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The Clinical Value of Iliac Vein Stent Implantation for Venous System Diseases

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Abstract

Objective: Summarize the clinical application value of iliac vein stent implantation for venous system diseases.

Methods: From January 01st, 2019 to June 01st, 2021, 27 patients with iliac vein compression syndrome underwent iliac vein stent implantation, and the clinical data were analyzed and summarized.

Results: 11 cases (40.7%) of iliac vein compression syndrome combined with deep vein thrombosis of lower extremity or post-thrombosis syndrome of deep vein of lower extremity were found, and 16 cases (59.3%) of iliac vein compression syndrome combined with great saphenous vein varicose were successfully implanted with iliac vein stents. The comorbidities are treated in one stage or in stages, and the swelling of the lower limbs of patients with deep vein thrombosis is significantly relieved after surgery. There has been no recurrence in the patients of great saphenous varicose veins.

Conclusion: Iliac vein stent implantation has extremely high clinical application value for venous system diseases caused by iliac vein compression syndrome, with high technical achievement rate and satisfactory improvement of postoperative symptoms.

Keywords: Varicose veins; Deep vein thrombosis; May-Thurner syndrome; Lower extremity edema

Introduction

Iliac vein stenosis and occlusion, also known as Cockett's syndrome or May-Turner syndrome, can lead to long-term swelling of the lower limbs, secondary varicose veins in the lower limbs, pigmentation and ulcer formation in the ankle area. The ulcer can be difficult to heal and seriously affects the patient's quality of life. A large amount of labor and time is lost each year due to this condition. Treating iliac vein stenosis and occlusion can save the lost social and economic losses, reduce patient suffering, shorten hospitalization time, and reduce medical insurance costs. This article analyzes and summarizes the clinical data of 27 patients with iliac vein compression syndrome who were treated with iliac vein stent implantation in our department in the past two years.

Materials and Methods

Clinical and imaging data were collected from 27 patients who were admitted to the department of vascular surgery of our hospital, and were diagnosed with lower extremity varicose veins or deep vein thrombosis of the lower extremities and its sequelae. Among the 27 patients, there were 12 males (44.4%) and 15 females (55.6%), with an age range of 48 to 76 years and a median age of 57 years. All the patients underwent the implantation of the Wallstent woven iliac vein stent (Boston Scientific, USA). Among the 16 patients with combined lower extremity varicose veins, 13 underwent secondary surgery for varicose vein stripping. Among the 2 patients with deep vein thrombosis of the lower extremities, both underwent primary Angiojet thrombus aspiration.

Surgical methods: All patients underwent lower extremity deep vein angiography first, using the Siemens Artis ZEE ceiling flat-panel vascular angiography system from Germany. The patient was placed in a supine position on an examination table, and a puncture needle with a sheath was placed on the dorsum of the foot. A tourniquet was tied around the ankle to block the blood flow of the superficial veins. If the dorsum of the foot was too swollen to place the puncture needle, the shallow vein in the calf was punctured instead, and the blood flow of the superficial vein was blocked above the puncture point. The puncture needle was connected to a high-pressure injector (2 mL/s flow rate, 100 kPa pressure, total volume of 100 mL) to perform deep vein angiography in

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the direction of the blood flow, and the condition of the iliac vein was observed under fluoroscopy. Non-ionic iodine contrast agents (Omnipaque or Visipaque) were used for angiography. If abnormal conditions were found in the iliac vein during angiography, the femoral vein was punctured to perform iliac vein balloon dilation and stent implantation.

For patients with Deep Vein Thrombosis (DVT) of the lower extremities, primary Anjiojet thrombus aspiration may be performed, and if compression of the iliac vein is found after aspiration, iliac vein balloon dilation and stent implantation may be performed simultaneously. For patients with lower extremity varicose veins, secondary surgery for high ligation and stripping of the great saphenous vein may be performed.

Result

Among the patients in this group, 11 cases (40.7%) were found to have iliac vein compression syndrome combined with deep vein thrombosis or its sequelae, and 16 cases (59.3%) had iliac vein compression syndrome combined with great saphenous vein varicose veins. All of them successfully underwent iliac vein stent placement and were treated for any associated complications concurrently or in phased approaches. Three stents were implanted in 2 cases, 2 stents were implanted in 6 cases, and 1 stent was implanted in 19 cases. Except for patients who underwent simultaneous thrombus aspiration surgery, the surgeries for all patients were completed within 2 h, and hospital stays did not exceed 1 week. Swelling in the lower extremities of patients with deep vein thrombosis was significantly reduced 1 to 2 days after surgery. Among the patients with great saphenous vein varicose veins, there were 2 cases of CEAP grade 3 (varicose veins), 7 cases of grade 4 (with pigmentation), 2 cases of grade 5 (with healed ulcers), and 2 cases of grade 6 (with active ulcers). Postoperative follow-up at the outpatient clinic has shown no recurrence of varicose veins, improved pigmentation, and all ulcers healed. All patients' clinical symptoms improved significantly, and treatment costs were low. No serious postoperative complications or deaths occurred in this group of patients (Figure 1, 2).

