Severe Skin Ulcer on the Hand Caused by Hemodialysis Shunt-related Venous Hypertension That Required a Skin Graft

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Summary: In dialysis patients, peripheral venous hypertension–induced hand ulcers are rare. We report a case in which a severe hand ulcer was treated with skin grafting after shunt ligation. The patient was a 60-year-old woman who been undergoing dialysis for 13 years. Twelve years ago, a shunt was created in her right wrist via a side-to-side anastomosis. Swelling and congestion occurred in the right hand, and skin ulcers developed on the dorsal proximal portions of the index, middle, ring, and little fingers. No central vein obstruction was apparent. The right wrist shunt was explored, and the distal vein was ligated. A new shunt was created at the right elbow, but the proximal end of the vein that was used for the wrist shunt had to be used, resulting in complete cephalic vein occlusion from the wrist to the elbow. The swelling extended to the entire forearm. Four weeks after the wrist and elbow shunts were ligated, conservative treatment had resulted in granulation tissue formation in the ulcers. Debridement and full-thickness skin grafting from the abdomen were performed. Overall, skin graft survival was 75%. In conclusion, in this patient, side-to-end anastomosis of the proximal vein might be appropriate for shunt creation. When venous hypertension is suspected, ensuring an appropriate alternative shunt, promptly detecting the cause of the problem, and appropriate treatment are important. Venous hypertension must be completely resolved before surgery for ulcers. (Plast Reconstr Surg Glob Open 2020;8:e2917; doi: 10.1097/GOX.0000000000002917; Published online 15 June 2020.)

In dialysis patients, peripheral venous hypertension–induced hand ulcers are rare. We report a case in which such hand ulcers were treated with skin grafting after shunt ligation.

PATIENT

The patient was a 60-year-old woman who had been undergoing dialysis for 13 years. Twelve years ago, a shunt had been created in her right wrist via side-to-side anastomosis. Removing blood from the proximal side of the shunt had been difficult for several months; therefore, blood removal was performed from the distal side of the shunt. Swelling and congestion of the right hand occurred, and skin ulcers developed on the dorsal proximal portions of the index, middle, ring, and little fingers. The patient was referred to our hospital’s urology department. No central vein obstruction was detected on angiography.

The wrist shunt was explored, and reversed venous flow from the shunt to the hand was seen. The distal vein was ligated, and a new shunt was created at the right elbow (Fig. 1). There were no suitable veins for creating the new shunt, so the proximal side of the vein used in the wrist had to be used. This resulted in complete occlusion of the cephalic vein (detected on ultrasonic imaging) between the wrist and the elbow (Fig. 1). The entire forearm became swollen, and the digital ulcers expanded. The wrist and elbow shunts were ligated (Figure 2). Four weeks later, it was revealed that conservative treatment had caused granulation tissue to form at the ulcer site, and the patient was referred to our division.

There were no exposed tendons, but mildly restricted joint movement was observed in the right digits because...
gauze dressing had been used to treat the ulcers for 2 months (Fig. 3). Under general anesthesia, debridement and the transfer of a full-thickness skin graft from the abdomen were performed, followed by bulky dressing and cast fixation. Hematomas developed at the skin donor site. The cast was removed on the sixth postoperative day. There were several hematomas under the graft. Overall, skin graft survival was 75%. At 1 year postoperative, the joint motion of the right hand had improved. Although webbing had formed between the digits, the patient did not wish to undergo further operations (Fig. 4).

**DISCUSSION**

Venous hypertension is a potential complication of arteriovenous hemodialysis access.1,2 The symptoms of venous hypertension include regional edema, pigmentation, dermatosclerosis, and ulceration. Central catheter–induced proximal large vein obstruction is the most common cause. Localized outflow obstruction can be caused by fibrointimal hyperplasia of the anastomotic outflow site/vein.1 Subclinical venous obstruction might be apparent when the flow through a well-functioning arteriovenous access point increase. It has been reported that severe venous hypertension can occur in radiocephalic side-to-side anastomoses or in patent side branches between an anastomosis and a stenotic outflow lesion.1,2

There was no proximal large vein obstruction in the present case. And we suspect that the venous hypertension was caused by the radiocephalic side-to-side anastomosis, gradual regional outflow obstruction of the cephalic vein, and complete obstruction of the vein after the creation of the new elbow shunt (Fig. 1).

Angioplasty with/without stenting is used to treat central venous hypertension.1 For localized ulcers, the vein that exhibits retrograde flow is ligated or localized outflow obstruction is corrected (Fig. 1).1 These approaches can be used to conservatively treat small ulcers, but there have not been any reports about the surgical treatment of large ulcers.

When we treat ulcers surgically, nephrogenic anemia and anticoagulant treatment can be problematic. Our patient had anemia, and a transfusion had been performed before surgery. After the wrist and elbow shunts were ligated, the hand edema disappeared, the necrotic tissue fell off, and good granulation tissue was observed. There were no exposed tendons. Regarding the surgical procedure, mesh skin grafts or distant flaps can be considered. After a discussion with the patient, we chose a multipored full-thickness skin graft. We suspect that the inferior skin graft take was caused by hematoma formation.

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**Fig. 1.** The development and management of local venous hypertension in our patients. Blue, vein; red, artery; purple, shunt blood; deep purple, clogged with thrombus. A, Just after the wrist shunt creation. B, Venous obstruction might be apparent when the flow through a well-functioning arteriovenous access point increases. C, First management of local venous hypertension. The wrist shunt was explored, and reversed venous flow from the shunt to the hand was seen. The distal vein was ligated, and a new shunt was created at the right elbow. There were no suitable veins for creating the new shunt, so the proximal side of the vein used in the wrist had to be used. This resulted in complete occlusion of the cephalic vein (detected on ultrasonic imaging) between the wrist and the elbow. D, After secondary management of local venous hypertension. The wrist and elbow shunts have been ligated. Proper vein detour was established, and the swelling of the forearm subsided.
In conclusion, when creating shunts, side-to-end anastomosis of the proximal vein might be appropriate. When showing venous hypertension, ensuring an appropriate alternative shunt, promptly detecting the cause of the problem, and appropriate treatment by a urologist are important. Venous hypertension must be completely resolved before surgery for ulcers.

In conclusion, when creating shunts, side-to-end anastomosis of the proximal vein might be appropriate. When showing venous hypertension, ensuring an appropriate alternative shunt, promptly detecting the cause of the problem, and appropriate treatment by a urologist are important. Venous hypertension must be completely resolved before surgery for ulcers.

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