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Case Report

Surgical femorocaval bypass for treating chronic iliac vein occlusion: a case report

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Abstract: Chronic inferior vena cava and iliac vein occlusion, caused by long-term of deep venous thrombosis, will lead to swelling of the limbs, venous claudication and intractable ulcer. However, conservative treatment is often ineffective for vein occlusion. With the development of interventional techniques, endovascular therapy has become the first choice for the treatment of vein occlusion with higher success rate and lower trauma. However, for cases those fail endovascular therapy or for segmental veno-occlusive diseases with low long-term patency rate, venous bypass might be the only option. And, design of anastomotic stoma and orificium fistulae design is crucial to the success of operation. A case of long term deep venous thrombosis patient with occlusion in bilateral iliac vein and distal inferior vena cava was admitted and treated with interventional therapy. Unfortunately, this method failed. Then, we selected reasonable anastomotic stoma and orificium fistulae and performed femorocaval bypass. The 12 month follow-up results showed that the swelling was successively relieved and the ulcer healed. This indicated that rational anastomotic stoma and orificium fistulae could guarantee the exact clinical efficacy of venous bypass and higher long-term patency rate.

Keywords: Deep venous thrombosis, venous bypass, femorocaval bypass

Introduction

Chronic inferior vena cava and iliac vein occlusion will lead to a series of symptoms such as limb swelling, skin eczema, pigmentation, venous claudication and ulcer. These symptoms make the patients lose labor ability and lead to a lower quality of life [1]. These patients often have a history of long-term chronic deep venous thrombosis. However, without timely and adequate treatment, the thrombosis syndromes such as limb venous hypertension and valvular insufficiency will appear. Because of its higher success rate and lower trauma, endovascular therapy has become the first choice for treating iliac vein and inferior vena cava distal occlusion [2, 3]. However, the use of venous bypass surgery is rarely reported. For cases those failed endovascular therapy or for segmental veno-occlusive diseases with low long-term patency rate, venous bypass might be the only choice. Design of anastomotic stoma and orificium fistulae is of most importance for the success of venous bypass surgery. In this study, we successfully treated a long-term deep venous thrombosis patient with occlusion in bilateral iliac vein and distal inferior vena cava with the method of surgical femorocaval bypass.

Case report

A 56-year-old patient was admitted to the hospital because of venous claudication and right lower limb swelling without apparent causes. These symptoms appeared in the left lower limb as early as 18 years ago and 10 days ago the same symptoms reappeared. Prior written and informed consent was obtained from this patient and this study was approved by the ethics review board of Peking Union Medical College Hospital. As confirmed by vascular color

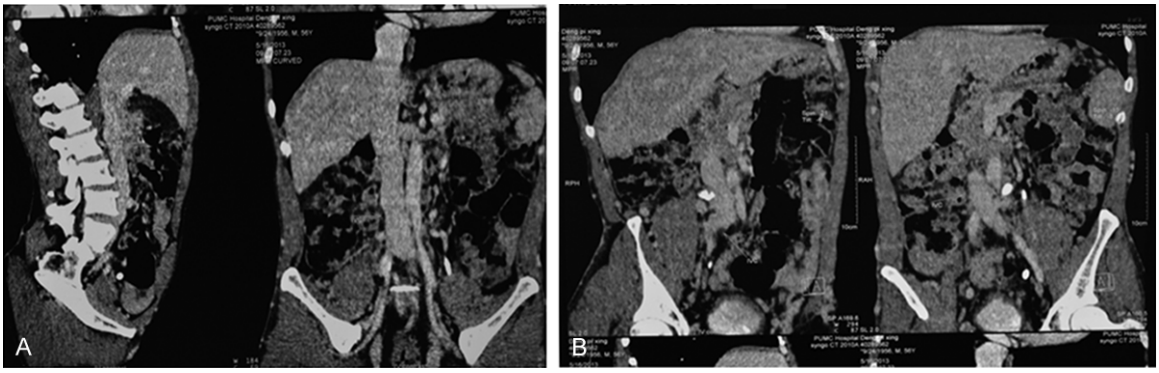

Figure 1. CTV examination showed that the distal inferior vena cava and bilateral iliac vein occlusion. A. Lateral view of inferior vena cava and iliac vein. B. Obligue view of the inferior vena cava and iliac vein.

