents an

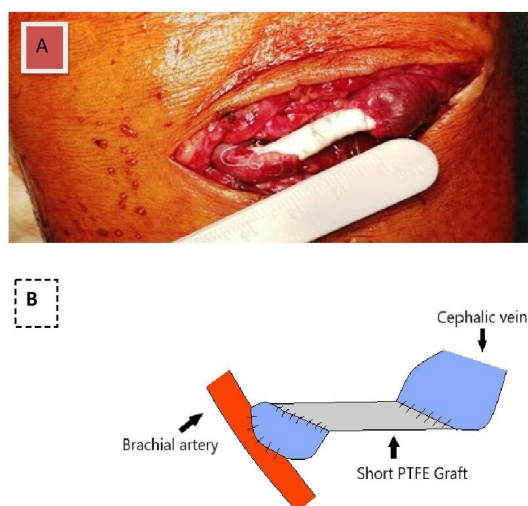


Figure 1 (A) A short polytetrafluoroethylene (PTFE) graft was inserted into the outflow vein beyond the anastomosis of a left brachiocephalic fistula at the elbow. (B) Schematic representation.



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alternative flow-limiting procedure for the treatment of access-related steal syndrome in hyperfunctioning fistulas.

Learning points

- Dialysis access steal syndrome (DASS) should be promptly recognised and treated before inadvertent ischemia of the hand occurs.
- Reducing the diameter of a wide outflow vein by inserting a short polytetrafluoroethylene (PTFE) graft can normalise blood flow in high-flow brachiocephalic fistulas. This is a simple procedure that does not require intraoperative ultrasound monitoring or fluoroscopic assistance. We believe it has a role in the subset of patients with DASS with high-flow brachiocephalic fistulas and a wide outflow vein beyond the anastomosis.

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Case reports provide a valuable learning resource for the scientific community and can indicate areas of interest for future research. They should not be used in isolation to guide treatment choices or public health policy.

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