

Prosthetic Grafting and Arteriovenous Fistula for the Surgical Management of a Common Femoral Vein Injury Using a Staged Approach

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A 27-year-old female patient was referred due to an edematous left lower extremity. Both saphenous veins had been ablated with an endovenous laser procedure used to treat varicose veins. Venography revealed that the left common femoral vein had been divided and that thrombosis was present at the site of division. No veins were available around the thighs. The patient was treated using a staged procedure. During the first stage, a ringed polytetrafluoroethylene graft was used to repair the common femoral vein, and an arteriovenous fistula was constructed from the femoral artery to the graft using a short segment of cephalic vein to increase graft patency. The edema was relieved postoperatively and the graft was patent. During the second stage, which was performed 6 months later, the fistula was occluded by coil embolization. The staged procedure described herein provides an alternative for venous reconstruction when autologous vein is unavailable.

Key words: 1. Femoral vein
2. Injuries
3. Varicose veins
4. Surgery, complications

Case report

A 27-year-old female was referred to Gil Medical Center due to a painful and edematous left lower extremity of 4 days' duration after varicose vein surgery at a local clinic. Both saphenous veins were ablated by an endovenous laser procedure. In addition to the edematous left lower extremity, there were bruises on the left thigh and around the operation wound site. Since deep vein thrombosis was suspected, computed tomography (CT) was performed,

and the left common femoral vein above the proximal superficial femoral vein was not visualized (Fig. 1A, B). Iatrogenic femoral vein division, rather than deep vein thrombosis, was then suspected. Subsequent venography depicted a divided left femoral vein and thrombosis around its stump (Fig. 1C).

The patient suffered from severe pain in her leg. She was a flight attendant, and the edematous, painful leg caused inconvenience both professionally and cosmetically; thus, we decided on femoral vein repair. The patient had undergone saphenous vein ablation

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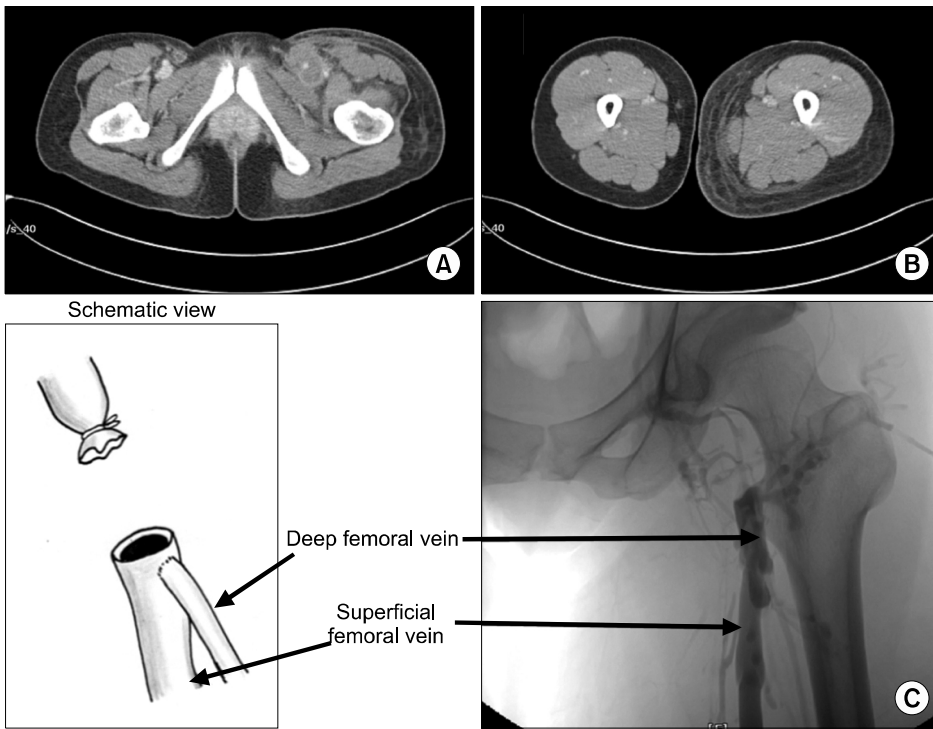


Fig. 1. Computed tomographic scan and venographic images. (A, B) The left femoral vein above the proximal superficial femoral vein was not visualized by computed tomography. (C) Venography showed that the left femoral vein had been divided and that thrombosis was present around its stump.

