

# Healing of venous ulcers secondary to an ankle arteriovenous fistula

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Venous ulcer as a complication of ankle arteriovenous fistula for hemodialysis is rarely reported. It poses a challenge between ulcer healing and fistula preservation. We report our experience in the management of venous ulcers secondary to an ankle arteriovenous fistula in a hemodialysis patient. (*J Vasc Surg Cases* 2015;1:229-31.)

Venous ulcer is a recognized complication of lower extremity arteriovenous fistula (AVF). These ulcers usually occur as a result of traumatic groin or thigh AVF. Ankle AVF leading to venous ulcer is rarely reported, however.<sup>1-3</sup> This is probably due to a lesser degree of venous hypertension associated with distal lower limb fistula compared with a proximal fistula.

Despite the high number of patients on hemodialysis, there is a lack of literature on the creation of and complications associated with ankle AVF. The available publications on ankle AVF are case reports or small case series that discuss the results of patient follow-up of between 4 months and 2 years and not for the long term.<sup>4,7</sup> To our knowledge, there are no published reports of venous ulceration arising from these fistulas to date.

With the patient's consent, we report our experience of a case of an ankle AVF created for hemodialysis, complicated with venous ulcers. This poses a challenge because ligation or cessation of the fistula by any measures would mean terminating the hemodialysis access.

## CASE REPORT

A 30-year-old woman was diagnosed during her childhood with end-stage renal disease as a result of chronic glomerulonephritis. She was managed with continuous ambulatory peritoneal dialysis for 4 years, but this was discontinued because of peritonitis. She was then changed to hemodialysis. She had multiple central venous catheters inserted in between AVFs, resulting in bilateral central venous occlusion. All her upper extremity fistulas and grafts either had failed or were complicated with stenosis, thrombosis, or infection. Although she was on the national renal transplant list, there were no suitable donors to date. Having used all access veins



**Fig 1.** Left venous ulcers following great saphenous vein (GSV)-posterior tibial artery arteriovenous fistula (AVF). The markings on the leg represent the course of the GSV. The scar just above the medial malleolus represents the site of anastomosis.

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Author conflict of interest: none.

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The editors and reviewers of this article have no relevant financial relationships to disclose per the Journal policy that requires reviewers to decline review of any manuscript for which they may have a conflict of interest.

2352-667X

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<http://dx.doi.org/10.1016/j.jvsc.2015.07.007>

in the upper limbs after 12 years, she had a right thigh polytetrafluoroethylene (PTFE) graft inserted 4 years ago for hemodialysis. This thigh graft thrombosed a year later. At that time, we also offered her the option of creating a left ankle fistula as the PTFE graft would have a high risk of recurrent thrombosis.

Preoperatively, she was noted to be obese with a body mass index of 35. Other than a history of chronic glomerulonephritis, she had no other comorbidities and no history of deep venous



**Fig 2.** Left ankle arteriovenous fistula (AVF) during hemodialysis with healed ulcer (*arrow*) after 10 months.

thrombosis. Both her lower limb pulses were palpable with normal ankle-brachial systolic index. There were no varicosities in the lower limbs. Duplex scan showed a patent left great saphenous vein (GSV) with a diameter of 4 mm and 3 mm at the proximal and distal lower limb, respectively. The depth of GSV from the skin surface was 3 to 6 mm below the knee and 5 to 15 mm in the thigh. There was no evidence of thrombophlebitis or reflux in the superficial veins as well as in the deep veins. To ensure that there was no obstruction in the proximal veins, we performed an ascending venogram, which confirmed patency of the left femoral vein, iliac veins, and inferior vena cava.

A GSV to posterior tibial artery AVF, close to the left medial malleolus, was created concurrently with the right thigh PTFE graft thrombectomy and jump graft repair. The right thigh graft thrombosed 2 years later and was not amenable to revision because of long stenosis of the common femoral vein. By then, the left ankle fistula had matured adequately to a diameter of 7 mm from her ankle to the medial aspect of her knee with a flow rate of 600 mL/min on duplex scan. However, she also developed two superficial ankle ulcers above the left medial malleolus and an episode of bleeding from some prominent venules at the base of the ulcers (Fig 1). Cultures of the ulcers did not yield any microorganisms.

To preserve the fistula, which was her only dialysis access, and to stop the bleeding and heal the ulcers at the same time was challenging. Nevertheless, she underwent hemodialysis using the ankle fistula, achieving a hemodialysis flow rate of 300 mL/min. The dorsalis pedis pulse remained palpable, whereas the posterior tibial pulse was impalpable because of scar tissue. Duplex scan showed adequate flow at the dorsalis pedis artery and no reversal of flow to suggest steal syndrome. There were no other refluxing collateral veins or perforators that could contribute to the ulceration on duplex scan.

We persisted with daily normal saline and foam dressing of the ulcers. Class 1 compressive stocking was applied throughout the day and removed only during hemodialysis. We did not apply multilayer compressive bandage for fear that it could inadvertently impede the flow of the fistula, which could lead to thrombosis. It took 10 months before the ulcers healed, and at the time of writing, the fistula remained functional, and the primary patency of the ankle AVF had been about 3 years (Fig 2).

## DISCUSSION

Ankle AVF is rarely created for vascular access in hemodialysis patients.<sup>4-7</sup> Given the fact that dialysis patients are living longer and a proportion of them would suffer from

bilateral central venous or superior vena cava occlusion due to repeated central catheter use, lower limb veins should be a viable option. Most studies of lower limb access are confined to prosthetic grafts and superficial femoral vein transposition, with the latter having better patency and reduced infective complications.<sup>8</sup> The feasibility of ankle AVF remains largely unexplored.

Current knowledge of ankle AVF is derived from observation of traumatic AVF in the lower limb, which usually remains undiagnosed for a long time. This is because the distal lower limb or foot ulcer has a latent period of 8 years to 34 years in the series.<sup>1-3</sup> All the ulcers reported with traumatic lower limb fistulas healed with ligation or cessation of the fistulas. This was done by surgical ligation, coil embolization, and endovascular stenting. However, AVF created for the purpose of hemodialysis is a different matter. These fistulas are the only accesses available for hemodialysis patients. The only treatment options for such venous ulcers are dressing, compression therapy, and perhaps banding of the fistula or ligation of refluxing veins that underlie the ulcers.

## CONCLUSIONS

The potential complications of limb ischemia and venous hypertension leading to ulceration will have to be taken into consideration in creating an ankle AVF. When an ulcer develops, ischemia secondary to steal syndrome or arterial insufficiency must be excluded expeditiously by invasive or noninvasive measures, failing which it could result in amputations. Venous ulcer may also be aggravated by enlarged collateral veins or incompetent perforators. It could arise from arterialized flow in the veins, leading to venous hypertension. In this patient, duplex ultrasound

showed that ischemia was not the cause of the ulceration and that no enlarged refluxing superficial collateral veins were present. The ulcers were most likely due to venous hypertension arising from the fistula. A period of conservative therapy using dressings and judicious compressive therapy has been successful in healing the ulcers. This shows that a balance between ulcer dressing and compression and AVF preservation can be achieved.

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Submitted Jun 5, 2015; accepted Jul 24, 2015.