Doppler sonographic detecting, there was thrombosis formation in distal inferior vena cava and bilateral iliac femoral veins. Before admission, this patient was treated with anticoagulant drugs only and without embolectomy or thrombolysis therapy. The patient had no other medical history. Physical examination revealed the following symptoms: swelling in bilateral lower limbs, skin pigmentation, thickening and scaling on both lower legs, and a 3 × 3 cm ulcer in the outer part of the left leg. There were clumps of varicose veins in bilateral lower limbs, bilateral abdominal wall and the area in the waist below umbilicus. And, it was visible that the blood was flowing upward. Scrotal edema and enlargement occurred. Varicose vein was visible in the left upper limb and bilateral femoral arteries and popliteal arteries were palpable. Blood test showed that the levels of protein C and protein S were normal whereas the level of homocysteine was far higher than normal. After admission, the patient underwent computed tomographic venogram (CTV) examination and the result showed that there was occlusion in distal inferior vena cava and bilateral iliac vein and chronic changes caused by thrombosis. Blood flow in the proximal inferior vena cava and the bilateral veins was smooth (**Figure 1**).

After the failure of intracavitary therapy, blood flow reconstruction in the occluded section was performed with femorocaval bypass instead of balloon dilation and stent implantation. Two 12-30 mm GORE-TEX artificial blood vessels were pre sewn into "V" type so as to expand the anastomosis of vena cava end (**Figure 2A** and **2B**). After longitudinal incisions were made along the paramedian of the right abdomen and along the bilateral inguinal canal, the inferior vena cava and the bilateral femoral veins were totally exposed. Three veins were with soft texture appearance and were eligible for bypass and did not need for endarterectomy. The proximal ends of these three veins were with stenosis, occlusion and fibrosis. The two branches of the artificial blood vessels were split and placed into bilateral inguinal canal, respectively, through the retroperitoneal tunnel. Anastomosis was performed between the artificial blood vessels and the ends of the inferior vena cava and bilateral cava (**Figure 2C**). In order to maintain the smooth blood flow of the fistula, orificium fistulae were made between superficial femoral veins (which were branches of bilateral saphenous veins and were with the diameter of about 3 mm) and superficial femoral arteries (**Figure 2D** and **2E**). Venous pressure above the anastomosis before and after fistulation decreased from 29 mm Hg to 18 mm Hg, indicating that the arteriovenous fistula was smooth. Finally, the incision was closed. Postoperatively, intravenous administration of heparin was carried for a week and the activated partial thromboplastin time was maintained at about 60 s. The warfarin therapy was also conducted. The patient wore stretch socks and his legs were elevated. Four days after operation, the patient got out the bed and venous edema and venous claudication were significantly reduced. Two weeks later, the patient was discharged when the incision and ulcer healed. During the 12 months' follow-up, the patient took warfarin orally for anticoagulation and his venous claudication symptoms disappeared completely, although there was still mild venous edema. Vascular color Doppler ultrasound showed that the bypass was smooth and arteriovenous fistula was without occlusion.