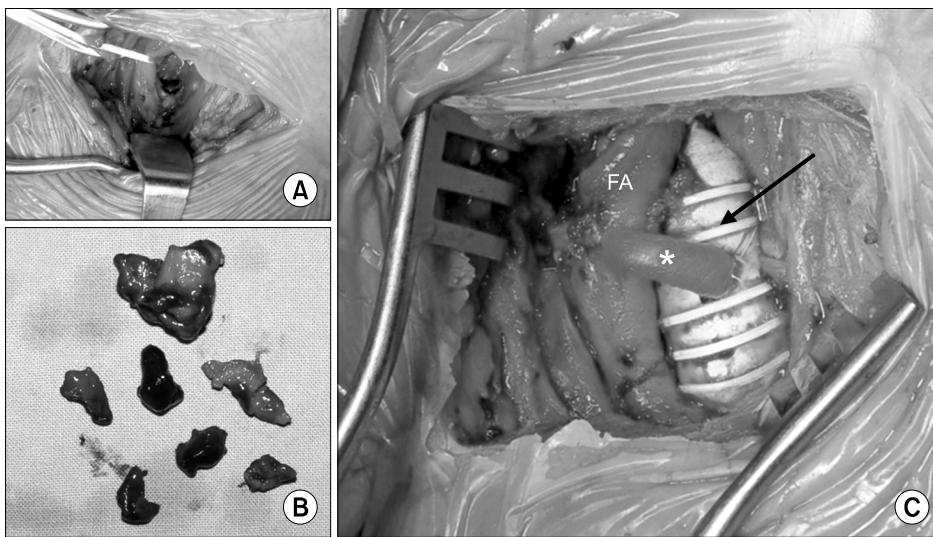


Fig. 2. Operative findings. (A) After extending the previous operation wound in the left inguinal area, the hematoma around the left femoral vein was removed. (B) Thrombectomy was performed in the left iliac and femoral veins. (C) The divided left femoral vein was repaired using a 14-mm ringed PTFE graft (black arrow). An arteriovenous fistula was constructed between the left common femoral artery and the PTFE graft using harvested left cephalic vein (*). PTFE, polytetrafluoroethylene.

in both legs, which meant that no autologous saphenous vein was available for femoral vein repair. Accordingly, left femoral vein repair with a polytetrafluoroethylene (PTFE) graft and an arteriovenous (AV) fistula (to improve PTFE graft patency) was chosen. During surgery, the previous surgical wound on the left inguinal area was extended and the hematoma around the left femoral vein was removed (Fig. 2A).

Thrombectomy was performed in the left iliac and femoral veins (Fig. 2B), the left cephalic vein was harvested for the AV graft, and the divided left femoral vein was repaired using a 14-mm ringed PTFE graft (Fig. 2C). The AV fistula was constructed between the left common femoral artery and the PTFE graft using the harvested cephalic vein. The patency of the left femoral vein and AV fistula was confirmed

by CT at 7 days after surgery (Fig. 3A, B), and edema of the lower extremity had improved. The fistula was removed at 6 months after surgery by coil embolization (Fig. 4A). The patient took warfarin (initial dosage: 4 mg, target international normalized ratio: 2) immediately after surgery in order to keep the graft patent, and the international normalized ratio level was maintained around 2. At 18 months post-

operatively, there was no evidence of edema and Doppler ultrasonography confirmed the patency of the left femoral vein (Fig. 4B). This study was reviewed by the institutional review board of Gil Hospital (IRB No. GAIRB2016-091).

Discussion

Vein injuries following varicose vein surgery are rare but serious due to risks of morbidity and mortality and medico-legal implications [1,2]. According to a comprehensive literature review of 87 vascular injuries after varicose vein surgery that included 43 vein injuries [3], laceration or division of the femoral vein was most common (28 cases), while partial stripping of the femoral vein accounted for only 4 cases [3]. The most common symptom of venous injury was heavy bleeding in the groin, and symptoms become obvious after a few hours or days with massive leg swelling in some patients without bleeding [3]. The treatment of major venous injuries is somewhat controversial. Although primary venous ligation might be a first choice in hemodynamically unstable patients, it often induces severe postoperative edema [4,5]. On the other hand, reconstruction has associated risks of stenosis and occlusion, and when a PTFE graft is interposed the risk of severe infection increases [5]. Complex venous reconstruction in patients with traumatic injuries of the lower extremity has been found to have a 30-day patency rate of 50%–93%, depending on the type of venous repair, and a patency rate of only 50% when a panel or spi-