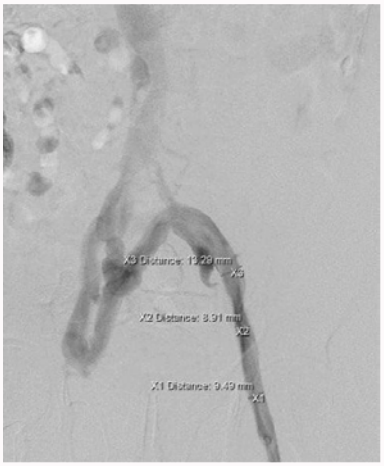

Figure 1: Iliac vein compression syndrome: Iliac vein shows compression marks, significant collateral circulation is formed in the pelvic cavity, and blood flow goes through the collateral circulation to reach the opposite side and flow upwards.

Figure 2: After implanting the iliac vein stent, the blood flow in the iliac vein significantly improves and the collateral circulation in the pelvic cavity disappears.

Discussion

Iliac vein disease mainly refers to stenosis and occlusive diseases of the iliac vein. It can cause high pressure in the lower extremity veins, which can lead to lower extremity swelling, deep venous thrombosis of the lower extremities, secondary varicose veins of the lower extremities, pigmentation and ulceration in the ankle area. Ulcers can be long-standing and difficult to heal, commonly known as "chronic leg ulcers", severely affecting the patient's quality of life and work ability. Kim et al. [1] reported on the progress sequence of clinical iliac vein compression: Stage 1: Asymptomatic iliac vein compression; stage 2: Formation of venous stasis; stage 3: Formation of deep venous thrombosis of the left iliac vein.

In the past, insufficient understanding of iliac vein disease made it difficult to treat it from the root. Since the clinical application of lower extremity deep venous contrast angiography, it has been found that a considerable number of patients with lower extremity venous system diseases have underlying iliac vein system diseases.

We performed lower extremity deep venous angiography on patients with venous system diseases upon admission to further clarify the etiology. We then performed corresponding treatments based on the fundamental cause, including minimally invasive iliac vein stent implantation, and achieved satisfactory therapeutic effects. Berger et al. [2] reported the first endovascular placement of an iliac vein stent to treat May-Thurner syndrome in 1995. In our study, no recurrence of venous varices was observed in patients with great saphenous vein varices after two outpatient follow-ups, suggesting that the patients' venous hypertension had been relieved, fundamentally solving the cause of lower extremity varicose veins. Ma Jianjun et al. [3] believed that patients with iliac vein compression syndrome had significant improvement in limb swelling, superficial vein varices, and elevated skin temperature of the lower legs compared to the control group after interventional treatment. They also showed significant improvement in pain, mental and physical ability compared to the control group. Lu Yongming et al. [4] reported on 59 cases of non-thrombotic iliac vein compression with venous reflux. Only stent implantation was performed without superficial venous surgery. Although reflux and superficial vein varices still existed, there was a significant improvement in lower extremity swelling and pain symptoms, and all eight ulcers healed in more than two years. All of the above suggest that interventional treatment for iliac vein compression syndrome has positive significance.

We found that the proportion of iliac vein compression was also high among patients with deep vein thrombosis of the lower extremities and sequelae after deep vein thrombosis. In our study, after thrombus extraction, we simultaneously performed iliac vein balloon dilation and stent implantation in patients with combined lower extremity deep vein thrombosis to not only relieve the thrombus load but also solve the disease from the etiology, achieving satisfactory therapeutic effects. Most of the lower limb swelling in patients subsided within 1 to 2 days, and no recurrence of lower limb thrombosis was observed during outpatient follow-up visits, indicating good results. This approach protected the deep venous valves and prevented the occurrence of sequelae after lower extremity deep vein thrombosis. Lou Wensheng et al. [5] believed that iliac vein compression is a high-risk group for deep vein thrombosis of the lower extremities, which can be induced by surgery, pregnancy, or long-term bed rest, and its manifestations during angiography include: 1. Widening of the diameter of the compressed left common iliac vein; 2. Filling defect or septum formation in the compressed segment; 3. Occlusion of the common iliac vein; 4. Formation of collateral circulation; 5. Delayed venous emptying of the affected limb. We found that iliac and external iliac veins had obvious pressure marks during angiography, and even visible pulsation of the veins, which we considered to be a direct sign of iliac vein compression.

In our study, iliac vein stent implantation was successfully performed in 27 patients, using the Boston Scientific Wallstent woven stent. Our experience was that there was a significant shortening phenomenon when the stent was released, and the longer the stent length, the more obvious the shortening phenomenon. Thus, during stent release, attention should be paid to this phenomenon, and an early starting point for stent release and pre-determined predetermined distances should be established. If the stent location is unsatisfactory during deployment before it exceeds 80% (i.e., before the second marker), the stent can be retracted into the sheath and repositioned.

The use of Wallstent woven stents for endovascular intervention in the treatment of iliac vein system diseases has the advantages of minimally invasive procedures, rapid postoperative recovery, and early mobilization of the patient. The success rate of endovascular intervention for iliac vein diseases is high, and the effects are significant, making it of great clinical value.

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