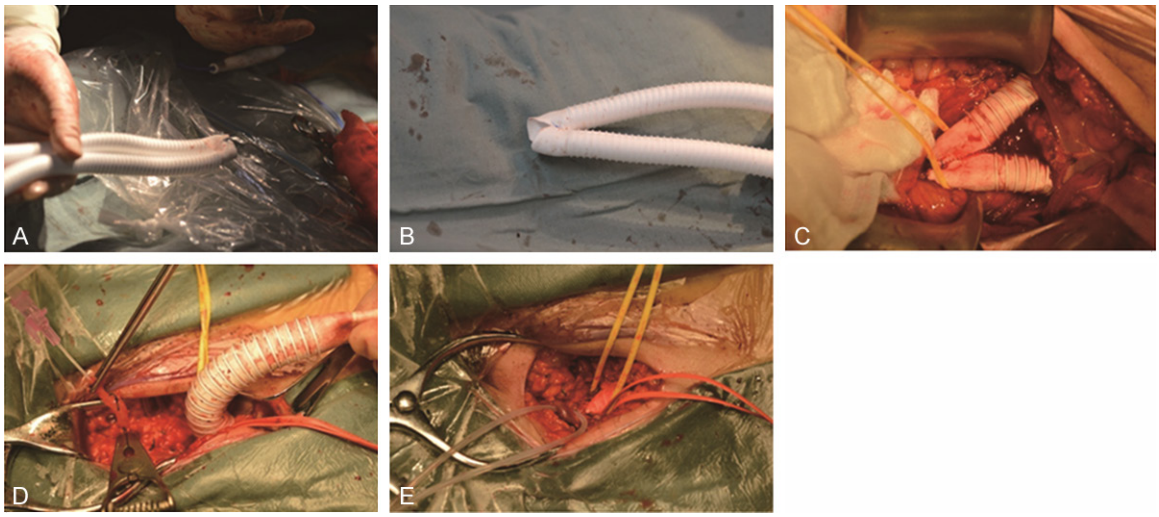

Figure 2. The "V" type artificial blood vessel used during the surgery. A. The artificial blood vessel that was completely sutured into "V" type. B. The artificial blood vessel that was partially sutured "V" type. C. Anastomosis between the "V" type artificial blood vessel and the distal inferior vena cava. D. Anastomosis between artificial vascular and femoral vein. E. Fistula between superficial femoral vein (branch of saphenous vein) and superficial femoral artery.

Discussion

According to Robbins et al. [4], the technical success rate of intracavitary vein reconstruction might be as high as 88% and the long-term effect of endovascular therapy was good. Neglen et al. treated 982 cases of patients with chronic benign femoral-iliac-inferior vena occlusive disease with stent implantation. They found that after stent implantation, the patency rates of initial stage, auxiliary initial stage and secondary stage were 67%, 89% and 93% [5]. However, for long segment femoral vein occlusion, the success rate of stent implantation is very low, and compared with lesions those without thrombosis factors (such as May-Thurner syndrome), the occlusion rate of stent is relatively high in venous occlusion caused by chronic thrombosis. Although intervened five years later, restenosis or occlusion occurred in 24% of the patients [6]. Therefore, for these patients, venous bypass surgery or hybrid reconstruction might be the only option with good early and long-term patency rate [7].

Reconstruction of femoral vein, because of its smaller diameter, is rarely used. The 10 to 14 mm artificial vascular, with the ePTFE support ring, is the most suitable graft, with lower incidence of thrombosis and higher long-term patency rate [8, 9]. In this case, 12 mm artificial vascular was used after measuring the diameter of femoral vena cava. Anastomotic stenosis and occlusion are important factors affecting the clinical effect of bypass operation. Therefore, two artificial blood vessels were pre sewn into "V" type in the vena cava anastomosis, which might be beneficial to maintain long-term patency. And, this design reduced the number of anastomotic stoma, and maintained the anastomotic stoma with a larger diameter and appropriate anastomotic angle. There are many methods for constructing the orificium fistulae [10]. The fistula between the superficial femoral artery and artificial blood vessels and fistula between the superficial femoral artery and the superficial femoral vein are the most commonly used methods [11]. PTFE artificial vessels with the dimeter of 4 to 5 mm and the great saphenous vein or its branches are generally selected for making fistula. We usually select the great saphenous vein or its branches and superficial femoral artery for making fistula, which simplifies the operation steps, reduces the number of fistula, avoids damage to the artificial blood vessels and superficial femoral vein and more fits with dynamics of blood flow. In this study, the diameter of superficial femoral vein reached 3 mm, which was suitable for constructing orificium fistulae. And, the pressure of the orificium fistulae constructed by superficial femoral vein and superficial femoral artery indicates that the blood flow in the orificium fistulae is smooth. The vascular color Doppler ultra-

sound results at 12 months of follow-up showed that both the bypass and fistula was smooth, and there was no apparent expansion in the great saphenous vein and the saphenous femoral vein. There is no sufficient evidence to show that arteriovenous fistula will cause big complications unless the fistula is big enough. So we believe that, if the great saphenous vein or hidden femoral vein are not expanded, closure of fistula after 6~8 weeks is meaningless, and reoperation increases the risk of trauma and thrombosis.

In conclusion, open femorocaval bypass is a complicated and risky operation, but for the patients with symptomatic chronic long segmental femoral vena cava occlusion, it is still irreplaceable. Besides, it has good long-term patency rate and symptom improvement effect. In addition, reasonable design of orificium fistulae and anastomotic stoma in the bypass surgery can improve the success rate of operation. We hope this successful femorocaval bypass surgery could offer help to this kind of disease.

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Disclosure of conflict of interest

None.

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