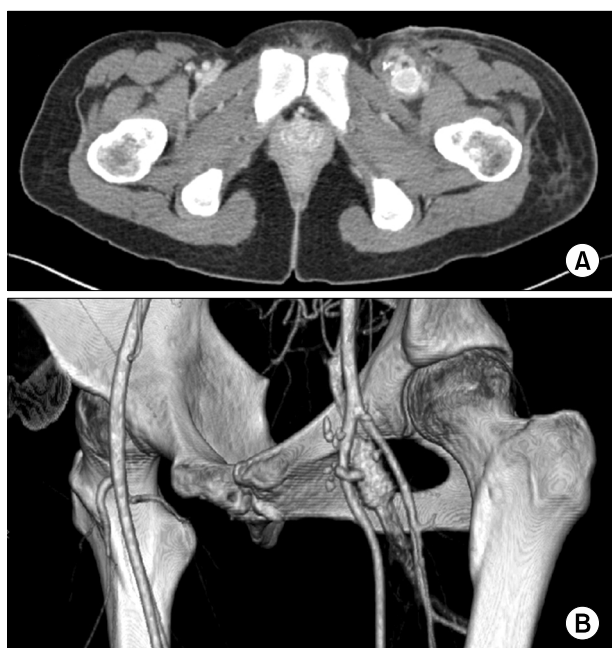


Fig. 3. (A, B) Computed tomography images obtained at 7 days after surgery confirmed patency of the left femoral vein and arteriovenous fistula.

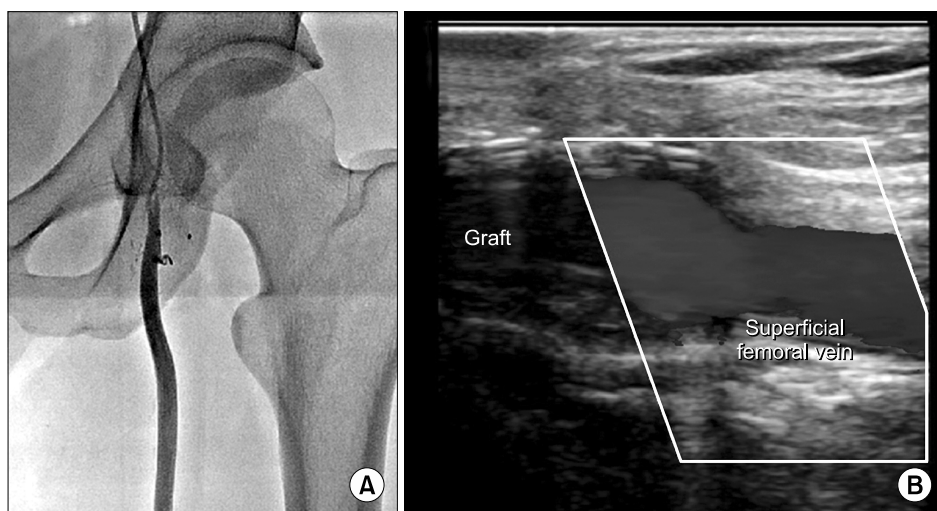


Fig. 4. (A) The fistula was removed 6 months after surgery by coil embolization. (B) At 18 months after surgery, Doppler ultrasonography confirmed left femoral vein patency.

ral graft was used [6]. The patency rate of PTFE grafts for surgical reconstruction of iliofemoral veins has been reported to be around 45% [7].

To avoid the postoperative risk of early thrombosis due to the use of a synthetic material and problems associated with size mismatch between the saphenous vein and the common femoral vein, most surgeons recommend vein repair without an interposition graft by end-to-end anastomosis, which is likely to be the best option [2]. However, it was impossible to interpose the graft by end-to-end anastomosis in our present case, because the segment of femoral vein division resulting from previous surgery was too long to repair with end-to-end anastomosis.

Based on considerations of the patient's job, we considered femoral vein repair to be the better route toward relieving edema in the lower extremity, but graft choice was a problem, because the saphenous vein was not available, and the patient did not want an extended surgical incision on the left thigh. To increase long-term PTFE graft patency, we added an AV fistula to the PTFE interposition site of the femoral vein. Several techniques can be used to increase prosthetic graft patency, such as vein cuffs, vein patches, and AV fistulae [8]. Richardson et al. [9] reported the results of temporary AV fistulae for the management of traumatic venous injuries of the lower extremity in 8 patients, and noninvasive Doppler studies performed in 4 of the 8 patients at 3 to 8 months post-repair revealed no evidence of deep venous obstruction [9].

Extremity edema was not observed in our patient after femoral vein repair and the graft remained patent. Her vein injury was caused by varicose vein surgery, and she considered the symptom of edema and associated cosmetic problems to be the most im-

portant issues. Choosing the best graft was found to be challenging. This case shows that a staged procedure can provide an alternative means of venous reconstruction when autologous vein is unavailable.

Conflict of interest

No potential conflict of interest relevant to this article was reported.

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